CONNECTO ERGO SUM': A HYPERLINK ANALYSIS OF NATIONAL ARCHIVES IN THE EASTERN AND SOUTHERN AFRICA REGIONAL BRANCH ON THE INTERNATIONAL COUNCIL ON ARCHIVES

Calvin Phiri
National University of Science and Technology, Zimbabwe
calvinphiri@gmail.com

Omwoyo B Onyancha
University of South Africa
onyanob@unisa.ac.za

Patrick Ngulube
http://orcid.org/0000-0002-7676-3931
University of South Africa
ngulup@unisa.ac.za

Samuel Chabikwa
National University of Science and Technology, Zimbabwe
schabikwa@gmail.com

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Abstract

Lennart Björneborn's famous tweet, 'connecto ergo sum', which means, 'I link, therefore I exist', puts forward the intriguing dimension of the web as a platform for link-based research, a major tenet of webometrics. Webometrics, as discussed in this study, explored the web presence, web visibility, web-impact and linkage of archival institutions in the ESARBICA region; examining the types of institutions that provide links to archival institutions in the ESARBICA region; establishing the links pointing to national archival institutions in the ESARBICA region; and examining the type of institutions that provide these links. Google Search engine and Alexa metasearch engine were used to collect data. Additionally, the formulas derived from the Statistical Cybermetrics Research Group (2016): 'Impact=Inlinks/page' and 'site:Domain' were used to collect data on the impact and web pages linking to the archival institutions. The study was underpinned by the Citation Analysis theory. Search engines, metasearch engines and web content analysis were used to collect webometrics data from ESARBICA archival websites. The findings of the study revealed that the web-impact of ESARBICA archival institutions is generally low as evidenced by the low impact factors attained. This may lead to the minimal usage of the information on the websites, undermining the importance of archival institutions. The low impact can be increased through such measures as

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redesigning websites to increase visibility, posting rich files on websites, and interlinking the websites to key archival associations and institutions, among others. Other findings showed that some websites were hosted by institutions other than the archival institutions The impact results further revealed that in the ESARBICA region, Southern Africa was more represented with the archival institutions from six countries (Lesotho, Malawi, Namibia, South Africa, Swaziland and Zimbabwe), while the Eastern African region had archival institutions from two countries (Kenya and Tanzania). The findings further showed that not all archival websites attained web presence in the form of accessible websites. The link classification results revealed that the ESARBICA websites mostly attracted industry links with extensions .com and .co as the most popular Top Level Domains (TLD). A strong link relationship was noted between archival institutions and research-based activities in universities, as well as evidence of openness as archival institutions published documents with archives-related discussions on Google Scholar. The study showed that ESARBICA archival websites are not interactive in nature and have not yet embraced Web 2.0 tools on their archival websites. The implications of the study included that archival institutions without websites might consider attaining web presence through constructing websites, establishing link relationships by archival institutions, and making efforts to avail more data to enhance web presence in ranking. The study recommended that ESARBICA archival institutions host standalone websites and establish links with archives related research sites. The practical implications of the paper include: revealing the specific ways in which archival institutions can conduct web-link assessments and web-impact assessments, ways of interpreting results from web-impact assessments and link-impact assessments, assessing alternative methods of link counts.

Keywords: access; link analysis; ESARBICA; national archives; webometrics

Introduction

Webometrics studies are increasingly being applied and emphasised in research as ways of increasing web visibility, presence, performance and web impact of different aspects on the web. The success of webometrics is through application of modern informetric methodologies, as a result, utilising the World Wide Web to apply traditional bibliometric techniques (Babu, Jeyshankar & Rao 2010). Webometrics is concerned with measuring aspects of the web, that is, websites, web

pages, parts of the web, words in web pages, hyperlinks and web search engine results (Thelwall 2009).

From the emergence of webometrics in 1997 (Almind & Ingwersen 1997), over the past years, webometrics has grown, and its application as a research method or technique is reflected in the number of studies that have been conducted recently in a variety of fields, which include information science (Almind & Ingwersen 2007; Bar-llan 2004; Thelwall, Vaughan & Björneborn 2006); business studies (Romero-Frias 2009; Vaughan & You 2006; Vaughan & Wu 2004; Vaughan 2004); banking (Romero-Frias & Vaughan 2009); universities (Smith & Thelwall 2002; Thelwall 2002a; 2002b; 2002c; Onyancha & Ocholla 2007; 2008; Thelwall & Wilkinson 2004; Vaughan, Kipp & Gao, 2006; Cybermetrics Lab 2007); e-governance (Onyancha 2007; Chisenga 2004); social networks (Thelwall, 2008), politics (Park & Thelwall 2008); libraries (Onyancha 2012, Zeinolabedinio, Maktabifard & Osarea s.a) and hospitals (Cybermetrics Lab 2014). Therefore, the successful application of webometrics in these fields raises a question of: can national archives successfully apply webometrics and raise their web visibility and web impact?

Archival institutions are the legal custodians of any country's archival heritage and they have the responsibility to make archives available and visible to their different clientele. It is mandatory for archival institutions to raise awareness of archival activities and services (Theimer 2011). There exists a need to raise web visibility of archives through various platforms such as the web, which triggers the following questions: How can aspects such as websites be used in raising awareness of archival institutions on the web? Additionally, how can the visibility of archival institutions be raised on the web?

Access to archival holdings is an important aspect in society and there is a need for the general public to be made aware of the treasures that archival institutions hold on behalf of society, (Mnjama 2009:5). As archival institutions are the legal custodians of any country's archival heritage, they have a responsibility to make archives available to their different clientele. Thus, it is mandatory for archival institutions to raise awareness of archival activities and services (Theimer 2011). Traditionally, national archival institutions have played the gatekeeper role, awaiting people to come and access archives (Mason 2007) from archival holdings. However, archival institutions have recently gone online, as evidenced by the existence of archival websites and the use of web 2.0 tools on archival institutional websites, mostly by first-world countries as tools for taking archives to the people, by raising

visibility through the web in a bid to reach out to a wider audience and consequently enhance access and the use of archival materials. The presence of national archives on the web has laid the foundation for webometrics studies in archives as national archives can now be analysed using webometrics techniques. The present research analysed the national archives in the Eastern and Southern Africa Regional Branch of the International Council on Archives (ESARBICA) using link analysis, a major tenet of webometrics. The ESARBICA was established in 1969 in Kenya, and is the regional arm of the International Council on Archives (ICA). It brings together individuals and institutions concerned with the creation, use, preservation and management of recorded information in Eastern and Southern Africa. It is made up of 13 member states, namely Angola, Botswana, Kenya, Lesotho, Malawi, Mozambique, Namibia, South Africa, Swaziland, Tanzania, Zambia, Zanzibar and Zimbabwe (ESARBICA, 2017). The mission of ESARBICA is the advancement of archives through regional cooperation. Amongst the 13 countries of ESARBICA, Zimbabwe, South Africa and Kenya have institutional websites, while Botswana, Malawi, Namibia and Tanzania have ministerial websites. However, the development of these websites as a mean of raising web visibility on the web is at varying levels as some of the institutions do not have websites, and some of those that have websites may not have embraced aspects that enhance web visibility, for example, the use of Web 2.0 tools; while nations such as Angola, Mozambique, Lesotho, Swaziland, Zambia and Zanzibar do not have archival websites (ESARBICA 2013).

