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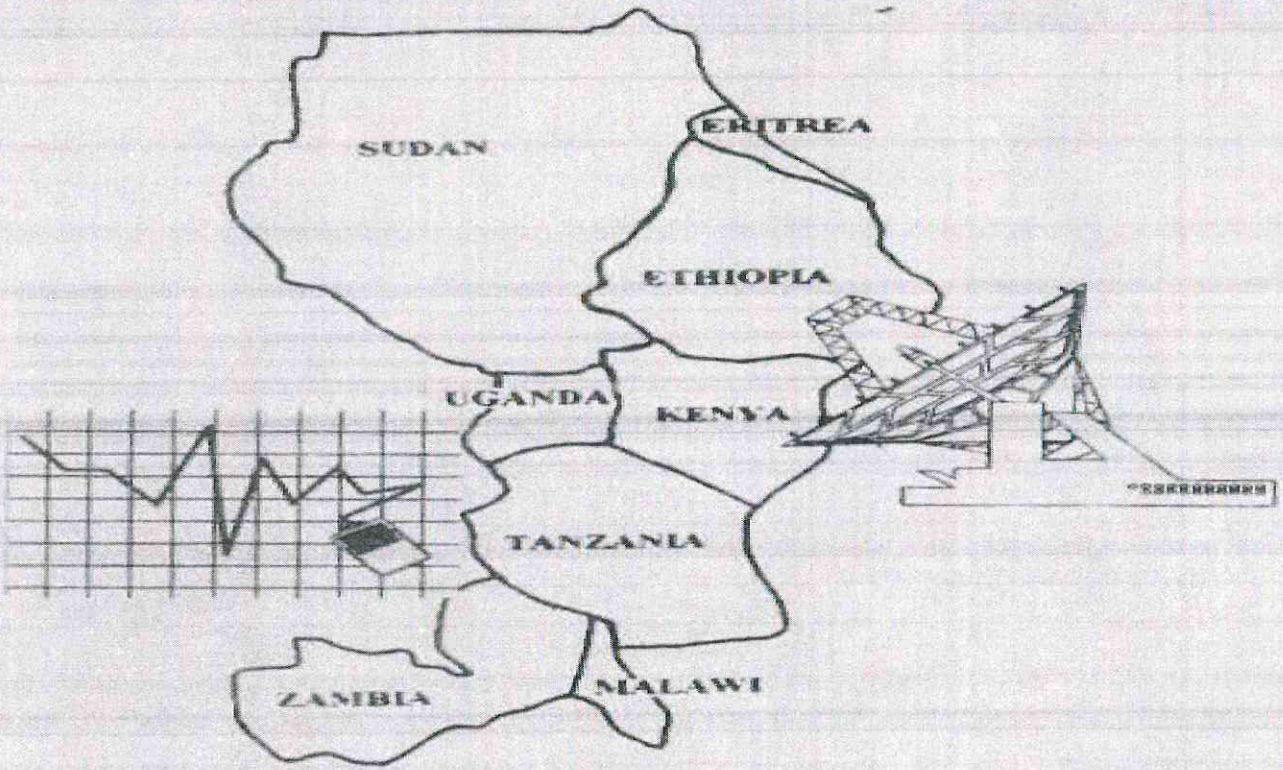

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Adoption of Electronic Journals in Scholarly Communication in African Universities: A Review of the Critical Issues

Kavulya, Joseph M., PhD

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Abstract

The advent of new information technologies, and in particular the internet offers advantages in terms of rapidity of scientific and scholarly communication and Universities worldwide are fast moving from the subscription of journals in print to electronic formats. However, for universities in Africa the transition to e-journals is hampered by high subscription costs as well as challenges relating to the administration, access and archiving of e-journals. This paper argues that, if African scholarship is to benefit fully from e-journals the above issues and specifically those of internet infrastructure, lack of information and specially those of internet infrastructure, lack of information and communication technology skills among librarians and inadequate budgetary support to university libraries in Africa have to be addressed.

Keywords: electronic journals; scholarly communication; Africa, and libraries

Introduction

The continued production and dissemination of knowledge is based on literature (or knowledge) generated by others across space and time. As such the generation of knowledge is only one part of the research process since for such knowledge to be useful, it should be shared with or communicated to other researchers and to different users/stakeholders in a suitable format. Therefore the communication to colleagues and students of results, observations and interpretations from one's

research in scholarly journals is an important part of scholarship. The importance of journal collections lies in their central role in scholarly communication (Kortelainen, 2004). Scholarly communication refers to the various activities and means by which members of the academy exchange information. This includes formal publication of research, informal discourse among colleagues, class discussions and lectures, data retrieval through local and global networks, and the continuing access to the scholarly record in print and digital libraries.

