



# Digital libraries and development in Sub-Saharan Africa

Digital libraries  
and development

## A review of challenges and strategies

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### Abstract

**Purpose** – The aim of this paper is to review some of the critical information needs in Sub-Saharan Africa and the challenges that face libraries in the region in establishing digital libraries as a way of overcoming the great information shortfall in the region.

**Design/methodology/approach** – A selective survey of relevant literature is carried out in the study with focus on the role of libraries and information in social development, sectoral information needs and the issues involved in the establishment of digital libraries.

**Findings** – The paper argues that lack of social development in Africa is exacerbated by lack of adequate information. The paper concludes that, through better information gathering, processing and especially by taking advantage of today's digital transfer of knowledge, countries in the Sub-Saharan region can experience rapid economic, social and political development.

**Originality/value** – The paper concludes that digital libraries in the Sub-Saharan region can be strategic gateways to the global information and a boost to development in the region. The goal of establishing digital libraries in the region can be achieved through measures such as adoption of modern information communication technologies, amassing relevant digital content, investing in digital skills for library staff and users, strategic partnerships between local institutions, and funding agencies and above all government-backed strategy on digital libraries.

**Keywords** Digital libraries, Sub Saharan Africa, Information services, Communication technologies, Education

**Paper type** General review

### Introduction

Information and knowledge are recognised as the world's most critical resource and the driving force for social development and the modern economic system (Unesco, 1999; Bilton *et al.*, 2002; Huang and Russell, 2006). Many writers have concluded that information and knowledge are key to advancement of education, environmental conservation, professional development, research and innovation (Stiglitz, 1999; Unesco, 2000). The 1998/1999 World Bank's *World Development Report* specifically underlined the fact that "economies are built not merely through accumulation of fiscal capital and human skills but on foundation of knowledge, learning and adoption" (World Bank, 1999).

The 2000 G8 Summit declared that information and knowledge are tools that individuals, firms and communities can apply to address economic and social challenges with greater success than ever before (Government of Japan, 2000). This implies that any effort to improve people's lives through development activities will greatly benefit if the project planners and the beneficiaries generate, acquire and use



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accurate information to assess needs, define objectives, set targets and guide the implementation and evaluation process.

The twenty-first century has been referred to as the “knowledge era” or the “information economy” era, characterised by systematic acquisition, development, storage, use and sharing of knowledge (Yi, 1999). Consequently many world governments especially in the developed countries have consciously taken steps to create an “information society”, through the establishment of efficient methods of production, organisation, transfer, and retrieval of digital information and its use to create new knowledge, values, products and services (OECD, 1996).

One effort to enhance information flow and knowledge sharing in Western countries has been to mount digital library development programmes such as the Digital Library Initiative in the USA (Chen, 2004) and The European Library (TEL) (Collier, 2004). The main areas of focus of such initiatives are: research into digital libraries: advancing the capacity of libraries to collect, store, organise and deliver information in digital form; and providing communities with the capacity to retrieve and apply digital information. The view in this paper is that libraries in the Sub-Sahara can contribute to development and that their ability to do so can be greatly enhanced through investments in their transformation into digital libraries.

There is no universally agreed definition of the term “development” but it is used widely to refer to “an economic, social and political process which results in a cumulative rise in the perceived standard of living for an increasing proportion of a population” (Hodder, 2000, p. 3). This definition implies that development is about sustained, positive change in the all dimensions of life for all categories of a society regardless of class, age gender, ethnicity and geographical considerations. The Human Development Index (HDI) uses three criteria to measure development: longevity in terms of life expectancy at birth; knowledge measured in terms of adult literacy and mean years of schooling; and finally standard of living measured in terms of per capita income (Watkins, 2005).

Todaro (1992) has given the key characteristic of lack of development as low levels of living. This is reflected by indicators such as: low levels incomes; high inequalities; low levels of productivity; high rates of population growth and dependency; high and rising levels of unemployment and underemployment; over dependency on agricultural production and primary export products; prevalence of imperfect markets and limited information; dependence and vulnerability in international relations (Todaro, 1993). He proposes therefore that the key objectives of development should be to ensure sustenance, raise people’s level of living through material well-being and self esteem and finally to expand people’s ability to make economic, social and political choices (Todaro, 2000).

