E-governance in Africa: challenges, trends and issues

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Abstract

This paper uses content analysis and webometric approaches to respectively examine e-governance challenges and the presence and performance of African governments on the Web as well as review and compare the availability and use of various types of Information and Communication Technologies (ICTs) in the region. Results show that, despite several challenges that are faced by countries in Africa, African governments' presence on the Web is improving; several ICTs and related tools are increasingly becoming available; Africa experienced the highest growth rate of Internet use between 2000 and 2007; there is minimal inter-linkages amongst the government Websites; majority of African governments are at the initial stages of e-governance development; external information to which the governments provide links include freeware, news, and general information (e.g. tourism) sites, etc. Recommendations for effective e-governance planning and implementation are provided.

Keywords: Webometrics, link analysis, E-governance, Africa

1. Introduction

In his paper entitled "*E-governance in developing countries'*, Backus (2001) argues that e-governance is more than just a government website on the Internet and proceeds to define e-governance as the "*application of electronic means in the interaction between government and citizens and government and businesses, as well as* [the application of electronic means] *in internal government operations*". While we agree that E-governance is not just the ownership of a web site, it is also true that the Web is one of the fundamental tools through which effective e-governance can be implemented and practiced. For instance, in his analysis of Gartner's e-governance model Backus (2001) observes that"*e-governance means being present on the Web, providing the public with relevant information*". According to Gartner, a consultancy firm (as cited in Backus,

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2001), this presence on the Web forms the first phase or stage of e-governance development. In phase two, which largely involves the government-citizen interaction, people can ask questions via email, use search engines, and download forms and documents. In phase three, transactions between the public and the government can be conducted electronically and more particularly through the Web without the public visiting any office physically. These transactions include services such as filling the income tax returns, filling property tax, renewing of licenses, visa/passports and online voting. These and many more issues give credence to the argument that a government Web site, as an enabling tool, is vital for any successful e-governance to take place.

Worldwide, governments have embraced and engaged in the provision of electronic related services over the cyberspace as a way of cutting down costs and improving service provision. As a starting point, several governments in Africa have initiated programs, strategies and policies towards the establishment of effective and operational e-governance in the respective countries. One of the strategies is the development of government Websites. Governments use the Web to provide access to digital-based information and services to their citizens and business communities. In the process of constructing their Websites, authors of governments Websites provide links to external Websites. Similarly, external Websites have provided links to government Websites. Web links are normally provided to assist the Web users have access to information available in particular Website pages and/or documents. The Web has therefore become an important tool through which effective e-governance can be practiced.

Why should we study the Web links and/or Websites/pages? According to various authors, "*links are not only a means to link documents; links have been extensively used to improve the performance of IR systems*" (Brin & Page; Kleinberg; and Lempel & Moran as cited in Bar-Ilan, 2001:973). An analysis of the Web links is meant (a) to measure the quality and relevance of the set of links pointing to a given site[2] (see also

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[2] www.2020visible.com/re-terminology.html (Accessed May 16, 2007)

Bar-Ilan, 2001); to determine what pages in the collection are important to users[3]; and (c) to determine what a page is about and whether that page is deemed to be 'important' and is deserving of a ranking boost[4]. When seen in light of the citations to scientific publications, Web links can be seen as a sign of appreciation. In addition, it is generally agreed that one of the key roles of citing is to provide a reader with a guide which he/she may use to explore further the ideas presented in a published work. In the same way, links provide Web users with a guide to other sites or web documents with similar information or where they can find additional information on a topic thereby improving the performance of information retrieval systems as earlier mentioned. Finally, Web links would indicate the effectiveness and extent of government-citizen or government-business interactions.

2. E-governance models

This study is informed by several e-governance models and frameworks such as those proposed by Backus (2001), Gartner in Backus (2001) and Zwahr & Finger (2005). Whereas Backus modeled his e-governance around the e-commerce model (i.e. using e-commerce concepts), Zwahr & Finger (2005) built their model using three major concepts, namely (a) information [and] technology as key drivers of state transformation, (b) emerging pressures on government and public administration and (c) the magnitude of e-governance. Zwahr & Finger's model takes into account four major dimensions of e-governance, namely the **level** at which the transformation is taking or has taken place; the **actors** in e-governance and e-government (i.e. the public and private sectors); the **functions** performed in e-governance (i.e. *service delivery, policy-making,* and *regulation*); and the **technology** that is used in enabling e-governance.