Martinez-Torres and Diaz-Fernandez (2013) posit that the concept of webpage visibility is usually linked to search engine optimisation and it is based on global in-link metric, that is, the number of links received from other websites, but without considering the sources of these links. Caro, Calero and Moraga (2011) articulate that web visibility is established in terms of the number of links received from other web pages. As an alternative, Kiefer and Stein (2005) introduced the idea of domain-dependent visibility and defined web visibility as the hit count of a search engine when searching for the string of a topic in that domain only. It is not only the number of in-links that is relevant, but also the position of a particular website in a certain context. It therefore raises questions as to whether or not a context of an archival website can attain a certain position in terms of web visibility. Furthermore, Kiefer and Stein (2005) advocate for the use of the domain-dependent visibility on the sense of web domains that can be obtained using search parameters like 'site:' which can discriminate web pages belonging to a specific country or type of

organisation. A question arises as to whether national archives in Africa could be zeroed down in such a manner?

The concept of web impact was proposed by Ingwersen (1998) and has its main thrust on the relationship between the number of pages in a website receiving links from other websites, against the number of web pages published in the site that are accessible to the crawler. The establishment of the relationship, which is the calculation of the web-impact factor, puts forward the notion that a high value is presumed to indicate a site with greater impact because there are relatively many pages linking to it. Thelwall (2000) accentuates this by stating that web impact has a close analogy with impact factors for journals, as, indeed, backlink analysis has with citation analysis. Thus, the web-impact factor can be used directly to measure impact on the web, or indirectly to provide a metric that may correlate with important offline phenomena (Thelwall 2000). It therefore raises questions as to whether such a relationship exists amongst ESARBICA archival institutions, which would then facilitate the measuring of value of archival institutions on the web, through web-impact.

In unpacking the concept of webometrics, Thelwall (2012) posits that webometrics is the study of web-based content, with primarily quantitative methods for social science research, using techniques that are not specific to one field of study. This articulation makes it possible for webometric studies to be applied in different aspects in the social science field, as the definition raises the following key aspect: a lack of limit to one field. In exploring the essence of links between archival institutions, Theimer (2011) reveals that analysing hyperlinks might be necessary for repositories because the links to a website can reveal useful information, such as how popular it is, which pages or resources are the most popular, why it is popular and where it is popular.

Webometrics: history, development and its application in the present study

Romero-Frías and Vaughan (2009) posit that the origin of webometrics can be found in the field of information science. Thelwall, Vaughan and Björneborn (2005) state that the origins of webometrics emerged from the realisation that methods originally designed for bibliometric analysis of scientific journal article citation patterns could be applied to the web, with commercial search engines providing the raw data. In view of the above, webometrics took off with the introduction of the

Web Impact Factor (WIF) metric to assess the impact of a website or other area of the web based on the number of hyperlinks pointing to it (Ingwersen 1998).

In line with the web impact as investigated in this study, Thelwall (2012) opines that WIFs seemed to make sense because more useful or important areas of the web would presumably attract more hyperlinks than average. The logic of WIF was derived from the importance of citations in journal impact factors, but WIFs had the advantage that they could be easily calculated using advanced search queries introduced by AltaVista. Webometrics further developed to include web-based quantitative techniques such as link analysis, web citation analysis, blog analysis and search engine evaluation.

Webometrics has been applied in digital libraries and the key aspect investigated was link analysis. Archival institutions are similar to digital libraries as both can facilitate some form of online repository. Thelwall (2013) raises a justification for analysing hyperlinks in evaluating digital repositories, arguing that links to a website can reveal useful information about how popular it is, which pages or resources are the most popular, why they are popular and where. The advantage of hyperlink analysis is that it can be applied to any website. Link analysis can be used to evaluate a website by comparing it to those of its competitors or to similar websites and can also be used to identify missed audiences for a site. Links can reveal information about websites because each link to a website may be created to direct visitors to it as the link author believes that the target site is important or useful. Link analysis can give indicators about likely users and uses. It is important to note that links can reveal information about where a website is used because many links originate from websites with a top-level domain that identifies their geographic origin (e.g., .uk for UK, .es for Spain, .za for South Africa and .zw for Zimbabwe). Therefore, links can also reveal why a website is used through reading the web pages hosting the links.

Link analysis

Link analysis is the quantitative study of hyperlinks between web pages (Thelwall 2007). The hypothesis underlying early link analysis was that the number of links targeting, for example, at university level, an academic website might be proportional to the research productivity of the owning organisation (Thelwall 2001). Thelwall and Harries (2004) are of the view that links to an organisation are related to its productivity, as productive researchers seem to produce more web content. However, the produced content does not attract more links per page. In

that regard, Thelwall (2007) argues that the relationship pattern is likely to be obscured in all studies, except large-scale studies, because of the often indirect relationship between research productivity and web visibility. This argument can be tested as some researchers produce highly visible web resources as the main output of their research, whilst others with equally high-quality offline research attract less online attention.

Björneborn (2004) characterises the web as "a highly complex and dynamic conglomerate of a diversity of information carriers constructed and utilised by the diversity of actors for a diversity of purposes". This is in line with Björneborn and Ingwersen's (2001) earlier assertion of the web as '3D': *distributed, diversified* and *dynamic*. Thus, the web facilitates a platform for quantitative analysis through analysing and mining the website content, document structure, site relations and user behaviour (Benoit, 2002). Björneborn and Ingwersen (2004) explain the web in terms of circles representing the different types of nodes (websites; web pages) with the arrow connections between them. Furthermore, the squares within the dashed line rectangle are nodes that are considered for analysis in a given research. Romero-Frias (2010) emphasises the usefulness of links on the web to illustrate a specific type of analysis, the so-called co-link analysis.

Thelwall (2009:27) articulates that "most webometric studies have been types of link analysis, using hyperlinks between web pages or websites as the raw data". The hyperlinks have been typically designed to help users navigate the web easily; however, they also contain explicit information that can be exploited for research purposes. Aguillo et al (2006) posit that the well-known webometrics ranking of universities also uses links as one of its indicators of universities' online presence. It therefore posed a question as to whether the same could be said for archival institutions, that is, could links be used as an indicator for archives' online presence. Thelwall (2009:29) posits that "the basic premise for link impact assessment is that a count of links to a web or a web site is a reasonable indicator of its utility, value, or impact". Chakrabarti et al (2002) add that links are useful indicators of the target page as they often connect pages with the same topic and so are useful in establishing content similarity.