Recent assessments indicate that Sub-Saharan Africa continues to experience low levels of development unlike other world regions due to factors such as to economic stagnation, slow progress of education, spread of HIV, and high child mortality rate (World Bank, 2005a). The region has witnessed low income for the majority of people, inadequate housing, poor health, limited or lack of education, low life expectancy, low literacy levels and high mortality rate (Todaro, 2000). Apart from low standards of living, Sub-Saharan countries are characterised by low levels of labour productivity brought about by widespread lack of skilled power, lack of capital, infrastructure as well as poor institutional arrangement.

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One of the recent efforts by international community to bring about development has been the inauguration of Millennium Development Goals to be achieved by the year 2015. These are development targets centred on: eradicating extreme poverty; achieving universal primary education; promoting gender equality and empowerment of women; reduce child mortality; combat HIV/AIDS malaria and other diseases; ensure environmental sustainability and developing a global partnership for development (World Bank, 2005b). However, recent assessment has indicated that:

- not one Sub-Saharan country with a significant population is on track to meet the targets of the Millennium Development Goals by 2015;
- on current trends it will take Sub-Saharan countries until 2115 to achieve the MGD targets;
- the Sub-Saharan account for the bulk of countries with a deficit in provision of water and sanitation;
- by the year 2015 the Sub-Saharan region will account for more than half of the people who will be living in extreme poverty; and
- by the year 2015 the Sub-Saharan region will have 19 million children out of school (Watkins, 2005).

A number of factors contribute to lack of development in the Sub-Saharan Africa. However it has been observed that the situation is exacerbated by lack of relevant, accurate and timely information needed for activities in various sectors. This has resulted in social stagnation, and decline in investment and economic growth (World Bank, 1999). At the same time, the ongoing “information revolution” characterised large amounts of data and provides more efficient methods of organisation and transfer of knowledge which can be used to fight problems such as poverty, inequality and environmental degradation in the region. By putting in place digital libraries to facilitate better information gathering, processing, distribution, access and application, Sub-Saharan countries can fill the information gaps in various sectors. By so doing they can gain from globalisation of world economy and speed up the much needed economic, social and political change.

### **The concept of digital libraries**

A number of definitions have been offered for the term “digital library”. Endres and Fellner (2000) argue that the notion of digital library embraces two related concepts: digitisation of all media, which results in the “electronic library” and “virtualisation” of the library service, which leads to the “virtual library”. Consequently they see digital libraries as encompassing three issues: storage of text and images in electronic devices (electronic library), provision of library services to remote based customers (virtual library), and integration of library stock and services efficiently through standard methods by use of intelligent systems. According to the Digital Library Federation (DLF):

Digital libraries are organizations that provide the resources, including specialised staff, to select, structure, offer intellectual access to, interpret, distribute, preserve the integrity of, and ensure the persistence over time of collections of digital works so that they are readily and economically available for use by defined community or set of communities (Walters, 1998).

This definition emphasises that digital libraries are about technology as well as people:

- Digital libraries employ a variety of resources but key among these are intellectual resources embodied in specialised staff. Digital libraries depend more on computer and electronic-network systems related skills rather than the skills of traditional cataloguers and reference librarians.
- Digital libraries require functions similar to those within conventional libraries, but these are in many ways different in kind.
- Preservation of digital objects is critical due to requirements of operating in a rapidly evolving electronic and network environment. Besides, electronic technology is rapidly changing with software and hardware obsolescence, which has implications for financing models.
- The notion of making information “readily and economically available” underlines the need to perform a cost-benefit analysis to ensure good return on investments in digital libraries. It also implies the need to create sound criteria for measuring the performance of digital libraries.
- The last part of the definition “use by a defined community or set of communities” revolves around the fact that like other libraries, the digital libraries should be demand driven service organisations. The needs and interests of the communities they serve will ultimately determine the trend of development for digital libraries including the investment they make in content and technology.

Borgman *et al.* (1996) presents a multi-level definition that gives the main characteristics of digital libraries as follows:

- They are a set of electronic resources and associated technical capabilities for creating, searching and using information.
- They are an extension and enhancement of information retrieval systems that manipulate digital data in any medium (text, images, sounds; static or dynamic images and exist in distributed networks.
- Their content includes data, metadata that describes representation, creator, owner, reproduction rights.
- They are constructed, collected and organised by and for a community of users and to support the information needs and uses of that community.
- They are a component of communities in which individuals and groups interact with each other, using data, information, and knowledge resources and systems.
- They are an extension, enhancement, and integration of a variety of libraries in all kinds of settings such as learning institutions, offices, laboratories, and business organisations.

