

The Open Access Movement: Interrogating its potential for inserting Africa in the global scientific information chain

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At present, Africa is at the margin of the global scientific information chain, with a little world science flowing in, and little African science flowing out. This article examines this observation, and reviews the Open Access (OA) movement and related initiatives with a view to showing that these initiatives would ease the flow of scientific publications in and out of Africa. It shows that the expectation that the Internet would facilitate scientific information flow does not seem to be realizable owing to observed low quality of those publications that are deposited on the Net at no cost, the restrictive subscription fees of the high quality sources, in addition to the beleaguering inequity in access and use of the Internet and other ICT resources. Finally, the slow advancement of the OA movement in Africa, the nonchalance of African scientists towards the movement, the non-expression of concern by policy makers, among others, in addition to their implications for scientific activities in Africa, are discussed.

Key words: Open Access, copyright, copyleft, common heritage of humanity, open library, ICT

Introduction

The challenge of how to foster the global free flow of scientific publications should be a matter of serious interest to scientists and their institutions and governments. As a matter of fact, scientists all over the world constitute a single community of people working together to solve human problems; hence, the need to access each other's research results (Price, 1963; Merton, 1973; Mengxiong, 1993). However, there arises the conflict between the rigours of writing scientific papers and managing the complex process of packaging and distributing the papers to all those who need them, and this largely accounts for the critical role of the intermediary commercial publisher. There is a further conflict between the interests of the publisher, who usually has a business motive, and the scientist, whose primary purpose is to share freely the knowledge he has developed with members of the global community of scientists, and in whose interest it is that his scientific publications be widely distributed. The developments arising from this conflict are partly responsible for the relative inequity in the access to scientific publications globally. One of these developments is the copyright question, in which publishers often require intending users of their

publications to pay certain clearing fees before they can be permitted to use, copy, modify, or distribute educational materials. For scientific publications often contained in journals and other serials, this problem can be very debilitating because all authors are not equally capable of meeting this expectation.

It has been observed that the 'big business of copyright' has caused an unprecedented hike in the cost of journals and other sources, with the resultant drastic reduction in individual and institutional subscriptions in recent years (Keller, 2001). As a result, the inequality of access to social, economic, and technological advantages among scientists has become a crucial factor in the formal science; some poor countries, particularly those in sub-Saharan Africa, can be said to be suffering from a severe shortage of scientific information.

In recent years, there has been increasing agitation by scientists, demanding that scientific publications be freed from the control of the commercial publishers. This article discusses some of these initiatives, which are deliberately crammed together as the Open Access (OA) movement. The missions of these initiatives include, among others, advocating that scientific publications be excluded from copyright protection and that scientific papers

be made available to scientists and other users free of charge. Typical examples of these initiatives include 'copyleft', open content, and the view of knowledge as a common heritage of humanity. We are exploring these initiatives with a view to understanding their potentials as well as the challenges they face in trying to improve the poor standing of Africa in the current global scientific information chain.

Table 1. World scientific publication statistics by regions and large countries

Region/country	Publication (%)	Publication/ GDP	Publication/ population
Europe	37.5	165	424
CIS	3.7	125	76
sub-Saharan Africa	0.7	29	-
North America	36.6	163	717
Latin America	1.8	21	22
Industrialised Asia	10.8	69	113
China	2	16	-
India	1.9	47	11

Source: Cetto, 2001

Africa in the Current Global Scientific Information Chain

Based on databases from developed countries, Gaillard (1996) showed that a small group of countries, comprising 20 per cent of the world population, accounts for over 90 per cent of the internationally recognized scientific publications. These countries are also more technologically advanced, and are therefore at a greater advantage when it comes to publishing and distributing the results of scientific activities. Another common piece of knowledge is the underdevelopment of science in Africa. African scientists are considered unproductive, the educational budget is known to be low, and remuneration for scholars is also not encouraging. Where scientific communities are believed to exist; they are fragmented and are not organized (Eisemon and Davis, 1991). Scientific sources are very few and irregular, and are believed to hardly contain the very best of hard science. Furthermore, African scientific institutions are ill-

equipped; hence, research is often based on old and outmoded equipment and facilities (Gaillard and Hassan, 2002).