Furthermore, Thelwall (2009) articulates that links can reflect or acknowledge organisational connections. Therefore, it raises questions as to whether archival institutions in ESARBICA could have their websites collaborate with one another. Furthermore, link analysis facilitates mapping, which is normally carried out for

websites, resulting in a diagram illustrating the relationship between the sites. Link analysis can facilitate an overview of the web environment of the sites in ESARBICA, facilitating:

i) A test of a hypothesis, for example, whether two sites tend to interlink with each other; or interlinking within one collection of sites is denser than interlinking within another collection of sites.
ii) Identifying the overall pattern of interlinking, for example, whether there are one or more central sites or whether the linking reflects the geographic locations of sites (Vaughan & Thelwall 2005).

Statement of the problem

Traditionally, national archival institutions have played the gatekeeper's role, awaiting people to come and access archives (Mason 2007:1) from archival holdings. However, archival institutions have recently gone online, as evidenced by the existence of archival websites and the use of web 2.0 tools on archival institutional websites, mostly from first-world countries as tools to take archives to the people, by raising web visibility in a bid to reach out to a wider range of users and, consequently, enhance access and use of archival materials.

There appears to be an underutilisation of archival websites in raising web visibility of archives on the web in the ESARBICA region as current outreach approaches are skewed to traditional forms such as exhibitions and publication, but have been silent on the use of the web. The underutilisation was further buttressed by the inaccessibility of some ESARBICA member countries' websites in random visits and searches of ESARBICA websites by Ngulube and Tafor (2006) who confirmed that six out of 10 websites were accessible at the time of their study. Garaba (2012:11), in a follow-up study in 2012, also revealed that six out of 13 websites were accessible at the time of the study. The same results were confirmed in 2016 by the current researcher when browsing through the websites. Consequently, this reduces the web visibility and impact of archival institutions as traditional and potential users of archives are not able to access relevant information. Such information can be used to reach out to members of the public and encourage the use of archives through taking them to the people.

Purpose and objectives of the study

The purpose of this study is to explore the web impact and linkage of archival institutions in the ESARBICA region.
The specific objectives of the study were to:

i. measure the web impact of national archival institutions in the ESARBICA region.
ii. analyse the links pointing to archival institutions.
iii. examine the type of institutions that provide links to archival institutions in the ESARBICA region.

Research methodology

This study used a webometrics approach to investigate national archives in the ESARBICA region, in particular, link analysis. Because Thelwall (2009:2) argues that "purely quantitative techniques risk being superficial or misleading if they are not complemented by supporting qualitative analysis", the study was complemented by qualitative information that was obtained from a content analysis of links obtained. The list of archives in the ESARBICA region was first obtained from the following sources:

i) www.ica.org
ii) www.en.wikipedia.org/wiki/national_archives/

After obtaining the national archival institutions from the above links, the institutions were searched for one by one to ascertain their existence, and the following national archives and their Uniform Resource Locators (URLs) were obtained.

Table 1: National Archives in the ESARBICA region and their URLs

Archival institution	Country	Home page (URL)	Notes
National Archives of Angola	Angola	www.mirex.gv.ao	
National Archives and Records Services of Botswana	Botswana	www.mysc.gov.bw/nars/index.php	
Kenya National Archives and Documentation Services	Kenya	www.kenyarchives.go.ke	
National Archives of Lesotho	Lesotho	http://www.gov.ls/mtec1/about-the-ministry/departments/state-library/	Dead link
National Archives of Malawi	Malawi	www.sdnp.org.mw/ruleoflaw/archives/index.html	
Arquivo Historico de Mocambique	Mozambique	www.ahm.uem.mz	Website in Portuguese
National Library and Archives of Namibia	Namibia	www.nln.gov.na	
National Archives and Records Services of South Africa	South Africa	www.national.archives.gov.za	
National Archives Swaziland	Swaziland	www.gov.sz http://www.gov.sz/index.php?option=com_content&view=article&id=461&Itemid=242	
Records and National Archives of Tanzania Division	Tanzania	www.tanzania.go.tz	
National Archives Zambia	Zambia	www.zambia.archives.org	
National Archives Zanzibar	Zanzibar	www.zanzibarheritage.go.tz	
National Archives of Zimbabwe	Zimbabwe	www.archives.gov.zw	

Having obtained the URLs, Google search was used to find out if the named country had a website and to access the links provided by the sources. The links were visited to ascertain whether they were active or inactive.

In order to measure impact, data were collected in line with the formula: *Impact=inlinks/web page*. URLs for institutional websites were identified in order to facilitate the extraction of inlinks data using the Alexa.com platform. In a bid to collect link data from websites, the study employed the use of the Alexa tool

(www.alexa.com), which was successfully used in a study of national libraries in sub-Saharan Africa (Onyancha 2012). Alexa was a tool for collecting data on linkages, co-links, site ranking (Globally and in country), inlinks, and volume of traffic for each site. The Alexa tool is also recommended by the Statistical Cybermetrics research Group (2014) as an alternative method for collecting link data.

Having identified the URLs, the Alexa.com tool was used to obtain data on inlinks pointing to ESARBICA websites, and the inlink results were exported from the Alexa.com metasearch engine to Excel. Data that were used to measure impact were obtained using the Alexa.com tool and google.com. In terms of data on web pages, google.com was used to extract data on the number of pages of ESARBICA institutional websites. The web page data were extracted by using the search query: 'site:Domain' where the domain is the URL of the institutions' websites. The previously identified URLs used to collect data on the number of pages and duplicates were removed in order to give more precise results. The data obtained were recorded in Excel and the calculations were made using Excel in order to reveal the impact of archival institutions. Having collected the inlinks and web page data, a content analysis of the links was done in order to increase the significance of the link counts so that the impact objective results are not described in very general terms, but to establish relationships between the institutions pointing to links and the archival institutions.

Using the given data collection tools, the study drew its concepts from citation analysis. Citation analysis can be seen as simplistic counts and analysis of outgoing links from web pages (outlinks), and of links pointing to web pages (inlinks) (Björneborn & Ingwersen, 2001). Thomas and Willet (2000) put forward that citation methods are widely used to evaluate the research performance of academic entities of all kinds, and it seems natural to extend these methods to enable the processing of the citation counts resulting from an analysis of the links between web pages. Björneborn and Ingwersen (2004) advance that citation analysis can facilitate the following range of citation studies: mapping scientific domains, growth, diffusion, specialisation, collaboration and impact. The use of citation analysis is further buttressed by Thelwall (2004) who postulates that citation analysis runs parallel with link impact assessment as the two regard the count of links to a web page or a website as a reasonable indicator of its utility, value or impact. As a result, citation analysis offers a good ground for understanding the importance of links in webometrics.

Findings of the study

This section presents and discusses the findings under the following subheadings:

i) Web impact of ESARBICA national archival institutions.
ii) Links pointing to the national archival institutions in the ESARBICA region.
iii) Examination of the type of institutions that provide links to national archival institutions in the ESARBICA.

Web impact of ESARBICA archival institutions

The research question was aimed at assessing the web impact of ESARBICA national archival institutions, in particular, finding out the number of inlinks pointing to the existing pages in each website analysed. In order to measure the web impact of the ESARBICA national archives, the average inlinks per page were computed and used to compare the web impact. The data that were extracted using google.com and Alexa.com are presented in Table 2.