In this definition the term digital is being used here in broad terms to mean a collection of networked digital information resources and associated technical and managerial infrastructure. It is assumed to include data and metadata in various formats which are created or assembled in order to provide a service to end users. In this case digital libraries consist of e-databases, e-journals, e-books and other electronic resources.

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These are purchased, licensed by a library or produced within the library and subsequently made available to users electronically.

The unifying theme in the above definitions is that information in digital libraries is organised using computers and made available over an electronic network, with procedures to select the material for collection, organise, make it available to users, as well as archive for continued access it. However some authors (Rosenberg, 2005; Joint and Law, 2000) have pointed out that transformation to digital libraries is a gradual shift from print to digital collections. Therefore though there is a tendency to distinguish digital libraries by the digitalness of the collection, the key question today and in the near future is how to integrate collections of materials in digital form with those in print format. In a recent review, Rosenberg (2006) proposes that immediate attention towards creating digital libraries in universities in the Sub-Saharan should be focussed on digitisation of local library collections and research, Creating online catalogues and making them available on the internet, facilitating access to full-text e-journal and e-books and other e-services and training both users and library personnel.

### **The case for digital libraries**

Libraries have traditionally been part of the global information infrastructure and an ideological and cultural force with far reaching implications in society. Over centuries they have collected, maintained, organised, and provided access to information and knowledge resources that enable individuals, organisations and communities to achieve their goals. Today they continue to mobilise and provide access to local and global knowledge for social, political and economic development. In doing so they act as gateways for information and tools for bridging the information divide within countries and between countries.

Even so there is evidence that in Sub-Saharan Africa print-based library services have failed in providing relevant and timely information for different purposes (Unesco, 1995). All categories of library services in the region are presently inefficient and largely ill-managed to service the information needs of the people. As a result they remain peripheral in the educational, scientific and social and political life of the people and especially those in rural areas (Rosenberg, 1994, 2005). Libraries in Sub-Saharan countries depend mainly on government funding but often without comprehensive strategy for development (Unesco, 1995). In the past decades the economic situation in many developing countries has been such that many libraries have not had the financial resources to maintain effective services. The increasing cost of books, journal subscriptions and the falling currency values has only worsened the situation (Sharma and Vishwanathan, 2001).

The fall of libraries in the region was aptly expressed thus:

All was well in the heady years immediately following independence when healthy commodity prices and booming economies kept modernisation hopes alive . . . Then from the mid-1970s many Africa countries fell into spiral of recurrent recessions, which wrecked havoc on development ambitions and the bookshelves grew empty. The "book hunger" joined the litany of Africa's other famines of development, democracy, and self determination (Zezeza, 1997, p. 72).

This has had very negative and damaging effect on training and research capacities and has limited the possibilities for good policy analysis and planning. Ten years ago,

Rosenberg (1997) observed that since the mid-1980s, the relative value of university libraries in the Sub-Saharan region had declined to a near total collapse. This trend continues to the present and has led to their marginalisation from the teaching, learning and research process in the university. This information shortfall is evident in almost every sphere of national activity including resource exploitation and environmental conservation, trade and industry, health, social and cultural development and employment creation.

Several authors such as Magara (2002), Mutula (2002), McDonald and Kebbell (2004), Jain (2006) and Rosenberg (2006) have written on the advantages of digital libraries. These advantages make the creation of digital libraries a strategic method to enhance information access in the Sub-Saharan region:

- Digital libraries provide a faster method of accessing and exchanging information in all sectors such as research, scholarship, medicine, government services and business.
- Digital information can easily be shared and therefore is available to everybody, which is a great improvement on print libraries, which require expensive duplication of material in different locations.
- Given their sinking cost of establishment, digital libraries can make it possible to provide everybody even those in the remotest parts of the Sub-Sahara with information in its most up-to-date form. With a link to the information superhighway, libraries in the region even the smallest and the remotest can serve as a gateway to local as well as global information.
- Digital libraries are available on 24-hour basis from anywhere in the world, offering flexible arrangements for students, researchers, scholars and the community.
- Digital libraries can be widespread and accessed as full text from any location or workstation.
- E-content is available on several subjects from a variety of sources such as libraries, electronic publishers, and business organisations and in multimedia formats.
- Information is readily available from offices, telecentres, laboratories, and homes without creating a need to travel long distances to physical libraries.