In the case of Backus' model which is graphically illustrated in Fig 1, the **actors** in Zwahr & Finder's model form the center upon which all the other dimensions of e-governance (i.e. the level of operation, functions and technology) can be explained. Gartner (in Backus, 2001), on its part, sees e-governance as a process involving four

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[3] http://publib.boulder.ibm.com/infocenter/db2help/ topic/com.ibm.db2.ii.of.doc/common/iiysgloss.htm (Accessed May 16, 2007)
[4] www.4-better-business.com/default.asp (Accessed May 16, 2007)

phases which are all geared towards increasing value to citizens and businesses. Gartner proposes that, ordinarily, e-governance will mature through the four phases (i.e. information, interaction, transaction and transformation). However, Backus says that the phases are not mandatory since, even in the Western world, some government institutions are in phase 1, 2 or 3. He notes that "*most governments start by delivering online information, but public demand and internal efficiency soon requires more complex service*s". Notable in all the proposed models is the emphasis laid on a two-way system of communication among the players, i.e. Government to Citizens, Citizens to Government; Government to Business and Business to Government; Citizens to Business and Business to Citizens). Citizens' interaction with the business community is sometimes facilitated by the government by providing the latter's hyperlinks on the government websites. The hyperlinks may include those pointing the citizens to jobs available in the industry, business tenders and contracts, contact addresses of companies operating in a given country, etc. Citizens can therefore access the business community via the e-governments' Websites.
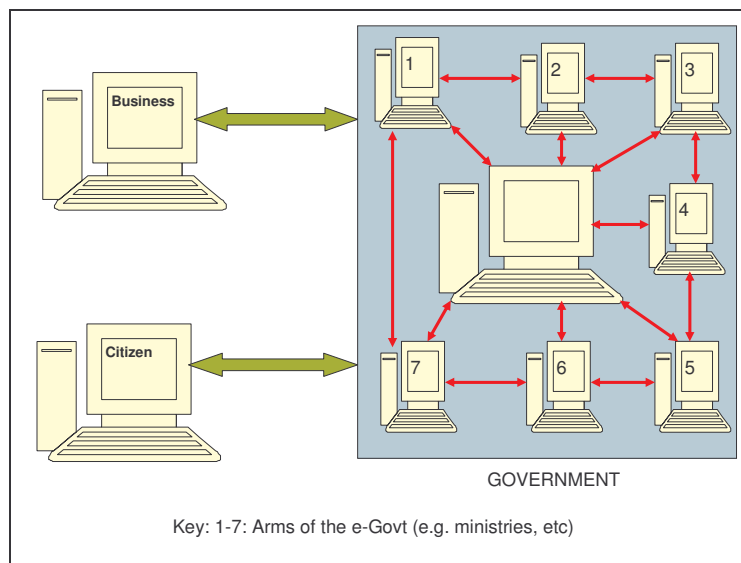

Fig 1: Interactions among the parties (adopted from Backus, 2001)

NB: The computer graphic stands for any ICT tool (or actors) involved in e-governance

The Government-Citizen and/or Government-Business interaction is only made possible if the governments provide, on their Websites, electronic or online services such as

feedback possibilities, various forms (e.g. identity card applications, birth certificates, voter registration, etc.) etc. Perhaps the South African government's Web site is one of the e-government sites in the region that provides the most detailed information about the government's services. The South African government, which is at an advanced stage of e-government, provides three types of services, namely (a) services for the people, (b) services for organizations and (c) services for foreign nationals. Services for the people (i.e. citizens) include, among others, information about birth, parenting, education and training, youth, relationships, living with a disability, the world of work, social benefits, a place to live, transport, travel outside South Africa, moving into or visiting South Africa, sports and recreation, citizenship, dealing with the law, retirement and old age, and death. Information specific to the business community (or organizations) include starting an organization or business; tax; intellectual property; import and export; permits and licenses; transport; labor issues; health and safety at workplace; and discontinuing a business while the Web site provides foreign nationals with information about moving to, working in and entering South Africa. On its part, Kenya provides the following information on its e-government Web site: e-citizenship, e-taxes and revenue, e-civil service, e-education, and e-business in Kenya. The Kenyan government identifies communication within the government and communication with the business and citizens as its core activities of e-government. Similar findings as those found in Kenya's government Website were noted in other government Websites.

In its framework of planning and implementing e-governance, Oracle (2006) spells out the following components that are "*mandatory in several activities that need to be accomplished for* [e-governance's] *successful implementation*": (1) **Strategy**: It is important to clearly define the strategy and implementation plan in order to avoid duplication, wastage of effort, minimize chances of mistakes and lead to the creation of an integrated system; (2) **Infrastructure**: Specifies how various government offices would be interconnected with one another and with external entities (including public); (3) **Hardware**: The hardware description primarily contains specifications for end-user terminals and servers at various levels; (4) **Database management**: There is need to plan on how government information can be transformed to electronic versions; (5) **Enabling**

technologies: Decisions need to be made concerning the various technologies such as those for pervasive/mobile access, speech interface technologies, security technologies and solutions, technologies for conducting electronic transactions, web hosting and multi-lingual support technologies, amongst others; (6) **Applications**: These consist of the software used by the end users for their activities; (7) **Middleware and workflow tools**: These tools are required because some applications/databases may have originated independently and may not be compatible in format or data model with other applications/databases, and for defining complex applications that span across multiple simple applications or multiple levels of users or multiple departments; (8) **Implementation services**: The implementation services would be needed for development of applications, their integration and deployment; (9) **Training**: Training of employees to enable them to use the applications would also be required; and (10) **Maintenance and upgradation**: Basically, this is an ongoing process in the development of e-governance solutions.