Journals function first, as a tool for the advancement of knowledge within a domain (Keefer, 2001). Secondly, publishing in scholarly journals provides the mechanism to assess the quality of contributions that individuals make to a discipline and therefore a channel through which individual faculty members demonstrate their worthiness for tenure, promotion, grants and fellowships (Roberts, 1999). Finally, for universities which are at the centre of knowledge creation, academic journals are a critical as means of certification, dissemination, indexing, and archiving of research and scholarship (Cummings, 1991).

The advent of new information technologies, and particularly the worldwide web (WWW), has radically transformed scientific and scholarly communication, foremost of which is the transition, from publishing and subscription to journals in print, to electronic formats. This has given birth to what has become known as e-journals, a term which refers to full text periodical publications available in electronic form and distributed by, for example, email or WWW via the internet. Like the printed formats, they cover a wide variety of subjects, and sometimes they are print and electronic versions of the same journal. There has been rapid transition to e-journals prompted by their perceived advantages. In the first place, unlike those in print, e-journals facilitate speedy delivery and access of information, unfettered by time, geography and searching facilities. Text in electronic form is instantaneously transmittable and accessible which makes it easier to acquire the relevant scholarly articles for given projects. Hence academics can save time on a task not directly related to the actual reading of the article such as information retrieval (Brown 1997). Hitchcock et al. (1998) argue that the easier it is to find published research findings the fewer

the duplicated research undertakings there will be, resulting in less wasted time and resources.

In the second place, the transition to electronic format removes the main impediments to resource sharing such as the cost and inefficiency of interlibrary services. This is because of their relative ability to be accessed by any number of people at any time at any place. This is a particular advantage to Third World universities because with internet access it is not necessary for each institution to subscribe to every journal but rather, acting in consortium, benefit from lower prices (Neal 1997). Thirdly, the transition to electronic journals eliminates storage costs incurred by print journals since they demand less space in libraries. Finally, e-journals make it possible to publish and access materials for which publication is inadequate such as three dimensional, graphic, moving simulation or animations or dynamic visual representation (Horoviak & Seitter, 1997). Consequently, e-journals offer an opportunity to speed and expand the range of scholarly communication and therefore their adoption is a requisite for a more efficient generation of knowledge through research and dissemination of findings.

In order to provide the scholarly community with more efficient access to information, university libraries worldwide are fast shifting from the subscription of journals in print to electronic formats. This is part of the global realization of the centrality of information in teaching, learning and research, and the accompanying trend by universities and research organizations to harness the advantages of modern information and communication technology in scholarly communication. This entails installation of electronic information processing systems and the creation of institutional, national and international electronic information networks using, especially, Internet technology.

This paper examines some of the critical issues that need to be addressed if African universities are to fully benefit from the advantages offered by electronic journals. Foremost of these issues are the subscription costs, administrative requirements of e-journals, policy and technological issues relating to usage and access as well as how to guarantee permanent access to e-journals through comprehensive archiving programmes. The basic prerequisite for the transition from print to electronic

journals is the need to establish affordable and reliable Internet infrastructure in the form of telecommunication networks, and the necessary computer hardware.

This paper adopts a review approach whereby current literature dealing with e-journals is examined in relation to the prevailing status of university libraries in Kenya. The main observation is that for universities in Africa, the transition to electronic journals is still at infancy especially because investments in library and information services in Africa is inadequate and inputs to library development have been largely low scale and uncoordinated (Rosenberg, 1997). The paper argues that if African scholarship is to benefit fully from e-journals the above issues and specifically those of internet infrastructure, lack of information and communication technology skills among librarians, as well as inadequate budgetary support to university libraries in Africa have to be addressed.

Issues in the Adoption of Electronic Journals in African Universities

(i) Cost of e-journals versus printed formats

Journal costs has been the subject of much discussion in the scholarly world for many years due to the continued increase in the percentage of the university budget devoted to their subscription. There was hope that subscription of journals in electronic format would be less expensive and the expectation that universities could save money by transition form print to e-journals (Pikovosky, 1997). However, the development of e-journal collection has turned out to be expensive both in terms of subscription and the staff resource requirements to manage the process of acquisition, cataloguing and access, as well as costs in training users and staff. Although some scholars have argued that savings of up to 70% are possible, publishers claim that savings for electronic publishing would not be more than 30% (Whisler & Rosenblatt, 1997). A number of studies have been carried out to determine the savings accruing from transition to electronic journals, but it has been observed that most of these analyses use subscription costs and ignore

operational costs associated with the management of e-journal collection (Odlyzko, 1998). In a later study, Odlyzko has concluded that operating costs of e-journals are at least twice as high as the acquisition expenses of the print formats (Odlyzko, 1999).