### **Sectoral information needs in the Sub-Saharan region**

#### *Education sector*

Education more than anything else determines a country's prospects for human development since it assists to find solutions to problems such as hunger, globalisation, and environmental degradation (World Bank, 1999). The ability to read among the population is a basic prerequisite for any social progress and in its absence the society experiences limited self-determination, and community participation whether in politics, civil or development activities. According to Delors (1996), education is also an indispensable asset in any effort to attain ideals of peace, freedom and social justice.

In Sub-Saharan Africa, universities are viewed to have a bigger role as "developmental engines" than elsewhere, especially because they are often among the few institutions with the resources, skills, logistics, organisation and network to

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undertake quality training (Rosenberg, 2005). They are also the only singularly endowed institutions with the capacity to conduct advanced research to support the community and also assess issues of national interest such as health and education (Unesco, 1995).

However access to up-to-date scientific information is the first condition to quality research. It is only through a well-equipped and endowed information resource with current books and journals that scholars can keep pace with developments in various disciplines and transmit the same to students. According to Unesco (1995), all levels of learning including basic skills (e.g. literacy, oral expression, and numeracy, problem solving) and content delivery (e.g. knowledge, skills, values and attitudes) require information resources to be actualised.

For education and research in African countries to improve there is need for access to information resources to support all levels of learning activities in schools, universities or research centres. Wang (2003) has observed that digital libraries have a strategic role in improving education: First, they assist learners' access unlimited information from global databases. Second, in e-learning they enable students to publish information whereas in the past they could only access it. Third, they assist learners to develop the ability to access, evaluate and use information to build new knowledge. Huang and Russell (2006) observe that establishing digital technology in public institutions such as schools and libraries would greatly assist access by the less privileged classes.

#### *Resource exploitation and environmental conservation*

Exploitation of natural resources for national development requires environmental information to facilitate sustainable development. Sustainable economic development is aimed at providing a better standard of living to communities while at the same time conserving the environment and natural resources for future generations (Rischar, 1996). Studies have indicated that the principles of sound environmental policy do not conflict with developmental objectives (Walmsley and Lewis, 1993). At the same time cases of environmental resource use failures in several developing countries is partly attributed to weak regulatory activity and incomplete information that would otherwise guide priority setting and policy design (World Bank, 2000).

Good policies can support sustainable development in the Sub-Saharan region by protecting or even improving the environment while promoting economic growth. This calls for not only proper institutions but also in-depth information and better knowledge of environmental impact of alternative policies. The Sub-Saharan countries also need information related to the exploitation of natural resources in the region, which includes information on agricultural production, monitoring of water resources, forest use and conservation, mineral exploration and above all environmental conservation. This would facilitate controlled exploitation of resources for development purposes and creation of sound and sustainable environmental policies.

#### *Trade and industry*

Information and knowledge are critical for the development of trade and industry in that they form the basis of business decisions that contribute to growth of trade and industry in any given society. Studies show that Africa economies remain small and fragmented with intraregional trade accounting for only 10 per cent of the total trade

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(World Bank, 2005a). This situation has been blamed on lack of information on the procedures and markets, potential trade opportunities across the borders that can support import and export activities (Economic Commission for Africa, 1996; World Bank, 2005b). At the same time a study carried out in Florida USA revealed that libraries play an important role in economic development by providing international resources for small business and assisted people to develop marketable skills (Griffiths *et al.*, 2004).

Parker *et al.* (2005) have observed that small businesses often lack the capacity to gather sufficient requisite knowledge for strategic planning and positioning and thus are unable to compete with larger rivals. They therefore propose that digital libraries will act as centres for knowledge management (KM) and competitive intelligence services. The business community in the Sub-Saharan region needs to have access to information on national, regional and international markets. Digital libraries will especially contribute to empowerment of different groups in the society such as rural communities, the youth and women.