Generally, most African governments have followed Backus' model of interactions among citizens, businesses and the government. The planning and implementation of e-governance, however, involves Oracle's framework and Gartner's and Zwahr & Finger's models of e-governance. One aspect that has emerged from the analysis of the types of services provided, especially, on the South African government's web site is the interaction between citizens of one country and an external government. We can add an interaction between two governments. Whether these forms of services introduce new components to the e-governance model proposed by Backus (2001) is an area that requires investigation. The big question to be asked is: should the external participants be grouped in the 'businesses' category? Or, should they be treated as new components of the model? An issue that requires attention when considering this question is the whole aspect of regional co-operations (e.g. the East African Community's legislative assembly, the African Union's Pan African Parliament, etc) which brings together several countries. Where, in the e-governance model, can external governments, regional co-operations, and institutions be factored in?

3.   Purpose of study

This paper focuses on examining and outlining various challenges that African governments face in the planning and implementation of e-governance as well as reviews and compares the availability and usage of Information and Communication Technologies (ICTs) and associated tools in selected countries in Africa. The study also examines the visibility and performance of African governments on the Web by identifying the number of governments in the region that have own websites; number of pages and links; the most targeted sites; page, directory, domain and site inter-linkages; and inter-relationships among the governments' Websites.

4.   Methods and materials

This study employed both the content and link analysis methods to identify the challenges that governments face in the implementation of e-governance and the presence and performance of African governments on the Web, respectively. Content analysis is defined as: "*a set of procedures for collecting and organizing non-structured information into a standardized format* [which] *allows one to make inferences about the characteristics and meaning of written and otherwise recorded material*"[5]. Several documents were scanned for information about the challenges of e-governance in Africa. Existing statistics were used to support the arguments presented in the findings section, especially in regard to the challenges of e-governance. Specifically, two Internet sources were used to provide statistics about the availability of information and communication technologies (ICTs) in Africa, on the one hand, and the Internet usage, on the other. These sources are:

1. The Africa ICT Policy Monitor[6]. This site is an initiative of the Association for Progressive Communication (APC). The APC Africa ICT Policy Monitor's primary goal is to *"enable African civil society organizations to engage in information and communication technologies (ICT) policy development to promote an Information Society based on social justice and human rights. The ultimate aim being that governments and policy makers recognize that access to*

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[5] www.ojp.usdoj.gov/BJA/evaluation/glossary/glossary_c.htm (Accessed June20, 2007)
[6] http://africa.rights.apc.org/ (Accessed June 20, 2007)

and the use of ICTs is a basic human right". Statistics provided on this Website concerning the national ICT status are drawn from the World Bank, the International Telecommunication Union (ITU) and the United Nations Development Programme (UNDP).

2. Internet Usage World Statistics[7]. This is an International website featuring free up to date worldwide Internet usage, population statistics and market research data, for over 233 individual countries and world regions.

In the case of the link analysis method, a list of African countries was obtained from the Internet using various sources which included:

1. African Governments on the WWW (http://www.gksoft.com/govt/en/africa.html)
2. African Governments on the Internet
   (http://www.uneca.org/aisi/NICI/africagovinternet.htm)
3. Foreign governments – Africa (http://www.lib.umich.edu/govdocs/forafr.html)

Table 1: Countries and government Web site addresses used to conduct the study

No.	Country	Government website address
1	Benin	http://www.gouv.bj/
2	Botswana	http://www.gov.bw/
3	Burkina Faso	http://www.primature.gov.bf/
4	Burundi	http://www.burundi.gov.bi/
5	Cameroon	http://www.cameroon.gov.cm/
6	Cape Verde	http://www.governo.cv/
7	Congo Brazaville	http://www.congo-site.com/
8	Cote D'Ivoire	http://www.pr.ci/
9	Djibouti	http://www.republique-djibouti.com/
10	Egypt	http://www.egypt.gov.eg/
11	Gambia	http://www.gambia.gm/
12	Ghana	http://www.ghana.gov.gh/
13	Guinea	http://www.guinee.gov.gn
14	Kenya	http://www.kenya.go.ke
15	Lesotho	http://www.lesotho.gov.ls/
16	Libya	http://www.gov.ly/
17	Madagascar	http://www.madagascar.gov.mg/
18	Malawi	http://www.malawi.gov.mw/
19	Mauritania	http://www.mauritania.mr/
20	Mauritius	http://www.gov.mu/
21	Mozambique	http://www.mozambique.mz/
22	Namibia	http://www.grnnet.gov.na/
23	Nigeria	http://www.nigeria.gov.ng/
24	Senegal	http://www.gouv.sn/
25	Sierra Leone	http://www.sierraleone.gov.sl/
26	South Africa	http://www.gov.za/
27	Swaziland	http://www.gov.sz/
28	Tanzania	http://www.tanzania.go.tz/
29	Togo	http://www.republicoftogo.com/

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[7] http://www.internetworldstats.com/ (Accessed July 4, 2007)