One of the implications of the above scenario is that scientists from Africa scarcely successfully publish in mainstream journals; their publications are hardly ever read even when they appear in mainstream journals (Garfield, 1983). Worst of all, when they publish in their local sources, the international science community does not recognize such sources because they are not believed to be of high impact, and are often hardly indexed in any international databases.

The regional/ country statistics of the supply of scientific publications into the world chore of knowledge in table 1 show clearly that sub-Saharan Africa (SSA) has not made any significant contribution (Cetto, 2001). The breakdown indicates that sub-Saharan Africa supplied only about 0.7 per cent in 2001, far less than India (1.9%) and China (2%). In a different but more recent study, King (2004) further showed that, South Africa, contributing 0.52 per cent and 0.5 per cent of the total world literature during 1993-1997 and 1997-2001, 0.29 per cent and 0.31 per cent of the global citations, and 0.15 per cent and 0.21 per cent of the top 1 per cent highly cited publications during the same periods, respectively, was the only African country ranked in the scientific impact of nations, as at 2004. Although these statistics may well be a true reflection of scientific activities in Africa (Gaillard and Hassan, 2002), there is sufficient basis to suggest that part of the reason for the low profile of scientists in Africa is the poor access to scientific publications from the developed countries, exacerbated by the institution of copyright (Tagler, 1996).

Copyright, the Publisher, and Access to Scientific Information

Copyright has been traced to the Italian merchants who accompanied the spread of early capitalism to the Netherlands and Britain. The impetus of copyright co-emerged with the bourgeoisie consciousness of individuals in which property rights were asserted with seriousness. The attendant development in market relations and technological breakthroughs, especially the printing press, further supported the arrogation of the copyright of an intellectual property to the publisher. Among other

references, in the sixteenth century, religious conflicts spurred the circulation of pamphlets in England; and these were followed by legislations that banned writings of heresy, sedition, and treason. Scott (2002) argues that this censorship bears the legacy of copyright. The custom of printers and authors having their names listed with their creations began as a law demanding this practice, not for the reason of ensuring that the originator of any information material was given due credit, but in order for the king to keep track of disobedient writers. In 1556, a Royal Charter established the Stationers' Company and granted it exclusive control of all printing in the United Kingdom and the powers to limit the number of publishers as a key strategy for regulating writings (Bettig, 1996). According to Bettig, copyright entered a new stage with the signing of the global treaty on intellectual property in 1994. This development could be attributed to the need to respond to the increasing consciousness of the exchange value of information and the impending information economy.

Although the current structure and practice of copyright, with respect to its tight grip on scientific publications, have made the concept appear misleading, copyright was actually well intended. It was instituted to protect the owner of an intellectual property, but it is today a big business. A property owner is one who originated and developed the property in question. But an antithesis in this development is that publishers have arrogated the right of ownership of intellectual property to themselves instead of to the originators of the property. In the academic circles, this antithesis has become a serious issue (Heftner and Litowitz, 2005).

With respect to scientific publications, however, copyright protection, as presently practised, is somewhat incestuous. This is because the property right of an article for which a scientist could be promoted to the rank of professorship, for instance, developed probably from the rigours of formal science, involving sometimes huge costs, laboratory experiments, and possibly funded by an agency, and so on. Although the scientist might be too busy to be a guardian of this publication, the popularity of the scientist and what is known about him and his works depend on how widespread his ideas are. Usually, a scientist regards this symbolic credit as a worthwhile benefit, and this might be the sole reason for which he embarks upon the scientific activity. Moreover,

the scientist would have contributed to problem solving if his opinions are widely read and, possibly, applied. But the publisher who packages the articles according to volumes and numbers finds market for the package, and retains the copyright, restricting the circulation and use of the product based on his profit orientation. The publisher considers the huge investment in printing machines and other facilities, and the mastery of the consumer market superior to the efforts of the scientist, without whom the new ideas might not have originated.