#### *Democratisation and social progress*

Many regions in Sub-Saharan region are presently experiencing challenges of adult illiteracy, civil conflicts and violations of human rights (Hodder, 2000). Countries such as the DRC, Ivory Coast, Uganda, Sudan and Somali have still engulfed in civil wars. At the same time there is pressure on governments in the region to involve citizens in the democratic processes (World Bank, 2005b). Availability of democratic access as opposed to state controlled information encourages a decentralised non-authority based social and civic awareness, which makes citizens aware of their civil rights and obligations and thus are able to participate in community and national life in an informed way. It has been observed that “Unaccountable power structures are often vulnerable and thus responsive to exposure of information” (World Bank, 2003). Therefore, having more information on freedom, democracy and human rights available to citizens can be a catalyst for change used by reformers, entrepreneurs and the civil society in the region.

Democratic access to information also means exposure to diversity of views, openness to different perspectives as well as interaction between communities. Chen (2004) argues that knowledge sharing promotes activities and processes that promote political and social barriers. This implies that digital libraries can encourage mutual understanding, social tolerance and the realisation of shared values and aspirations between peoples of different ethnic and political backgrounds. Moreover, information facilitates better citizens’ perceptions of government policies and their implementation as well as NGO-funded development projects.

The overriding conclusion from this discussion is that, better provision of sector-focused information can be an effective strategy for the Sub-Saharan countries to achieve their development aspirations. By connecting people to information sources more efficiently, digital libraries can contribute to people’s empowerment, sustainable economic growth, quality educational process, strengthening of democracy, increase transparency and accountability in governance, promote human rights, enhance cultural diversity and foster peace and stability in the continent. Establishing digital libraries is therefore a strategic action necessary for bringing about social change in the Sub-Sahara.

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### Digital library initiatives in Sub-Saharan region

The last few years have witnessed the emergence of initiatives to promote access to electronic information in the developing countries. Most countries in the Sub-Saharan region are beneficiaries of these programmes on account of their low gross domestic product (GDP) per capita. The following are some of the best examples of success stories:

- *PERI – Program for the Enhancement of Research Information.* This is one of the programmes of the Oxford-based International Network for Availability of Scientific Publications (INASP). The overall objectives are to: facilitate access global countries by developing countries; support publication of in-country research findings; and provide information skills for researchers, librarians and publishers. Through discounted pricing academic and research institutions in the Sub-Saharan Africa can access thousands of e-journals.
- *AGORA – Access to Global Online Research in Agriculture.* This programme is designed to enhance the scholarship of the many thousands of students, faculty and researchers in agriculture and life sciences in the developing world by the Food and Agriculture Organization (FAO) together with major publishers. It enables developing countries including those in Sub-Saharan Africa to gain access to a specialised digital library collection in the fields of food, agriculture, environmental science and related social sciences. So far AGORA provides a collection of 892 journals to institutions in 69 countries.
- *HINARI – Health InterNetwork Access to Research Initiative.* This is a programme set up by World Health Organization (WHO) together with major publishers, and enables developing countries to gain access to global collections of biomedical and health literature. Presently over 3300 e-journal titles are now available to health institutions in 113 countries, benefiting many thousands of health workers and researchers, and in turn, contributing to improved world health.
- *ADL – African Digital Library.* This is a collection of e-books jointly created by the by the Association of African Universities (AAU), Technikon SA (TSA) and netLibrary, an American company that specialised in setting up digital libraries for universities and companies. The objective is to develop a digital library that is available free of charge for residents of Africa for academic and business purposes. Established in 1999, today ADL boasts of a collection of 8,000 book titles.

### Strategies for future development of digital libraries

#### *Provision of digital library infrastructure*

Digital libraries depend on information and communication technologies (ICT) infrastructure to facilitate distributed processing, high-speed networks, information processing, storage and retrieval, user interfaces, geographical distribution, security, high quality presentation and perpetual availability of digital information (Chowdhury and Chowdhury, 1999). To transform into digital libraries, libraries in the Sub-Saharan region require commitment to the use of modern information and communication technology as a strategy of choice in achieving information service objectives.