30	Tunisia	http://www.ministeres.tn/html/
31	Uganda	http://www.government.go.ug/
32	Zimbabwe	http://www.gta.gov.zw/

The government URL (Uniform Resource Locator) addresses were identified from these sources and before the commencement of the crawling processes, each of the URLs was investigated in order to, among other aspects, verify their authenticity and existence. Only those countries with government portals were included in the analysis. Out of the 53 African countries, only 32 were found to own official government Websites as shown in Table 1. Using the SocSciBot computer-aided tools, the study crawled the government Websites that were accessible. At first, the process was too slow and sometimes the computer that was used to crawl the Web could run out of the virtual memory. This compelled us to ban all URLs that contained question marks, a fact that may have underestimated the number of Web pages in and outlinks from each of the government's Website. Data was collected between the 2nd and 13th of April 2007. Some government Websites (e.g. Benin, Cameroon, Uganda, Cote D'Ivoire, etc) that were either under construction or inaccessible at the time of data collection were not crawled. The link analysis was employed to measure each government's total web pages, out-links, in-links, most targeted sites, and to construct social networks. Data were analyzed using the SocSciBot Tools (version 1.3.347) in terms of page and link counts; ADM (Alternative Document Model) count summaries; known and unknown external links; and file, domain, directory and site from-to counts. In addition, the Pajek networks were subjected to non-metric multidimensional scaling (MDS) analyses in order to investigate similarities among the crawled government websites. The MDS program is one of the analytic technologies within the UCINET computer software. The program (i.e. MDS) finds a set of points in k-dimensional space in such a way that the Euclidean distances among these points correspond as closely as possible to a rank preserving transformation of the input proximities (Borgatti, Everett & Freeman, 2002). In the analysis of the similarities between the items analyzed, the program draws a set of the items close together on the MDS map, while the opposite is true when the option of dissimilarities is selected. Microsoft Excel software was largely used to present the analyzed data in tables and graphs while Pajek computer-aided software was used to draw social networks.

4.   Results and discussion

Content analysis of existing statistical reports and other documents shows that African countries face several challenges in their planning and implementation of e-governance. In the first instance, Oracle (2006) outlines several weaknesses that are associated with conceptualizing, operating and maintaining systems of e-governance. These challenges include social aspects (e.g. poor basic education, low literacy level, poor IT literacy, different languages, lack of public acceptance of self-service models, and shortage of skills); political aspects (e.g. low budget allocation, lack of cyber laws, slow decision making processes, poor hierarchical structures, short-term approaches due to elections, and poor integration and reform agenda); economic aspects (e.g. lack of investors and poor budget control); and technological aspects (shortage of IT skills, high cost of Internet, heterogeneous data, lack of IT standards, and software licenses). Tankoano (n.d.) observes that e-governance obstacles are largely associated with the clientele whose sensibility to e-governance may be insufficient; a low level of adaptation to these technologies by individuals, administration and businesses; resistance to change; and existing infrastructures. The United Nations Online Network in Public Administration and Finance [UNPAN] (2007) considers the following as the major challenges of e-governance in Africa: a country's leadership which may be lacking a clear e-vision, capacity and will to lead change, and management and accountability structures; the people who may be lacking appropriate skills, training, culture of increased access to information and commitment to high level teamwork; lack of policies on liberalized telecommunications sector and effective regulation, ICT adoption and use, freedom of information, privacy, security, intellectual property and copyright and policies on arresting 'brain drain'; poor processes on monitoring and evaluation, etc; technology-related challenges such as privacy and data sharing, authentication, and building user trust; and access (e.g. making information widely available to citizens, etc.). Other challenges include lack of e-readiness in terms of data systems infrastructure, legal infrastructure, institutional infrastructure, human and technological infrastructure and e-readiness of leadership and strategic thinking (Heeks, 2002). Indeed, some of these challenges are reflected in Tables 2 and 3 which show that not only are the ICT tools lacking but also the existing ones such as the Internet are not fully utilized. For instance,

the Internet penetration rate is lowest in Africa (i.e. 3.6%). The rate of illiteracy in Africa is also said to be high. Statistics[8,9,10] indicate that the overall literacy rate in Africa is less than 60% with the highest rate being 85-90% in Zimbabwe and the lowest being 10.6-17.1% in Niger.

Table 2: Availability of ICTs and the number of Internet users in each country

No.	Country	Televisions*	Radios*	Telephone mainlines*	Mobile phones*	Personal computers*	Internet users**
1	Benin	44	441	9	19	1.7	25
2	Botswana	30	150	91	165	38.7	50
3	Burkina Faso	103	433	5	6	1.5	19
4	Burundi	220	30	3	3	-	6
5	Cameroon	34	163	7	20	3.9	45
6	Cape Verde	101	181	143	72	68.8	12
7	Congo Brazaville	8	123	13	48	3.9	1
8	Cote D'Ivoire	60	183	18	45	7.2	70
9	Djibouti	71	87	15	5	10.9	3.3
10	Egypt	217	339	104	43	15.5	600
11	Gambia	3	396	26	41	12.7	18
12	Ghana	118	710	12	9	3.3	40.5
13	Guinea	44	52	3	7	4	15
14	Kenya	26	221	10	19	5.6	500
15	Lesotho	16	53	10	15	-	5
16	Libya	137	237	109	9	-	20
17	Madagascar	24	216	4	9	2.4	35
18	Malawi	4	499	5	5	1.3	20
19	Mauritania	96	149	7	42	10.3	7
20	Mauritius	301	379	257	252	109.1	158
21	Mozambique	5	44	4	8	3.5	15
22	Namibia	38	141	66	56	36.4	45
23	Nigeria	68	200	5	4	6.8	115
24	Senegal	79	126	25	31	18.6	100
25	Sierra Leone	13	259	5	6	-	7
26	South Africa	152	338	112	252	68.5	3068
27	Swaziland	128	162	31	65	-	14
28	Tanzania	42	406	4	12	3.3	300
29	Togo	37	265	10	20	21.5	150
30	Tunisia	198	158	109	40	23.7	400
31	Uganda	27	127	3	14	3.1	60
32	Zimbabwe	30	362	19	24	12.1	100
	TOTAL	**77**	**238**	**39**	**43**	**15.6**	**188**