The main constraint experienced by library services in African universities is inadequate budgetary allocation. This is vital in ensuring the addition of new information resources in the existing areas of study and research, and in creating new disciplines or extensions of existing ones. This lack of financial resources makes the implementation of coherent book and print journal purchase programmes very difficult, and therefore subscription to electronic journals is an added burden to an area already battered by neglect. This is illustrated by a 1992 American Academy for the Advancement of Sciences (AAAS) survey, which indicated that above 30% of the responding universities in Sub-Saharan African did not subscribe to any foreign journals and that only 3% subscribed to more than 500 titles (Lispeth, 1993). More recently, Simui and Kangengo (2000) and Were (2002) have restated the inability of university libraries in Zambia and Kenya respectively to acquire new books and subscribe to journals due to funding problems. With the added cost of electronic information it is clear that any meaningful transition to e-journals will require African universities to increase resource allocations for library and information infrastructure.

Two viable options, which can assist African universities to stem the high prices associated with e-journals include, first, focusing on access instead of ownership of journals. This involves using documentary delivery services to provide articles on an individual basis as needed instead of subscribing to a journal. Secondly, universities should seek to act in consortiums to cooperatively collect and access several electronic journals and other electronic resources as well as to create and manage archives of journals for continued access (Meyer, 1997). Studies on the viability of consortiums in Germany have reported significant price reduction in terms of access costs (Schäffler, 2001; Nape, 2001).

(ii) Administrative and skill requirements of e-journals

Apart from cost implications, electronic journals present fresh administrative challenges to universities that require, first, more human resources and secondly, a new set of skills that include negotiation techniques and specialized skills in electronic information management. Library departments, which are charged with providing information services to support teaching and research activities in the university, are expected to undertake journal selection, acquire the right subscription information, and successfully place orders. They are also expected to retrieve and download the texts, and ensure that the scholarly community has easy, adequate and unfettered access to this electronic information through proper cataloguing and indexing.

The increasing quantity of unfiltered electronic information has made it even more important to apply stringent standards to any publication before it is put in the library collection. While the selection of print-based journals has been based on factors such as level of demand, suitability of journals to the institutional needs, and impact factors based on the analysis of citation indexes and the reputation of the publishers, in the case of e-journals other factors have to be taken into account. These include the format of electronic files, the type and quality of delivery, and price based on number of potential users, simultaneous users and contractual restrictions (Keefer, 2001). Unlike the case of print journals where once a subscription has been established the only task that remains is to monitor the arrival of individual issues, electronic journals acquisition include ensuring that URLs (Uniform Resource Locater) remain active and that new information is added according to the schedule announced by the publisher (Raney, 1998). Unlike in print where details of a paper journal remain constant and therefore easy to find, websites change their URLs or they frequently disappear altogether.

Unfortunately across the African continent the prevailing situation is characterized by endemic understaffing of university libraries, compounded by the problem of outdated skills. This renders library personnel inadequately prepared to function in the present information technology era (Raseroka,

1999). The changing information environments demand the use of information technology (IT) skills as a tool in the provision of scholarly information. The library personnel are expected to meet the challenge by first accessing and organizing the global electronic information and secondly, by providing guidance and training users in the best methods of harnessing useful information. Unless librarians across the continent are given appropriate skills to manage e-journals and electronic-based services, universities across the continent will continue to lag behind in the adoption of electronic-based academic and scholarly communication.

(iii) Technological and access issues in the use of e-journals

On the subject of access to electronic journals some issues need to be considered which include technological requirements of access and delimitation of use, and finally whether e-journals are be accessed directly from the publishers or via aggregators (Buckley, 1999). One of the technological challenges to the use of e-journals is the existence of several interfaces and delivery mechanisms with which the user may be required to become familiar. Even though the Web has become the main method of access and PDF (Portable Document File) as the dominant method of delivering full-text, the implementation of the features of the Web by different publishers varies considerably with a variety of search options and navigational tools. The various methods of access and the multi-media features appearing in electronic articles such as sound or video clips require, first, the installation of appropriate software and hardware to access them and secondly, the ensuring that both the faculty and student possess internet use skills (Edwards, 1997).