Table 2: Impact of national archives

Site	Inlinks	Pages	Inlinks /Page
Angola National Archives	-	-	-
Botswana National Archives and Records Services	-	-	-
Kenya National Archives and Documentation Services	9	11	0.818
National Archives of Lesotho	124	5	24.8
National Archives of Malawi	520	1	520
Arquivo Historico de Mozambique	-	-	-
National Library and Archives of Namibia	2	1	2
National Archives and Records Services of South Africa	191	230	0.83
National Archives of Swaziland	334	485	0.688
Records and National Archives Division of Tanzania	80	60	1.333
National Archives of Zambia	-	-	-
National Archives of Zanzibar	-	-	-
National Archives of Zimbabwe	4	146	0.027

The results in Table 2 indicate that Swaziland had the highest number of pages (485), followed by South Africa (230), Zimbabwe (146), Tanzania (60), Kenya (11),

and Namibia (1). In terms of the inlinks, Malawi received the highest number (520), followed by Swaziland (334), South Africa (191), Lesotho (124), Tanzania (80), Kenya (9), Zimbabwe (4) and Namibia (2). Hence, the total number of inlinks pointing to the national archives were 1246. The country with the highest impact was therefore Lesotho, which had an average of 24.8 inlinks per page while the lowest impactful website was the Zimbabwe National Archives (0.027). It should be noted, however, that impact was not computed for the national archives in Angola, Botswana, Mozambique, Zambia and Zanzibar, as these had no data.

Links pointing to the national archives in the ESARBICA region

The objective was aimed at finding the exact number of links that point to ESARBICA national archives and have them analysed in terms of number of appearances to different archival institutions. As such, links pointing to archival institutions were classified according to the links that appear in one or more institutions in order to identify high-impact links, as shown in the table below. A total of 96 links appeared in at least two countries, while 17 links appeared in at least three countries, six links appeared in at least four countries, and three links appeared in five countries. Of the 96 links appearing in at least two countries, a sample of 19 links was systematically collected for content analysis through selecting every fifth link to avoid systematic bias. The links are listed in Table 4.

Table 3: Links pointing to national archives

Link number	Appears in two countries	Appears in three countries	Appears in four countries	Appears in five countries
1.	tripod.com	aahana.co.in	aefpa.org.es	secureserver.net
2.	bildung-weltweit.de	archives.org.rs	list-of-domains.org	webnamelist.com
3.	bridgat.com	archivalportal.nu	loc.gov	wikipedia.org
4.	competencia-informacional.blogspot.co.uk	arsiponis.bogspot.com	msu.edu	
5.	desenvolvimento.gov.br	bbc.co.uk	quickwiki.com	
6.	ezilon.com	europa.eu	stuffgate.com	
7.	globaldialogue.info	familii-v2.narod.ru		
8.	ilo.org	fao.org		
9.	juergen-schrempp.com	listofdomains.org		
10.	macmap.org	nationsonline.org		

11.	osisa.org	nyulawglobal.org		
12.	right2infor.org	rusarchives.ru		
13.	sade.int	top.ind.in		
14.	scholarship-positions.com	uidaho.edu		
15.	slateafrique.com	upenn.edu		
16.	weddings.co.za	washlaw.edu		
17.	unimondo.org	who.int		
18.	thecommonwealth.org			
19.	zum.de			

Table 4 shows a list of links that point to at least two countries in the region under investigation. Links were closely examined as to how many times they appear per website, in a bid to establish the importance of each link amongst the ESARBICA websites. It was noted that the links that pointed to the highest number of countries were secureserver.net, webnamelist.com and Wikipedia.org.

The link classification shows the most popular types of links being secureserver.net, webnamelist.com and wikipedia.org. It can be noted that the listed popular links appear in Lesotho, Malawi, South Africa, Swaziland and Tanzania, and not in any other ESARBICA countries. The most popular links possessed the following Top Level Domains (TLDs): '.net', '.com', and, '.org'. The network diagram (Figure 3) shows that most of the links pointed to Malawi and Swaziland, while Tanzania and Zimbabwe had the lowest number of links pointing to the websites. While the Zimbabwe archival website had the least number of links pointing to it, it was able to attract links such as 'loc.gov', 'aefpa.org.se' and zum.de'. Additionally, the link 'loc.gov' which was attracted to the Zimbabwe archival website which has the lowest number of links, also pointed to Malawi, Swaziland and Lesotho which had a high number of links pointing to them.

Types of institutions providing links to national archives in the region

The objective was aimed at classifying links pointing to ESARBICA national archival institutions in terms of their nature, based on the established classification scheme derived from Thelwall (2012). Thus, links pointing to national archives were collected using Alexa.com. Of the 13 ESARBICA institutions, eight, as seen in figure 2, were able to provide links through the Alexa.com site. Links for all seven countries were collected and combined in order to clean the data (through the

removal of duplicates). Of the 1264 links pointing to ESARBICA archival institutions, 164 links were identified as duplicates and were removed for classification purposes. Thus, a total of 1100 links were used for the classification exercise. The links were classified inductively, primarily focusing on the type of organisations that created the links. The scheme below was adopted to reveal the organisational sectors that link with archival institutions and the results are shown in Figure 1.

i) Academic: university or other similar academic institutions (.ac; .edu)
ii) Government: government departments and government funded organisations (.gov or .go)
iii) Industry: commercial organisations (.com; .co)
iv) Organisations: organisations not funded by government (.org)
v) Others: press or blogs

Using the above classification scheme, the number of links provided to the national archives in the ESARBICA region were as follows: industry (.co or .com) (459 links: 42%); others (press or blogs) (315 links: 29%), organisations (242 links: 22%); government (37 links: 3%); academic (47 links: 4%).