Source: APC Africa ICT Policy Monitor: http://africa.rights.apc.org/index.shtml?apc=se_1

Key: * Availability per 1000 people;   ** Users in thousands

It was observed that the radio was the most common ICT in Africa, having recorded a total of 238 per 1000 people in the 32 selected African countries. In the second position was the television [TV] (77 sets per 1000 people) followed by mobile phones (43),

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[8] http://www.overpopulation.com/faq/literacy/literacy-rate-by-country-africa/ (Accessed July 4, 2007)
[9] http://encarta.msn.com/media_701667753/Literacy_Rate_in_African_Countries.html (Accessed July 4, 2007)
[10] http://africa.rights.apc.org/index.shtml?apc=se_1 (Accessed July 4, 2007)

telephone mainlines (39), and personal computers (16). The total number of Internet users in the countries investigated was 6,023,800 (approximately 6 million) which translate to an average of 188,000 people per country. Seemingly, entertainment and probably news, which are the key services provided through radio and television, may be the citizens' most preferred services. This scenario has resulted in several people owning radios in the region. Additionally, radios are generally cheaper than the other ICTs. The radio and television are, however, limited because they mainly offer one-way type of communication thereby hampering effective interaction between the government and the clientele. Citizens would find it difficult to 'talk' back to the government so to speak. Nevertheless, the 'call-in' type of communication is increasingly becoming common during radio and TV talk shows, although this type of communication is commonly initiated by programme presenters and not the 'users'. It is worth noting though that if well utilized, this service can be used by the governments to improve service delivery. Equally gaining popularity are the mobile phones and personal computers. Generally, electronics (including mobile phones and personal computers) are becoming cheaper and therefore affordable for most people. Some countries, such as Kenya, have abolished or drastically reduced taxes that are levied on the importation of electronics, thus making it possible for majority of the population to not only own these gadgets but also possess the most reliable ones, the type that can perform most e-governance related functions, e.g. Internet surfing, phone calls, radio services, entertainment, short message services, email services, etc.

It is encouraging to note that Africa experienced the highest Internet usage growth rate (i.e. 640.3%) between 2000 and 2007 when compared to other geographic regions (see Table 3). Given that the number of personal computers in Africa is low, the growth rate witnessed within the last 8 years could only mean that the African population is forced to share the few available computers to access information on the Internet. The role played by what is commonly termed as 'Internet Cafes' in the provision of Internet access in the continent can not be overemphasized. Although countries in Africa are struggling with their meagre budgets, efforts are being made to improve the availability of Internet services at all levels of governance, including the rural areas. This is well illustrated in

recent ICT-related developments[11] initiated by various governments such as the formulation and enactment of ICT policies, the introduction and passing of parliamentary bills on improving Internet access[12], and implementation of rural electrification programmes, etc. It can be assumed that leaders have realized that ICTs (including the Internet) offer very many opportunities which, if taken up by African governments, can tremendously improve e-governance.

Table 3: World Internet usage and population statistics

World Regions	Population (2007 Est.)	Population % of World	Internet Usage	% Population (Penetration)	Usage % of World	Usage Growth 2000-2007
Africa	933,448,292	14.2 %	33,421,800	3.6 %	2.9 %	640.3 %
Asia	3,712,527,624	56.5 %	409,421,115	11.0 %	36.0 %	258.2 %
Europe	809,624,686	12.3 %	319,092,225	39.4 %	28.2%	203.6 %
Middle East	193,452,727	2.9 %	19,424,700	10.0 %	1.7 %	491.4 %
North America	334,538,018	5.1 %	230,987,282	69.0 %	20.4%	113.7 %
Latin America/Caribbean	556,606,627	8.5 %	102,304,809	18.4 %	9.0 %	466.2 %
Oceania / Australia	34,468,443	0.5 %	18,756,363	54.4 %	1.7 %	146.2 %
WORLD TOTAL	**6,574,666,417**	**100.0 %**	**1,133,408,294**	**17.2 %**	**100.0 %**	**214.0 %**

(Source: Miniwatts Marketing Group[13], 2007).

NOTES: (1) Internet Usage and World Population Statistics as at June 10, 2007. (2) Demographic (Population) numbers are based on data contained in the world-gazetteer website[14]. (3) Internet usage information comes from data published by Nielsen//NetRatings[15], by the International Telecommunications Union[16], and by local NICs.