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The development and maintenance of digital libraries calls for investment of considerable financial resources in digitisation equipment, and computer servers, developing information retrieval capabilities via network infrastructure, purchase of electronic information resources and retraining of library staff on digital library management skills. With the ever-changing media technology, there will always be costs of continued upgrading of the digital infrastructure. Given the uncertain nature of ICT infrastructure in the Sub-Saharan region it may need to maintain parallel conventional and digital system (Mutula, 2002; Jain, 2006).

#### *Content creation*

Information is not an end in itself, but simply a means to an end and can therefore only be useful if it is of the right quality, timely and relevant to the specific needs of the user. There is need to amass digital information content that is relevant to the communities in the Sub-Saharan Africa and which is based on needs analysis to determine the requirements of different consumers and reflect the aspirations of communities in the region. For example decision and opinion leaders, researchers and communities need access to a wide scope of information resources covering issues facing the region such as health (e.g. HIV Aids, malaria, etc.), improvement of trade and industry food security, gender, development and education.

According to a research by Mchombu (1984), rural communities in the Sub-Saharan Africa require a diversity of information applicable to their daily life covering health, careers and occupation, sanitation, nutrition recreation, education, legal issues and culture. This kind of information will sensitise communities to their situation and how it can be changed; instil development consciousness through skills and abilities (Mchombu, 1984). Students, on the other hand, need access to a wide variety of national, regional and international electronic information networks, including electronic libraries that contribute to their learning process.

Findings of a research by Wang (2003) indicate that digital content for university students should include journals, textbooks, newspapers, encyclopaedias, magazines, maps and multimedia resources that are relevant to the curriculum. Carnaby (2005) has noted that libraries can contribute useful content significantly in from teaching and research. This can be achieved among others by putting local information into virtual databases, digitising research reports, thesis, papers and dissertations produced in the continent and government document.

#### *Information literacy skills and lifelong learning*

To ensure that digital libraries are fully utilised, there is, need to develop learning and education as a life long process through information literacy programmes. In a digital library environment, end-users are expected to interact directly with computers to fulfil their information needs. They should therefore acquire skills to create structure, locate, search and use materials in digital formats (Wang, 2003). This is especially urgent in the Sub-Saharan region where experience and tradition of use of library and information are limited among the vast majority.

Information literacy efforts need to develop view of information as a crucial resource and provide consumers of information with skills on how to extract, evaluate and use available information resources for their different needs. Because of their closeness to the people, libraries in the Sub-Saharan region are well placed to training

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various categories of people at various levels so as to empower them with skills to access and exploit electronic resources and integrate the various information sources in the production of knowledge.

#### *Digital librarian competencies and values*

The digital environment requires a variety of new skills on the part of librarians to enable them to establish digital libraries and provide user services effectively and efficiently. Particularly, library personnel are expected to meet the challenge of providing information literacy skills of harnessing and applying information in concrete situations. According to Bawden (2005), apart from the traditional skills of information organisation the library and information science (LIS) professional are expected to be firmly grounded in ICT-related competencies such as core hardware and software skills, web design, internet searching and evaluation of electronic information.

In the past the library field in Sub-Saharan Africa has been characterised by inadequate or outdated skills among the staff, which render library personnel inadequately prepared to function in the present dynamic electronic information environment (Were, 1990; Raseroka, 1999; Rosenberg, 2005, 2006). There is hence a dire need for substantial investment in order to improve and update the knowledge and skills of library and information personnel in the region to face the fast changing information and communication technology. Chowdhury and Chowdhury (1999) have argued that modern LIS training courses should address the fundamental issues in digital library development such as of digital library collections, information services and access to digital libraries, technical skills and infrastructure, social and economic issues, skills for fundraising, consortium activities, negotiating with authors, publishers and suppliers, and managing development projects to enhance the library services.

#### *The need for collaborative efforts*

Digital libraries project can only succeed through the collaboration between different stakeholders such as those who create information and the people who use it and their needs. There also need for expertise from various LIS domains, including information acquisition and processing, reference services, classification and indexing. LIS professionals must also collaborate with other players in the information field such as researchers, IT specialists, information seekers and information providers, content creators and publishers. The economic difficulties experienced in the Sub-Saharan region, the exploding information universe, the fast changing information and communication technology, as well as cost of modern information technology make it necessary for libraries to pool resources together nationally and regionally so as to provide quality electronic services.