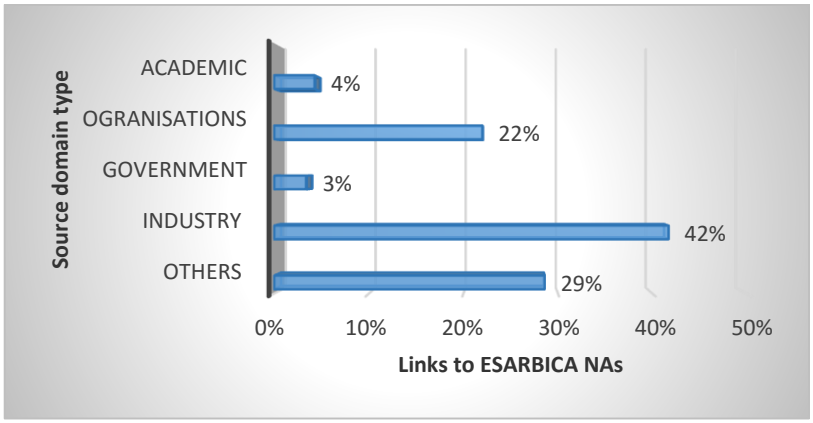
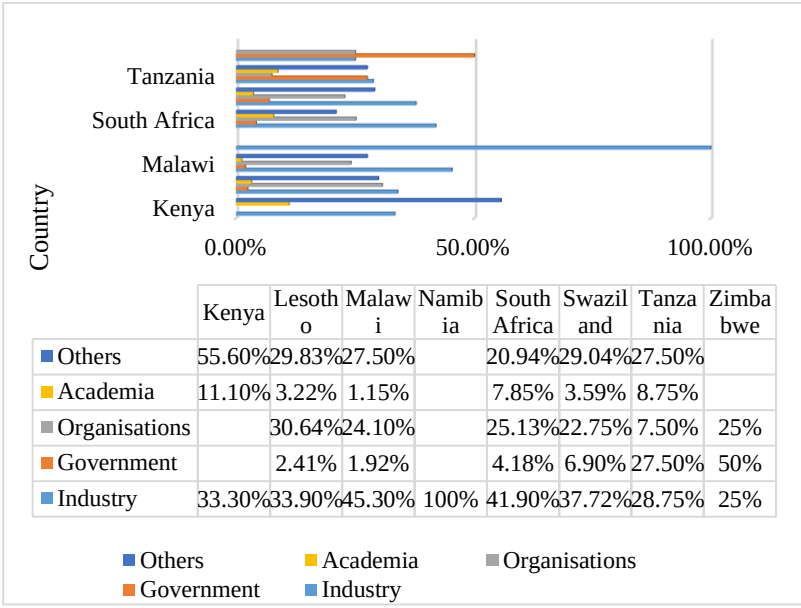


Figure 1: Types of organisations/companies providing links pointing to the national archives (N=1100 links)



	Kenya	Lesotho	Malawi	Namibia	South Africa	Swaziland	Tanzania	Zimbabwe
Others	55.60%	29.83%	27.50%		20.94%	29.04%	27.50%	
Academia	11.10%	3.22%	1.15%		7.85%	3.59%	8.75%	
Organisations		30.64%	24.10%		25.13%	22.75%	7.50%	25%
Government		2.41%	1.92%		4.18%	6.90%	27.50%	50%
Industry	33.30%	33.90%	45.30%	100%	41.90%	37.72%	28.75%	25%

Figure 2: Link classification for national archives

When the analysis of Figure 1 was applied to individual countries, the findings were found to be different from one country to another as shown in Figure 2. Figure 2 shows a country-by-country classification of links pointing to ESARBICA national archives. The graph shows that all links pointing to the national archives of Namibia were industry links. Kenya possessed the highest number of links which were either press or blogs, as classified by the category 'others'. It also emerged that while the links associated with academic institutions were few, Kenya received the highest proportion of academia links (11.10%) when compared to other archival institutions, while Malawi had the lowest (1.15%). The graph further shows that under organisation links, Lesotho had the highest proportion of 30.64% of its links being organisation links, while the national archives with the lowest proportion was Tanzania with 7.50%. With regard to government links, Zimbabwe had the highest proportion as 50% of its links were government links, while Malawi had the lowest proportion of 1.92% being government links.

Social network of country and institutional in links

Social networks were used to visually represent relationships of web links in ESARBICA archival institutions. Based on the links pointing to the national

archival institutions in Table 4, a network diagram was drawn to show the mapping of web links that exists between ESARBICA websites.

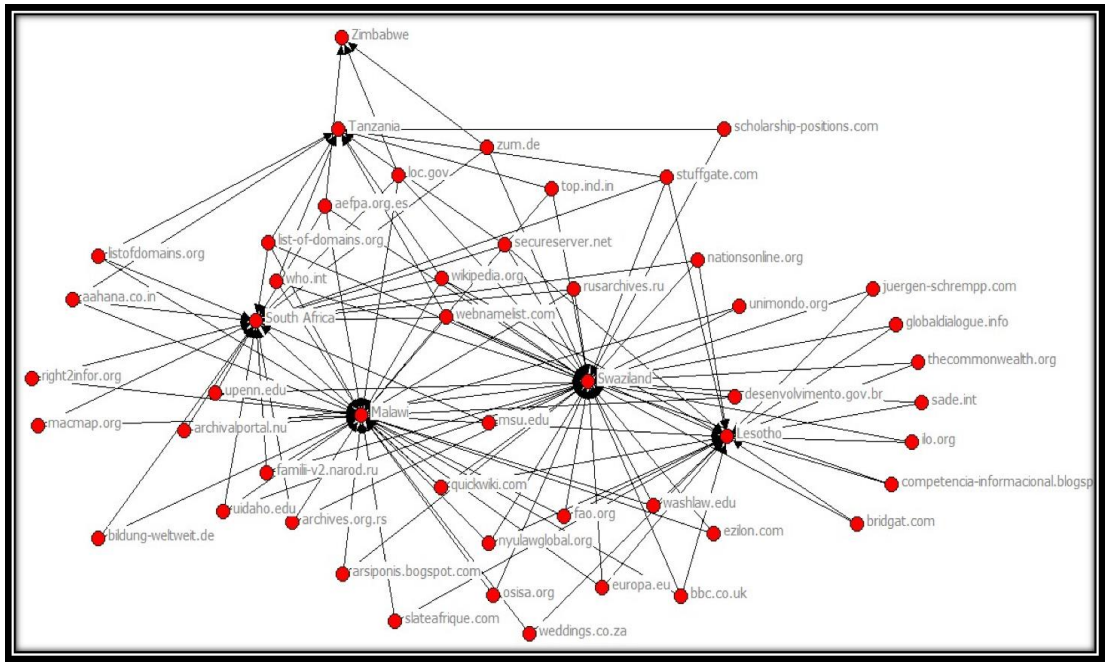


Figure 3: Social network map of inlinks to national archives in the ESARBICA

Figure 3 provides the social network map for the national archives in the ESARBICA region. The figure reveals clusters, as well as links that point to at least two archival institutions or more. The links were classified according to the countries they point to. Of the existing 13 ESARBICA national archives, only six had at least two links pointing to each archival website. The thickest cluster belongs to Malawi, followed by Swaziland and Lesotho. Zimbabwe had the least number of links pointing to its website, followed by Tanzania and South Africa. Of particular interest were links that pointed to up to five archival institutions. These included secureserver.net, webnamelist.com and wikipedia.org. While Zimbabwe had the least number of links that pointed to it, it was interesting to note that one of its links, loc.gov, points out to the other four archival institutions as well.

The study then performed a content analysis of links pointing to archival institutions, in a bid to go beyond describing links in general terms. The most popular links were regarded as those links that pointed to at least four and five archival institutions in the ESARBICA region. A content analysis of links was performed and the following were the findings.

i) secureserver.net: Upon following the link 'secureserver.net', an error message given was as follows: **'Sorry, the page you requested does not exist'.**
ii) webnamelist.com: this is a commercial link that points to a list of domains that help users find a great domain name for their websites.
iii) wikipedia.org: this is an organisational link which is a free encyclopaedia that has over 5 027 000 articles.