Although not an absolute indicator of the amount of Web information or measurement of the Web content, the number of Web pages may reflect how much information there is on a particular Web site. The number of Web pages is supplemented with the number of outlinks. By providing links to external Websites or pages or documents, the linking Website or page provides additional information for its intended user(s). In view of this, the South African government can be said to offer more information than any other African country. South Africa was the leading with 193447 pages while it provided a total of 2004619 outlinks. An evaluation of the South African government Website

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[11] http://africa.rights.apc.org/ (Accessed June 20, 2007)
[12] http://www.nationmedia.com/dailynation/nmgcontententry.asp?category_id=2&newsid=101698 (Accessed July 5, 2007)
[13] www.internetworldstats.com (Accessed July 4, 2007)
[14] http://www.world-gazetteer.com/ (Accessed July 4, 2007)
[15] http://www.nielsen-netratings.com/ (Accessed July 4, 2007)
[16] http://www.itu.int/ (Accessed July 4, 2007)

against the phases or stages of e-governance development shows that the country is probably the only African country that is on the verge of attaining full e-governance status. Gartner (in Backus, 2001) proposes four phases of e-governance while Torres, Pina & Acerete (2006:281) identify five "*stages of e-government that can be used to measure the degree of development*". Torres, Pina & Acerete (2006:281), while citing Moon, note that:

> "*Stage 1 is the most basic form of e-government and uses ICT for disseminating information, simply by posting information on the Web sites. Stage 2 is two-way communication. In this stage, the government incorporates e-mail systems as well as information and data-transfer technologies. In Stage 3, the government allows online service and financial transactions by completely replacing public servants. In Stage 4, the government attempts to integrate various government services vertically and horizontally. Stage 5 involves the promotion of Web-based political participation in which government websites include e-governance tools such as e-democracy*"

The South African government has not fully fulfilled all the requirements spelt in both Gartner's and Torres, Pina & Acerete's (2006) models but an assessment of the Website reveals that much of the elements of e-governance in stages 1 to 4 have been fulfilled while stage five's are being implemented[17].

An analysis of the number of page, directory, domain, and site inlinks and outlinks among the Websites investigated reveals minimal inter-government linkages. Majority of the government Websites did not have any links to or from the others. Only 9 out of 28 crawled government Websites provided and/or received links to and/or from other government Websites. Figs 1 to 4 show patterns of inter-government linkages. The low inter-government linkages has serious implications with regard to the sharing and exchange of information among governments in the region and the provision of quick links to enable access to most information by the entire African population. With the strengthening of the African Union and the probable establishment of the United States of Africa, we hope that the situation may improve. Lack of inter-connectedness may also be attributed to non-professionalism on the part of the Website developers. Information professionals, in our view, should be involved in the development of government Websites. They are not only custodians of information, but also as information scientists,

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[17] See: http://africa.rights.apc.org/ (Accessed June 20, 2007)

they are involved in information handling activities (e.g. information production, organization, storage, and dissemination or transfer).
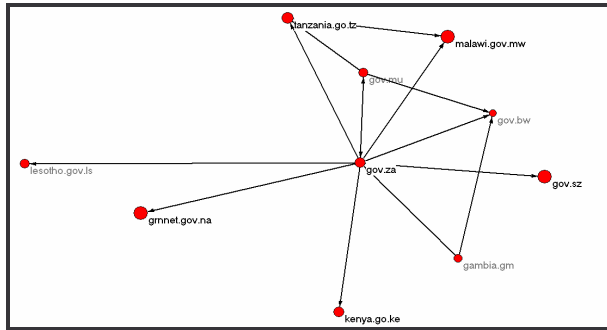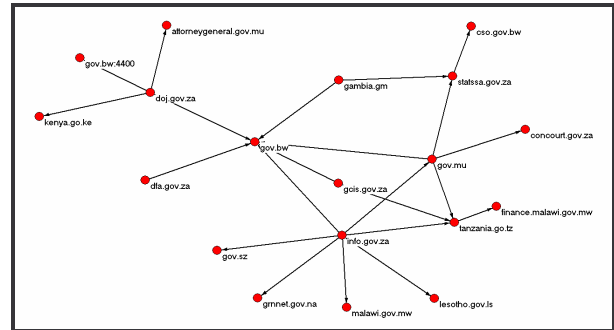