Organisational self-sufficiency is an unachievable dream but through cooperation in establishing and providing digital-based information services can lead to success. Co-operation and networking could lead to wider access to collection, and enhanced operations by sharing resources, reducing duplication and offering more cost-effective services through capacity building initiatives and innovative financing, and assisting to achieve economies of scale and lower costs. This is already happening in countries such as Kenya and Uganda in the form of consortia with great benefits (Rosenberg, 2005). Global collaboration with donor agencies and foundations can enable

Sub-Saharan libraries access information resources in other parts of the world and gain the tremendous experience, knowledge and skills already established elsewhere.

At the local level, libraries and information centres must co-ordinate their efforts with learning and research institutions, development agencies, community organisations and government departments. This will ensure that locally generated information is gathered, and digitally stored. This will in turn be delivered to all and especially remote and isolated communities that are presently disadvantaged by lack of information infrastructure. In the same vein LIS professionals must also develop strong collaboration with community leaders and opinion leaders to champions for establishment and improvement of digital libraries.

#### *Copyright and contractual agreements*

With the transition from print to digital information there are fresh questions on the application of copyright laws in a digital environment. This is an issue that may curtail libraries in the Sub-Saharan Africa in their bid to create and use digital collections due to weak regulatory framework in the region and the unclear global copyright law on digital information. Chowdhury and Chowdhury (1999) have insisted there is need for changes in the current copyright law to protect the interests of owners of intellectual property but facilitate efficient user access to digital items. There have been calls for the revision procedures and policies under the copyright law to allow libraries pursue their key objective of acquiring and facilitating digital information unhindered (IFLA, 2001). One noticeable trend is the use of contractual agreements entities within the information chain such as libraries and suppliers of electronic information. There is need for LIS professionals in the Sub-Saharan region to address this issue if digital libraries are to be established on firm foundation of practice.

#### *Standards*

Just like in traditional libraries, standards are essential in a digital library environment. Access to a variety of media requires a standardised method of organisation of and retrieval (McDonald and Kebbell, 2004). Standards are especially critical in the digital environment in that they facilitate: integrated interface to different kinds of resources; unified searching across multiple systems; unified searching across different metadata schemes with results merged and de-duplicated; unified searching across different formats of material such as bibliographic records and full text; simplified authentication and authorisation for the user; dynamic reference and citation linking (Cox and Yeates, 2002).

Today libraries in Sub-Saharan region in the process of putting in place digital-based systems such as electronic library management systems, creation of local area networks, purchase of digital information in diverse media and quest for access virtual databases and creating local content. In the stampede for the promised digital paradise there is little or no co-ordination between institutions even within the same country. This may lead to lack of interoperability that will defeat the goal of seamless access to information and resource sharing.

#### *Preservation and archiving*

There is general agreement among scholars of LIS on the need to ensure that digital libraries continue into the future so that digital objects can be accessed in perpetuity.

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However debate still ranges on the best archiving practices (Cordeiro, 2004). Yakel (2004) has proposed a number of approaches:

- Unit-based digital repository in which the archive is part of the library system and undertakes archiving activities for specific unit within an institution.
- Institutional digital repository whereby a single archives is set up for the entire institution instead of one for each unit.
- Trusted digital repository whereby a third institution is given the archiving role.

Lor (2005) believes that libraries in the Sub-Saharan Africa are incapable of archiving digital collections due to the current funding and infrastructural problems in the region. He therefore proposes that repositories in developed countries should spearhead archiving for the region. This suggestion goes against the spirit espoused by several digital information partnerships in the Sub-Saharan region of promoting self-sustainability of libraries in the region. Besides, shifting of archiving responsibilities to the developed countries could reverse the gains made through regional consortia as well as by individual local institutional efforts. This will only serve to deepen the lamentable North-South digital divide.

Several digital library initiatives have been reported in the Sub-Saharan region (Lor, 2005; Rosenberg, 2005, 2006). Although these efforts are still at their infancy there is need for a system of data capture preservation and archiving to be established. There is for stronger partnerships with professionals and institutions in the South with those in the North to ensure that preservation and archiving in African digital libraries is part of the ongoing digital library initiatives in the region. Particularly, purchase agreements with North based e-information aggregators should address perpetual access to electronic information items by users and institutions in the South.