The above-mentioned three links were the most popular links as they pointed to the highest number of five ESARBICA countries. The link 'wikipdedia.org' could be linking to most archival websites due to the fact that it is a web encyclopaedia which gives out a wide range of information that is widely accessed by users. The webnamelist.com provides a list of domain names for their websites linking with all archival institutions.

Links that point out to at least four ESARBICA countries are as follows:

i) aefpa.org.es: inaccessible link: name error – the domain name does not exist
ii) list-of-domains.org: the link provides a free list of domains
iii) loc.gov: the link points to the library of congress websites
iv) msu.edu: the link points out to Michigan State University
v) quickwiki.com: a modern Wikipedia reader used for learning
vi) stuffgate.com: Free online website analyser

The sample of links pointing to at least three archival institutions

i) aahana.co.in: this is a link for a domain name that is listed for sale
ii) archives.org.rs: archives of Serbia: the website is presented in Dutch but can be translated

iii) archivalportal.nu: the link could not be retrieved: name error – the domain name does not exist
iv) arsiponis.bogspot.com: the link points out to Facebook
v) bbc.co.uk: the link leads to the British Broadcasting Commission homepage
vi) europa.eu: official website for the European Union
vii) familii-v2.narod.ru: error 401 – the website was deleted due to violation of user agreement
viii) fao.org: Food and Agricultural Organisation of the United Nations
ix) listofdomains.org: ideas for domain names which are for sale
x) nationsonline.org: One World – Nations Online, which aims to link all nations online
xi) nyulawglobal.org: directory listing denied: the virtual directory does not allow contents to be listed
xii) rusarchives.ru: the website is in a language that cannot be translated
xiii) top.ind.in: the domain name is listed for sale
xiv) uidaho.edu: the link points to the University of Idaho
xv) upenn.edu: the link could not be accessed
xvi) washlaw.edu: the link points to Washburn University School of Law.
xvii) who.int: the link points to the World Health Organisation

The study further analysed the content of the websites that provide links to at least two archival institutions:

i) tripod.com: the site focuses on building websites
ii) bildung-weltweit.de: the site focuses on information on education and research. The site is originally in Dutch but offers a translation option
iii) bridgat.com: the site sells clothes
iv) competencia-informacional.blogspot.co.uk: page could not be translated to English
v) desenvolvimento.gov.br: the site is a link to the Ministry of Development, Industry and Foreign Trade in Brazil
vi) ezilon.com: the site is a guide to accessing relevant information with emphasis on world regions. The subjects range from business, travel to education

vii) globaldialogue.info: intergovernmental forum on mining, minerals, metals and sustainable development
viii) ilo.org: international labour organisation. This is a specialised agency of the United Nations focusing on promoting jobs and protecting people
ix) juergen-schrempp.com: business
x) macmap.org: market access map focusing on improving transparency in international trade and market access
xi) osisa.org: open society initiative of Southern Africa
xii) right2infor.org: link inaccessible. name error – the domain name does not exist
xiii) sade.int: inaccessible page. name error – the domain name does not exist
xiv) scholarship-positions.com: site for scholarship positions
xv) slateafrique.com: a link leading to a site with news for different countries in Africa
xvi) weddings.co.za: a variety of aspects relating to weddings
xvii) unimondo.org: the link points to an online magazine that provides information on the subject of peace, sustainable and human development. The page was translated to English
xviii) thecommonwealth.org: the common wealth homepage
xix) zum.de: points to a platform for teachers

The content analysis exercise revealed different trends in terms of the sample of links that point out to the archival institutions. Some links were inaccessible as they pointed to dead ends. The error message for links that were inaccessible included 'domain name does not exist', which may imply that some websites have since been moved. The links that point to archival institutions were from sister professions such as libraries, as evidenced by the Library of Congress link which related to at least five ESARBICA countries.

Further investigations revealed that universities also point out to archival institutions. This was evidenced by the existence of links from Michigan State University, University of Idaho and Washburn University School of Law. This could be showing a trend of research between universities and archival institutions. Furthermore, the content analysis of links also revealed that there are some links

that point to archival institutions for the purposes of being advertised as they are available for sale. Such links provide domain names that can be purchased by any organisation and they are marketed to archival institutions.

It was also revealed that some of the links that pointed to archival institutions were from the United Nations, as evidenced by links from the World Health Organisation as well as food and agriculture organisation and a ministry in Brazil where the focus is on Development, Industry and Foreign Trade. Furthermore, some business-related links pointed to archival institutions. These included companies that offer services in clothing ranges, weddings, and transparency in international trade and market access.

Discussions

It has been observed that links facilitate the evaluation of whether a given website has a higher link-based web impact compared to its peers (Thelwall 2009:28). Smith and Thelwall (2002) are of the view that inlink counts can be an indirect gauge of attributes of the organisation represented by the website, making links a potential estimator of performance. Web and link impact analysis is based on the comparison of the number of web pages or websites that link to a set of web pages or websites under study. Web impact is measured by counting the number of other sites, indexed in the same engine, which have links to the site as well as computing the number of inlinks per page (Thelwall 2000; Onyancha 2007; 2012). Hence, inlinks reflect the acknowledgements received by an external web document.

Consequently, the study assessed the link impact (inlinks per page) of national archives in the ESARBICA region (see Table 4). Lesotho had the highest link impact of 24.8 because of an extensively higher number of links (124) pointing to the website, even with its low number of web pages (i.e. 5). The results also showed that Malawi had the highest number of inlinks (i.e 520), yet it had a single page, thus making its impact factor high, as all the links were pointing to a single web page. This was different from Swaziland, which had the second highest number of inlinks (i.e. 334), yet its number of web pages was even higher (485) than its links, resulting in a lower impact ratio of 0.688 as compared to Lesotho. The results therefore indicated that for a website to attain a high web impact, the existing web pages on a site should attract as many inlinks as possible.

In their study of university websites in South Africa and Kenya, Onyancha and Ocholla (2007) noted that high-impact factors were particularly recorded by universities with fewer web pages and numerous web links. A similar trend was found in a webometric study of universities by Jeyshankar and Babu (2009) where Avinasilingam University of Women in India was ranked the highest with an impact of 8.85, which was posted by 71 pages attracting 629 links. In the same study, there were universities that had more than 71 web pages, for example, Madurai Kamaraj University which had a higher number of pages totalling 403 and 1180 links but had an impact of 2.92, which was lower than that of Avinasilingam University of Women.