Fig 1: Site inter-linkages
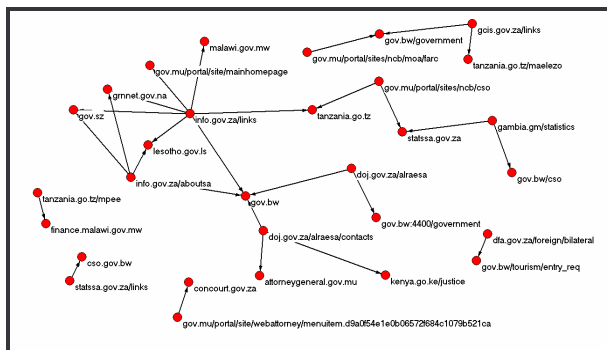

Fig 2: Domain inter-linkages
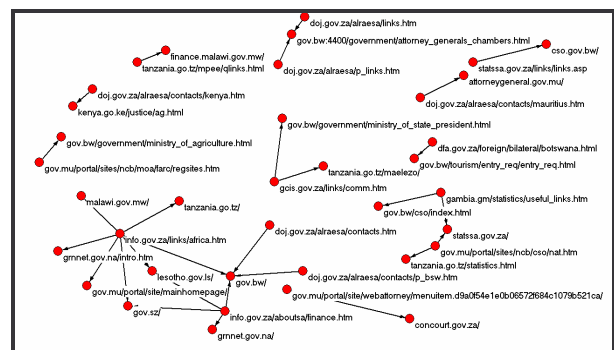

Fig 3: Directory inter-linkages

Fig 4: File or page inter-linkages

Besides illustrating the inter-linkages of government Websites in Africa, the social network maps identify the Web sites, domains, directories and pages that link to one another. For instance, in the case of domain inter-linkages, the South African department of justice (doj.gov.za) and department of finance (dfa.gov.za), are among the government departments (or domain names) that provided and/or received links to and/or from others. Others include the Mauritius' Attorney General's Office and Ministry of Justice & Human Rights (attorneygeneral.gov.mu); South African government department of information (info.gov.za); Government Communication and Information System (gcis.gov.za); Central Statistics Office – Botswana (cso.gov.bw); Statistics South Africa (statssa.gov.za); Constitutional Court of South Africa (concourt.gov.za); Ministry of Finance and Economic Planning – Malawi (finance.malawi.gov.mw). The directory and page social networks provide further details about the nature, type and/or reasons for the linking patterns witnessed in the site and domain networks. One of the reasons of

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interlinking is the provision of information about governments and links to their contact details (e.g. doj.gov.za/alraesa/contacts/Kenya.htm; doj.gov.za/contacts/Mauritius.htm; etc). Further research is however recommended to study the specific motivations of linking. For instance, why does the Gambian government's statistics department provide links to South Africa's Statistics department? Likewise, why is Tanzania's statistics department receiving a link from the government of Mauritius?
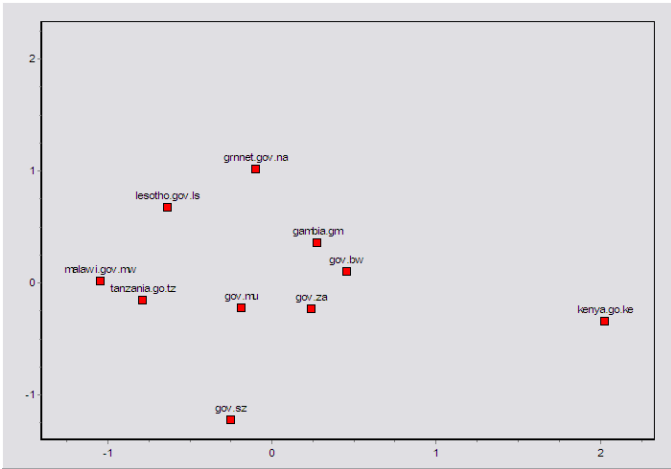

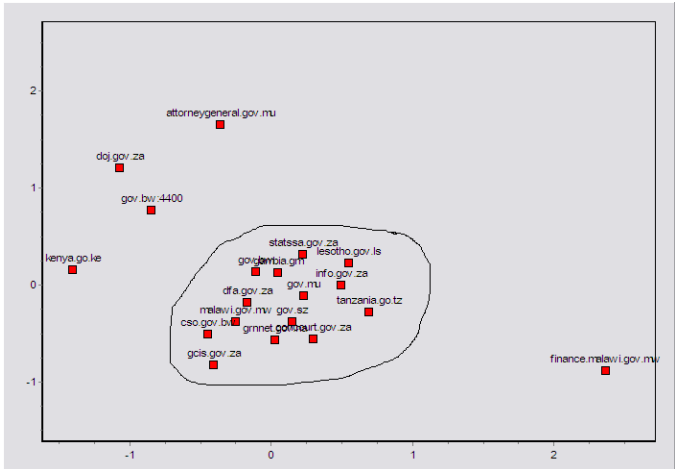Fig 5: Non-metric MDS mapping of site links

Fig 6: Non-metric MDS mapping of domain links

Figs 5 and 6 examine the closely linked sites and domains, respectively. Although Fig 5 does not identify clear inter-relationships among the government websites, it nevertheless shows that South Africa has a closer link relationship with Botswana, Mauritius and Gambia unlike Kenya which is placed too far from the rest of the countries. Similarly, Tanzania and Malawi are close together indicating a close link or relationship between them. Fig 6, which was generated using the domain network in Fig 2 with a stress value of 0.198 in 36 iterations, shows close relationships between several domains that formed a high cluster as circled in the illustration. The elements in the cluster revolve around three South African domains, namely, the department of information (www.info.gov.za), the department of finance (www.dfa.gov.za), and the department of statistics (www.statssa.gov.za). Any close relationship between two domain names in the cluster, other than the three South African departments, therefore, simply comes about because the domain names are linked to one of the said South African government departments. Worth noting, too, is the presence of four domain names scattered across the top left

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corner of the scatter graph (Fig 6). They include Mauritius' attorney general's office (attorneygeneral.gov.mu), Botswana's attorney general's chambers (gov.bw:4400), Kenya's attorney general's office (kenya.go.ke) and the South African department of Justice (doj.gov.za). The latter, through one of its sections (the Association of Law Reform Agencies of Eastern and Southern Africa) provides links to the named member institutions in different countries. The four domain names represent the governments' legal advisory offices or officers in charge of departments of justice.