Ironically, the publisher seeks the services of other scientists to review articles written by one or some scientists, on most occasions, at no cost. At best, complimentary copies of journals are given to the reviewers and other contributors. On some occasions, the scientist is expected to even request the permission of the publisher if he wants to use his article for another purpose. In order to publish an article, the scientist is sometimes compelled to sign out to the publisher the copyright of articles that cost him so much labour and money to produce. This is a very incestuous system. Worst of all, the free materials received from the scientists by the publisher has not reduced the prices of the journal in the market; neither does it guarantee free subscription by scientists and research libraries. This right of ownership of articles is sold to the publisher at no cost, without the publisher even increasing the number of complimentary copies to deserving persons. Thus, these scientists are used merely to improve the quality of the articles written by their counterparts; the articles are then sold back, in the form of journals and other packages, to the institutions which probably sponsored the same research.

Copyright may be very necessary in the commercial art world, where a musician, for instance, would want to retain the right of ownership of his music. Also in the performing arts, an artist wants financial credit for his artwork. This is definitely not the case in the scientific world, where a scientist wishes to instigate new knowledge and push the knowledge to the various interested communities. He thus derives satisfaction only when such knowledge has been found useful in problem-solving. The restrictive clause in the copyright law, however, limits the reproduction of published material. This reduces the number of potential readers, who cannot afford to buy the entire book or

material. And this is detrimental to the author's primary desire – the dissemination of knowledge. It does, therefore, appear that the primary motive of the publisher to package articles in a journal is profit and only when this is achieved will the ideas of scientists find their way into the hands of prospective users. This reduces the spread of scientific ideas. Only those who are capable of buying the sources will have access to the ideas. In a world where access to wealth is uneven, scientists from the developed world have better access to scientific information than their counterparts in the developing regions.

The condition of education in Africa cannot be improved by structures that support the restrictive retainment of copyright by publishers. Educational budgets are known to be poor due to competing priorities, in addition to social unrest, political instability, and economic hardship, among others. Libraries in Africa can hardly pay for the acquisition of the required journals and other resource materials. At the individual level, salaries and emoluments are poor, and can definitely not suffice for personal and family maintenance and the purchase of book materials. Worst of all, the business of printing is capital-intensive, requiring huge financial investments, which are often beyond the capacity of most higher educational institutions. Scientific activities are also very low, and often generate products that are believed to be of low quality (Gaillard and Hassan, 2002). African scientists require access to scientific publications, which scientists all over the world are always willing to make available at no cost, in order to also contribute to and benefit from the world stock of knowledge. What Africa needs is an initiative or arrangement that will guarantee scientists access to scientific publications irrespective of where the sources are developed. Ordinarily, one would expect that such a development would favour African countries; however, there has arisen the necessity for even scientists in the developed world to agitate for free access to scientific publications. In recent years, several initiatives have been developed to tackle the problem of disentangling scientific publications from the aprons of commercial publishers. What follows hereafter is a brief overview of these initiatives; undertaken because of the perceived low awareness and the benefits they could offer scientists.

The idea of Open Access

According to Suber (2003), the history of Open Access (OA) can be traced to the activities of the Open Access movement in the early 1990s. Although we cannot be categorical about this history, there is indication that OA originated from the mass resignation of an entire editorial board in the United States because publishers were charging exorbitant fees for their products (Moller, 2004). This panel of editors subsequently launched their own OA journal which they distributed free of charge. There were also incidents in which universities in the US were reported to have protested against exorbitant fees charged by publishers for their publications. The actions taken by these universities included large cancellations of subscriptions, and new policies against high subscription costs of journals and other library materials. The philosophy of the movement highlighted many related initiatives, some of which are older than OA, but which aim at fostering a free flow of scientific publications. Keats and Shuttleworth (2003) have observed that these initiatives are relatively unpopular in most developing countries. We will, therefore, briefly discuss four of these initiatives, namely: Knowledge as a common heritage of humanity, copyleft, open content, and Open Access.