The findings from the present study correspond to those of Onyancha (2012), who analysed the web impact of national libraries in sub-Saharan Africa. The results from Onyancha's (2012) study indicated that out of the 10 websites which were subjected to analysis, the least link impact was less than one, and the highest was 12.50. The findings of Onyancha's (2012) study showed that in general, the web impact of national libraries in sub-Saharan Africa was low as a significant number of the libraries had a link impact score of less than one. Based on the findings of the web impact analysis of the ESARBICA national archival websites, it emerged that national archives in the ESARBICA region have a low web impact. This was revealed by the fact that only four out of the seven national archives that could be evaluated in terms of link impact, yielded impact factors that were as low as less than one. This was evident in results for countries such as Zimbabwe which possessed up to 146 pages, yet attracted only four inlinks. When comparing Zimbabwe to Lesotho, a huge difference was observed as Lesotho had as few as five pages but managed to attract as many as 124 inlinks. The main question then is that what can be done for ESARBICA archival websites to have a high web impact. When the websites were further analysed in order to explain the differences between the high number of links in Lesotho in comparison to countries such as Zimbabwe which had more pages than Lesotho, it emerged that the Lesotho archival websites fell under a broad ministerial portal that included links pointing to other ministries as well and not necessarily the archival institution.

Link counts also require both quantitative and qualitative analysis to determine if the links can be used as a reliable indicator for web visibility (Scharnhorst & Wouters, 2006). A content analysis of links pointing to Lesotho in comparison with those pointing to Zimbabwe was done to establish the existing extremes as Lesotho had the highest number of inlinks per page and Zimbabwe had the lowest number

of inlinks per page. Links pointing to the Lesotho archives website included the following:

i) wikipedia.org
ii) bbc.co.uk
iii) secureserver.net
iv) bbc.com
v) Europa.eu
vi) Msu.edu

A content analysis of these links revealed that the information contained in the links pointing to Lesotho lacked a direct relationship to archival activities. On the other hand, the links pointing to Zimbabwe were few, yet they possessed a direct relationship between the National Archives of Zimbabwe and archival activities. This included links such as pindula.co.zw and aefp.org.es. The results revealed that archival websites that are embedded in government portals end up attracting general links that may not have a direct relationship with archive-related activities such as the Lesotho archival institution. On the other hand, the results for standalone archival websites such as the Zimbabwe archives enable the institution to have archive-related links pointing to it. The same observation can also be made for most archival websites in the ESARBICA which are embedded in the government portal, together with other government ministries or departments. These include Swaziland, Tanzania and Kenya.

The results further revealed that standalone archival websites are able to attract links that are specific to their establishments, as demonstrated by the links to the National Archives of Zimbabwe. This was further buttressed by the archival website of South Africa which is a standalone website and which also managed to attract links that are related to archival activities. This is important in raising the visibility and impact of an institution on the web as the embedded web page or website is sometimes not easy to discover or navigate.

The need for archivists to embrace technology so as to remain vital and essential to current and future users needs no emphasis (Garaba 2012). Archival institutions can embrace technology and attain web presence through the establishment of websites. A total of eight out of 13 ESARBICA members had their websites accessible while five of the websites were not accessible (Table 4). These institutions were Kenya, Lesotho, Malawi, Namibia, South Africa, Swaziland, Tanzania, and

Zimbabwe. Therefore, a considerable number of archival institutions in the ESARBICA region do have their websites readily available online.

The websites for Angola, Botswana, Mozambique, Zambia and Zanzibar were not accessible mainly due to dead links and, ultimately, these countries experience reduced web presence and visibility in that regard. However, it is important to note that while Botswana did not have an archival website, it has some form of web presence through its Facebook page (see section 5.6). The lack of websites for some of the archival institutions in the region confirms the findings from previous studies by Garaba (2012) and Ngulube and Tafor (2006) who revealed the lack of websites by ESARBICA member countries. This impacts negatively on the web visibility of archival institutions as a continued lack of archival websites means that archival institutions remain unknown on the web. Noticeably, the lack of websites for some archival institutions has stretched for almost a decade, considering the analysis initially done by Ngulube and Tafor in 2006.

The implications of the lack of websites include a continued lack of web presence for ESARBICA archival institutions. This cascades to other branches of the ICA in Africa. A browsing exercise in the present study revealed a lack of websites for countries in the Central African Regional Branch of the International Council on Archives (CENTRABICA) region and West African Regional Branch of the International Council on Archives (WARBICA) region. However, a browsing exercise performed by the researcher revealed that the same cannot be said for archival institutions outside Africa, as developed countries such as Australia, the United Kingdom and America, have demonstrated the great use of the web to portray activities of archival institutions, thereby being more active in cyberspace.

With regard to institutions providing links to ESARBICA national archives, Thelwall (2009) advances that the categorisation of web pages fills a gap through finding out what types of web pages are common in the results. The study assessed the incoming links to gauge the impact of the websites of the archival institutions in the ESARBICA region. In a web impact analysis for publications produced by the UK National Endowment for Science, Technology and the Arts (NESTA) in 2006-07, the following classification scheme for web links was considered: academic, press or blogs, industry, and government. Due to the relevance of the above classification scheme, similar categories were adopted for the present study in a bid to categorise links.

The present study classified links pointing to ESARBICA archival institutions (see Figure 4) and the major categories used were academic, press or blogs, industry, organisation and government. The majority of links that pointed to the ESARBICA archival institutions were commercial organisations, as characterised by the domains .com and .co. The greatest interactions were from the commercial sites (42%: n=459 links) and press and blogs (29%: n=315 links) as opposed to links from academic (4%: n=47 links) and government (3%: n= 37 links). A content analysis exercise revealed that from a sample of links that pointed to at least more than one archival institution, the sites with industry domains linking to archival institutions included sites such as quickwiki.com and stuffgate.com (see Table 4). These links pointed to at least four archival institutions. Therefore, it means that there is a stronger connection between the .com organisations (i.e. companies) and archival institutions. Quickwiki.com is a modern Wikipedia reader used for learning. Upon following the link for content analysis purposes, it emerged that this domain is for sale as it is being marketed to archival institutions. This explains why the link 'Quickwiki.com' is popular as evidenced by its connection with up to four archival institutions.

The second link with an organisational (i.e. .com) domain was stuffgate.com which was analysed in order to determine the nature of the link and to establish why it was popular among archival institutions. The analysis revealed that it is a free website analyser. This website analyser provides information about the sites' worth, Google page rank, Alexa traffic rank and site statistics. This link could be important in helping archival institutions establish how they perform online, thereby enabling the institutions to find ways of improving their web visibility.

As Thelwall (2009:33) posits "…a content analysis of a random sample of links is highly desirable to be able to interpret the link counts. Without this, the significance of the link counts can only be described in general terms". The interconnectedness of web information is especially suited to scholarly communications where web mentions (i.e. citations), types of links between web pages (relationships), and the resulting network dynamics produce quantifiable metrics for scholarly impact, usage, and lineage (Kousha 2005; Thelwall 2009; Bollen, Rodriquez & Van de Sompel 2007). As a result, links pointing to ESARBICA institutions were subjected to content analysis in a bid to extract in-depth knowledge of how the links impact the visibility of archival institutions. High-impact links that pointed to up to five archival institutions were subjected to content analysis in order to establish the relationship between the links and archival institutions. The content analysis

exercise revealed the following about the identified three high-impact links: 'securesever.net' is for sale, webnamelist.com is a web name catalogue that points to domains that sell domain names, and wikipedia.org offered a free encyclopaedia with over 5 027 000 articles. The content analysis exercise shows that the two high-impact links 'securesever.net' and 'webnamelist.com' offer archival institutions a platform to purchase domain names or buy the actual domains. Therefore, it is shown that links that point to archival institutions can sometimes have no archival-related activities and that the creation of the links could include non-archival activities such as selling of domains, as shown by the 'securesever.net' link. Thelwall (2004) also supports that some links have no meaning and this is evident with links such as securesever.net which lead to dead ends and are non-functional.