External links were examined in order to find out the nature and type of external information that citizens can access through their governments' Websites as well the institutions that government Websites link to. In other words, what kind of external information to which African government Websites direct the clientele and more particularly the citizens? Notably, commercial companies [i.e. *.co* or *.com*] (49 out of 95 top ranking domains) are the most commonly targeted institutions followed by non-governmental organizations (23), and academic/educational institutions (7). It was also observed that the most commonly targeted Website was http://www.safrica.info (3908 links) – South Africa's gateway to investment, travel and country information. The purpose of the website is to provide information about South Africa for the International Marketing Council of South Africa (IMC). The website is owned by the IMC. It is most likely that most of the links to this Website originates from the South African government Website. The second most targeted Website was Microsoft Corporation's Windows home page (http://www.microsoft.com/windows/) (2600). Microsoft Corporation is an American multinational computer technology corporation that manufactures, licenses, and supports a wide range of software products for computing devices such as Microsoft Windows operating system and the Microsoft Office suite of productivity software. Perhaps the reasons for the high number of links to this home page is associated with the downloading of Windows operating software (OS) and Microsoft Office Suite files for purposes of installing or upgrading the OS and Suite files or installing drivers of computer accessories such as printers, modems, external hard drives, etc. The provision of such information to citizens is vital for purposes of ensuring that computers which citizens use are operational to enable citizens interact with the government at all times.

Other sites include mozilla (2600) and netscape (2600). These two companies are two of the major developers of internet browser softwares by the same names. When analyzing the type of external links, it became apparent that governments have provided the citizens with a variety of Internet information sources and products which include freeware downloads (e.g. netscape, mozilla, adobe acrobat reader, etc); news (e.g. cnn.com, engineeringnews.co.za, businessday.co.za, sundayindependent.co.za, etc); academic or education (e.g. up.ac.za, uct.ac.za, uwc.ac.za, and sun.ac.za, etc.), general information (safrica.info), travel (safrica.info, sacities.net, southafrica.net, etc); and search engines (e.g. google.com). Another notable aspect is that most of the external sites are located in countries that were investigated in this study. Foreign-based sites (i.e. sites located outside Africa) were few perhaps because most African governments view their Websites as marketing tools for the respective countries. In some instances, majority of the companies that support a particular government Website may be located within the country.

5.   Conclusions and recommendations

In conclusion, African governments' presence in cyberspace is increasingly becoming a reality as illustrated in Table 1. This study concurs with Chisenga's (2004) which states that majority of the African governments are finding their way into cyberspace through the construction of their own websites. Although the use of most ICTs for e-governance could not be established in this study, these tools can be effectively used by governments in the region to enhance the provision of services to the general public and more particularly the citizens. It was however noted that a lot remains to be done in terms of ensuring that these facilities are readily and cheaply available for all. Efforts and initiatives such as the provision of telecentres, the formulation of ICT policies, the New Partnership for Africa's Development (NEPAD's) projects of providing Internet facilities in schools in Africa, rural electrification, etc may result in accelerated use of ICTs in e-governance in the region. Concerning the level or stage of e-governance development, it was observed that most countries in the region seem to be at the early stages of development. Only the South African government has made significant progress in this regard. Most governments have only achieved to provide information on their Websites,

which is the first stage of e-governance development. These governments need to move to a higher level of e-governance development by introducing other services which will improve their interactions with the citizens. Links to external sites need to be improved so that citizens can be able to access most information at one seating without necessarily moving from (i.e. by closing) one window to (i.e. by opening) another. The Website authors need to ensure that the links are updated regularly to avoid 'dead links' which may frustrate citizens in the process of accessing information. In the case of queries, an electronic 'HELP DESK' that operates on a 24/7 hour-day basis need to be established. The impact of ICTs in transforming governance, not only in Africa but worldwide, is far reaching. The influence of ICTs on the way individuals and institutions interact is well summarized in the Sunday Nation (Kenya) of July 1st 2007, thus:

> *Interaction is more immediate and more intense; people are joined every second of the day by the umbilical cord of technology. This has speeded up the rate of change in values, power and authority relations within social units and so on.*

Zwahr & Finger (2004), too, opine that the ongoing e-Government initiatives are proofing ICT's high potential to enable the emergence of new business models at the public-private sector interface. Finally, it is recommended that African government leaders should show goodwill (i.e. provide an enabling political, social and economic environment) for ICT policy formulation and consider e-governance as an enabler and not a competitor and therefore throw their weight behind all initiatives that are geared towards achieving e-governance in the region.

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