Another technological factor, which has a bearing on the usage, is that publisher licences for electronic journals allow access only to *bona fide* members of the institution holding the licence. This creates the need for universities to evolve methods of providing access while restricting the use of e-journals to members of the institution holding the licence. One method applied to delimit use of e-journals is, first, to use the Internet Protocol (IP) address of the user computers by issuing password(s)

to the subscriber. While use of IP is convenient t the need to establish the range of permitted IP addi institution and to notify changes constantly to the While this is not a major problem, access by users is to their institutions since they are not being able journals from home and office, and this negates one of advantages of e-journals: universal 24-hour access unfettered by distance. The second method is the use of passwords, which ensures that users can access e-journals from any internet terminal. Institutions opting for this alterative face the challenge of creating a mechanism of issuing passwords only to authorized users (Buckley, 1999).

The issue of usage has also to do with the fact that e-journals are acquired under licences for using the material over a specified period of time and under stipulated conditions. A typical licence for a university may limit access so as to include only students and full-time faculty and staff. This arrangement fails to address the needs of other groups such as visiting professors, part-time students, or students of other local universities and institutions who have access to the library collection. Licence prohibition of forms of use such as downloading, printing, and interlibrary loans may infringe on the university's right and ability to serve their clientele. Therefore subscribing universities must ensure that terms of procurement of e-journals are flexible and in line with institutional library service objectives.

A decision has to be made at the institutional level on whether to access full-text journals directly from publisher or through aggregators who conglomerate journals of several publishers under one interface and search system. The main advantage of accessing journals directly from publishers is lower subscription costs due to absence of intermediaries and value-added features (Luther, 1998). However there are also advantages to using aggregators. First, they maintain up-to-date journal and subscription information, thus provide a single source of information on serials consistent with the needs of customers. Secondly, they provide infrastructure that facilitates simplified access to full text electronic journals regardless of the format, for example whether PDF, Hypertext Markup Language (HTML), or the American Standard Code of Information

Interchange (ASCII). Finally, aggregators assist to alleviate the administrative workload of libraries such as handling back issues, renewing existing, processing and ordering new subscriptions (Knibbe, 1999). In other words, agents have the technological infrastructure, skilled personnel and well developed services to accommodate the requirements of acquisition and use of electronic journals, which university libraries need not duplicate.

(iv) Archiving of e-journals for continued use

As African universities replace print journals with electronic formats, they need to create an infrastructure for archiving e-journals so as to guarantee their continued access for future research and scholarship (Hedstrom, 1995). The options available for archiving of e-journals are: housing journals locally, accessing them directly from the publisher's site via remote connection, or relying on subscription agents to archive the journals. It can be strongly argued that, since it is critical for the teaching and research fraternity that permanent archival access to information be available, universities cannot rely solely on external providers to be their archival source. However while local archiving gives universities greater control over the journals and their accessibility, it is costly in terms of development and storage.

Remote access of e-journals from suppliers' sites means less costs to universities, but it removes the assurance of permanent access in the future since it is not certain what will happen to the journal content in situations such as if the subscription is cancelled or the publisher ceases to exist. Furthermore, it has been observed that publishers are presently not proactive in long-term archiving though some have been involved in collaborative efforts in developing archiving tools and techniques (International Coalition of Library Consortium, 1998). Collaborative action between publishers and universities or among universities has been cited as a compromise solution to the archiving problem. A good example is the collaboration between Yale University and Elsevier Science publishers to develop a digital archive to over 1100 publishers by Elsevier Science or the Online Catalogue Library Consortium (OCLC).

This collaboration guarantees universities and other institutions permanent access to contents that have been acquired, as well as the future migration of these contents to new platforms or formats (Costers, 1995).

Alternatively, it has been argued that aggregators or subscription agents are better placed to undertake the task of archiving. Aggregators have the advantage over both publishers and universities since they are able to offer all available advantages of scale in managing electronic storage, optimizing the use of networks for distribution, providing superior search interfaces and engines, and taking steps to integrate materials from diverse sources into a coherent whole (Getz, 1997). The diversity of alternatives in e-journal archiving underlines the fact that any decision made by African universities in this respect should be based on serious examination of its long-term availability and access to this scholarly information.