#### *The need to address the digital divide*

There is a growing concern that the digital library will lead to further consolidation of information power in the hands of a few and widen rather than bridge the existing information divide within and between countries (Gore, 2000; Huang and Russell, 2006; Sigh, 2002). Presently libraries in the Sub-Sahara are concentrated in cities and major academic and research institutions. The high costs of modern ICTs make it only accessible to a privileged category of citizens (Mutula, 2002; Jain, 2006).

Faced with lack of access to PCs, telephone lines and internet connection the large majority of Sub-Saharan communities stand to lose out in the information society. This means that if the issue of democratic and equitable access to information especially in the region is not adequately addresses it can lead to further alienation isolation and disempowerment of certain ethnic minorities, rural communities, women and youth. The governments and professionals in the region have the duty to address the issue of digital divide between groups of classes and communities and enable every body harness the power of knowledge to improve their lives.

#### *National digital library strategy and framework*

The establishment of digital libraries is a gigantic undertaking and many writers have advised that to succeed there is need for a government-backed national digital library strategy (Carnaby, 2005). Chen (2004) has observed that the spectacular success of digital libraries in the USA can partly be attributed to Federal Government policy

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commitment to implementing the concept. This led to projects such as the Digital Library Initiative (1994-1998), which focused on advancing the means to collect, store and organise information in digital forms and make it available for searching and retrieval and research into various issues, relating digital libraries such infrastructure.

Governments of the Sub-Saharan countries can facilitate the establishment of digital libraries by fostering the necessary political, legal and institutional conditions under which the information sector and particularly information services institutions like digital libraries can thrive. This includes developing library and information service policies, developing viable library and information and communication infrastructure, and legislating on issues such as intellectual property rights, privacy and free flow of the necessary content and knowledge.

Library and information policy is especially useful in facilitating equitable access to digital libraries for all sectors, groups and communities of the society. This can be achieved by setting out the role of the information in promoting socio-economic growth, establishment of digital libraries and creating strategic goals, structures as well as funding, advisory and co-coordinating mechanism for the sector. To enhance funding it is particularly important to create an environment in which the internet business will grow into a self-sustaining enterprise through liberalising the communications sector to allow for more investment and competition which will in turn lead to lower cost of digital library infrastructure.

### **Conclusion and recommendations**

Digital libraries are becoming more and more prevalent worldwide and there is no doubt that the future of knowledge creation and information sharing lies in electronic networks. To reap the most out of the twenty-first century the Sub-Saharan countries need to position themselves in the information revolution by putting in place the infrastructure to facilitate better knowledge gathering, processing, distribution, access and application. Digital libraries will enable libraries in the region to reform their knowledge management approaches to services and therefore boost their capacity to enhance modernisation of the communities they serve.

One of the constraints experienced by libraries in the Sub-Saharan region in bid to transit to digital mode is lack of adequate budgetary support necessary for collection building, remuneration of qualified staff, setting up buildings and installation of modern information technology. With the worsening economic situation in the region, the funding situation of libraries is bleak. Critical is the failure by governments and communities to recognise the centrality of information as a key factor in social and economic progress and library services as useful means to provide equitable access to information. Consequently there has been growing marginalisation of the libraries, which has precipitated loss of vital confidence from all classes of stakeholders further jeopardising their ability to contribute to the development process. This can be reversed through deliberate government action to improve infrastructure as well as collaboration between the various players and development partners.

Independent information search, usage, analysis and integration of different sources are the enduring hallmarks of the digital age. With the proliferation of digital libraries, well-trained library and information personnel are in great demand to train information users in the use and evaluation of electronic information. Digital libraries present a new paradigm that challenges LIS professionals in the region to rethink their

roles in the electronic environment. There is therefore urgent need for the traditional library education to be re-thought to enable the professionals meet the challenge of investing in digital libraries. There is need to train information professionals in the management of electronic information by giving them skills such as designing and administration of electronic networks, electronic reference services, skills for electronic information literacy teaching, and evaluation of internet information. Even more important would be training in digital library management activities such as supply models, searching, downloading, document delivery, archiving, software, copyright, licensing and managing and access. Presently, digital libraries are expensive to build, however their components are steadily becoming cheaper and order for Sub-Saharan countries to reap the long-term benefits of digital libraries the time to invest is now.

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