The content analysis exercise revealed that there are links that perform functions that are related to archival activities as there were links from auxiliary fields such as library science. This was evident through the link 'loc.gov' which points to the Library of Congress websites. The link analysis results showed that the Library of Congress link was one of the high-impact links that pointed to up to four ESARBICA institutions. On the same note, the content analysis results revealed that the link 'msu.edu' which points to Michigan State University indicates the relationship between archival institutions and universities. The results also revealed relationships with other universities such as the University of Idaho and Washburn University School of Law which had links pointing to up to three archival institutions in the region. Likewise, the links also fall under high-impact links that point to up to three or four archival institutions. This shows a strong relationship between archival institutions and universities.

The content analysis exercise on the web domains further indicated that the link 'archives.org.rs' which points to at least three archival institutions is an archives-related link. Similarly, while the link content analysis exercise shows that the link 'rusarchives.ru' is written in a language that could not be translated, the domain name shows evidence of being within the nature of archival institutions. The presence of such links which are archives related, is of great importance in raising the visibility of archival institutions as it shows common interests between the organisations. Upon analysing the contents of the link pointing to the archives of Serbia, there are links on the site that point to the UNESCO archives portal and the ICA. The existence of links pointing to the UNESCO archives portal and ICA can help archival institutions increase their impact through an increased link relationship with other archival institutions.

Findings of the current study indicated that archival institutions had a low number of web pages and external links. This may cause archival institutions to have a low presence on the web. The findings suggested that the greatest web impact was observed in countries that had a lower number of pages than the links. The results indicated that over half of the archival institutions had accessible websites that could provide links and pages to facilitate calculation of their web impact. Therefore, it can be concluded that archival institutions are aware of the possible benefits of having active websites.

Despite the inaccessibility of five websites for other archival institutions, at least eight of the ESARBICA institutions made provision for websites. While the archival institutions are aware of the benefits of having a website, the findings of the study showed that the visibility of ESARBICA archival institutions is low, as there are other archival institutions that do not have websites. Fewer than half of the institutions in the ESARBICA region could not have their web impact calculated, mainly because they do not have accessible websites. This trend of inaccessibility of institutional websites in African institutions was also reported by Garaba (2012).

With regard to the classification of links, the study concluded that archival institutions in the ESARBICA region attracted links that were classified as 'Industry', as shown by the content analysis of the links, with the extensions .com and .co as the most popular Top Level Domain (TLD). The findings of the study showed a strong link relationship between archival institutions and research-based activities such as the Library of Congress and Michigan State University. Furthermore, archives-related links such as that of Serbia Archives (archives.org.rs), have outlinks that point to relevant organisations such as the UNESCO Archives portal and the ICA. It can be concluded that the establishment of links to relevant organisations such as UNESCO and ICA would increase the visibility of archival institutions. While there were links between ESARBICA region archival institutions and institutions that linked with UNESCO and ICA, the findings of the study indicated that there were no direct links between the archival institutions and UNESCO or ICA. The social network map of inlinks shows no evidence of interlinking among archival institutions in the ESARBICA. This study therefore concluded that ESARBICA archival institutions on the web seemed to exist in isolation, yet they offer related services.

Conclusion and recommendations

Based on the above articulated discussions, the following conclusions were drawn. The findings of the current study indicated that archival institutions had a low number of web pages and external links. This may cause archival institutions to have a low presence on the web. The findings suggested that the greatest web impact was observed in countries that had a lower number of pages than the links. The results also indicated that more than half of the archival institutions had accessible websites that could provide links and pages to facilitate calculation of their web impact. It can therefore be concluded that archival institutions are aware of the possible benefits of having active websites. Based on the limitations of web impact factor analysis, the findings should be interpreted as the minimum impact of the ESARBICA region rather than an estimate of its actual impact.

Despite the inaccessibility of five websites for other archival institutions, at least eight of the ESARBICA institutions made provision for 1websites. While the archival institutions are aware of the benefits of having a website, the findings of the study indicated that the visibility of ESARBICA archival institutions is low as some of them do not have websites. Fewer than half of the institutions in the ESARBICA region could not have their web impact calculated mainly because they do not have accessible websites. This trend of inaccessibility of institutional websites in African institutions was also reported by Ngulube and Tafor (2006) and Garaba (2012). This implies that those archival institutions without websites might consider attaining web presence through constructing websites.

With regard to classification of links, the study concluded that archival institutions in the ESARBICA region attracted links that were classified as 'Industry', as shown by the content analysis of the links, with the extensions .com and .co as the most popular Top Level Domain (TLD).

The findings of the study indicated a strong link relationship between archival institutions and research-based activities such as the Library of Congress and Michigan State University. Furthermore, archives-related links such as that of Serbia Archives (archives.org.rs) have outlinks that point to relevant organisations such as the UNESCO Archives portal and the ICA. It can be concluded that the establishment of links to relevant organisations such as UNESCO and ICA would increase the visibility of archival institutions. While there were links between the ESARBICA region, archival institutions and institutions that linked with UNESCO

and ICA, the findings of the study indicated that there were no direct links between the archival institutions and UNESCO or ICA.

The social network map of inlinks shows no evidence of interlinking among archival institutions in the ESARBICA region. The study therefore concluded that ESARBICA archival institutions on the web seemed to be existing in isolation, yet they offer related services. As such, ESARBICA archival institutions may want to consider establishing a link relationship amongst one another.

Based on the conclusions drawn from the discussions, the following recommendations can be made:

i) Establish standalone archival websites which archival institutions host themselves. This will help institutions to focus on archival activities, vis-à-vis existing within a ministerial domain which limits their interaction with archival users. Furthermore, archival institutions are encouraged to make websites readily available and accessible on the web as a way of enhancing the visibility of archival institutions.

ii) Archival institutions in the ESARBICA region can establish interlinking of one archival institution with another in order to help attract users who would be given exposure not only to the archival institution they are searching for, but also to other related archival institutions. This can be done by placing home links of an archival institution on the web pages of other member countries of the ESARBICA region. Furthermore, in a bid to enhance impact, archival institutions can target high-impact links in order to establish connections between archival institutions and such links.

iii) Establish links with archives-related research sites such as websites of ESARBICA, the ICA, and other branches of the ICA such as the Central African branch and the West African branch, which involve archival activities that can enhance the visibility of archival institutions. Furthermore, this engagement can be pushed to ICA branches in Asia, Europe and America.

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