Archiving of e-journals is far more complex than the preservation of print collections, and there are technological issues to be addressed. Preservation efforts have to cope with factors such as hardware obsolescence, software dependence, as well as degeneration of the physical medium. This calls for measures such as 'migration' – the periodic transfer of digital materials from one hardware or software configuration to another, or from one generation of computer technology to a subsequent generation which preserves both the integrity of the digital objects and maintains their usability in spite of constantly changing technology (Sommerlad, 2000). This issue needs to be addressed especially in African universities where computer hardware and software have to be imported amidst financial constraints and the training of personnel to manage advanced information communication technology is still in its infancy.

A final problem related to archiving is that publishers and vendors licence specific rights of use of a journal or a group of journals for a limited period of time, and the terms of licence sometimes exclude copying, distribution and storage for long-term use, which limits the university's control over the information materials. This raises legal issues such as the right of universities to undertake archiving activity and to access volumes already in the publishers' archives, and perpetual

availability of journals even when the publisher goes out of business. Although some publishers such as the John Hopkins Press permit university libraries within the terms of licensing to download and archive their publications, if universities in Africa are to successfully carry out archiving work they have to ensure that agreements to procure e-journals include provisions to purchase and not just lease or provide temporary access (Sommerlad, 2001).

(v) Equipment and telecommunication infrastructure

On a more basic level, efforts by African universities to migrate from print to electronic journals are hindered by inadequate infrastructure and equipment needed for internet operations such as computers, poor telecommunication and internet services prevalent in Africa. Although there is a remarkable recognition of the potential of electronic information handling technologies in Africa, poor telecommunication infrastructure and lack of information and information technology policies to support internet development continue to hinder efficient electronic scholarly communication in Africa (Jensen, 2002). The major problems are insufficient bandwidth for delivering web pages over the internet, and high telecommunication tariffs which put internet connection beyond the reach of many educational institutions in Africa. Any efforts to improve electronic scholarly communication in Africa should therefore include facilitating better access to the information superhighway through improved telecommunication infrastructure on the continent. A development in this direction has been noted in the Sub-Saharan Africa where internet connectivity has increased steadily from 14 countries in 1995 to all of Africa except two countries in 2002 (Jensen, 2002).

Conclusions and Recommendations

Scholarly communication is at a turning point where scientific publications and especially journals predominantly appear only in an electronic format.. Electronic journals are becoming more and more prevalent and universities in Africa

need to position themselves to make the most of these developments in information technology. This is necessary if the academic community in the universities is to keep abreast of worldwide developments in the different academic fields and undertake quality teaching and research. It will also enable African universities to contribute to building a viable knowledge base, and communicate to the rest of the world the African contribution to global knowledge. While the cost of electronic access is presently uncertain, there is no doubt that when printed journals are finally replaced with their electronic equivalents, African universities stand to save in terms of subscription, human and other resources. The transition to electronic journals essentially eliminates space requirements, and university libraries will no longer need to shelve and bind their journals, or replace lost or damaged issues. The elimination of print versions will also reduce publishers' costs, which if passed on to consumers will result in reduction of library costs.

At the same time, if African universities are to successfully transit from print to electronic journals issues of library and information services funding, journal management, access, and archiving need to be addressed. In the first place it is fundamental to have a proper infrastructure in the individual institutions including suitable computers, appropriate software packages and a high speed campus-wide electronic network as well as an adequate number of Internet access points for accessing and downloading materials from the internet. Secondly, there is need to train library staff and enable them keep abreast with the ever-changing skills of acquisition and management of electronic information. Thirdly, there is need for faculty members and students to become internet literate if the e-journal collection is to be effectively used. Fourthly, decisions have to be made within universities regarding issues of accessing and arching of electronic information to ensure continued use.

Finally, the development of electronic journals should also be seen in the context of world-wide recognition of information as the single most critical factor in national development and the global effort by individual countries to reap the unlimited rewards of modern electronic techniques of information

dissemination and access. Therefore at the bottom line, the full realization of electronic scholarly communication in Africa requires the development of reliable telecommunications infrastructure at the national level, which can facilitate the transfer of large quantities of text and data at high speeds. In Africa there are already many projects to convert print journals to electronic format, the majority of which rely on donor agencies. While this is a good beginning, a sustainable electronic-based scholarly communication can only be achieved if the appropriate funding of library and information services infrastructure is put in place.

The author is a librarian at Catholic University of Eastern Africa, Nairobi. His areas of research interest are information and social development, information and communication theory, management of information systems and emerging information and communication technologies.

Correspondence
Joseph M. Kavulya
The Catholic University of Eastern Africa
P O Box 62157
Nairobi, Kenya.
Tel: 891601-6 (Ext)
Email: jkavulya@hotmail.com

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