The Principle of Common Heritage of Humanity

Before the emergence of OA movement, there was a view that knowledge was a common heritage of humanity – this was first propagated by Grotius (1911, cited in Keats and Beebe, 2003). This principle was built on the premise that natural resources, irrespective of where they are located, belong to the whole of humanity. The resources of this world are not evenly distributed; some countries of the world have resources that others do not have but may need. Hence, human existence on earth should be based on mutual surrender to the universal pool of all the resources bequeathed to individual countries by nature for a mutual universal community. Some nations excel in one art (or science) and others in another. While countries cannot be compelled to share their natural resources, it would do humanity much good if they can share them with others, especially those whose survival is threatened by the absence of such resources.

This principle has been applied to address several aspects of social inequity among human communities. Frankman (1990) made the first attempt to articulate all the issues that should be regarded as common heritage of humanity, which captured issues on information flow. They include (i) spoken and written words, (ii) the food we eat, (iii) the clothes we wear, (iv) technological building blocks, (v) property rights, and (vi) even human thoughts. In making his point, Frankman regarded national boundaries as historical accidents that should not deny the rest of the world access to the common heritage of humanity. Although the principle of common heritage of humanity covers a wider range of concern than the copyright of scientific publications, there is an impetus to relate it to access to scientific publications. It is significant therefore that Frankman included spoken and written words and property rights as components that should be regarded as the common heritage of humanity. This actually relates to another initiative known as copyleft.

Copyleft

Copyleft is a 'mockery' of copyright. In its original use, it is a general method for making a scientific publication free, and requiring all modified and extended versions of it to be made freely available as well. People are allowed to share the work and improve on it, if they are so minded. Users can make changes and distribute the result as a proprietary product. It therefore contributes to the advocacy for the abrogation of all copyrights that prevent the free flow of scientific information. Copyleft actually developed from the Open Source software and the Free Software Foundation (FSF) during the early days of the Internet (Stallman, 1999). The concept of 'free' in FSF usage is as in 'free speech' and not as in 'free beer'. Hence this freedom is restricted to use, modification and distribution and not cost. Gradually, open source documents, which developed as a result of the need to provide documentation to Open Source software, is becoming very popular in the US and the UK (Moller, 2004). Beginning with the frequently asked questions (FAQ), in which users of the Open Source software are given the opportunity to inquire from the software providers about how to use the software, and solve problems that arise in the course of using the software, open

source documents have gradually become more available. This has also sprawled across the development of the concept of open content.

Open Content

Content is often defined as anything that is not a computer programme, but can be recorded or stored and reproduced digitally, such as a scientific publication. Open content would then imply unrestricted access to content. The idea of open content originated with a movement formed by David Wiley, a doctoral student at Brigham Young University in the United States, to distribute learning materials for free, but ensuring that the copyright remained with the authors and that the articles would be used responsibly (Wiley, 1999). Based on his knowledge of the open source movement, he wanted to facilitate the prolific creation of freely available, high quality, well-maintained content. This content can be used in an infinite number of ways, restricted only by the imagination of the user. He then developed an open content license, commonly known as Open Publication License (OPbL), which is one of a number of small, related legal instruments for promoting the free and open distribution of knowledge. With this license, anyone can modify, use, and distribute or even sell an object published in accordance with the OPbL, observing certain restrictions.

The various initiatives are discussed together, not because they are the ideas of a particular group of persons, but rather because they are regarded as being guided by the same 'credo', namely, to ensure that information is distributed freely for the good of the public. Their emergence at different times does suggest that there is a common objection to the commodification and commercialization of information, and the strict application of strenuous copyright and intellectual property provisions.

The OA movement would want to eliminate all the factors that inhibit the free flow of knowledge from the South to the North, and vice versa. If embraced, the movement would probably expose the true level of scientific activities going on in Africa and other developing regions, as well as give them access to sources that have been hitherto restrictive to them. In addition, the OA movement will strengthen the science communities of Africa and their national science systems, and very crucially expose those

virile local knowledge sources, systems, and methods that are yet to find their way into the international market of ideas, often because they are believed not to meet international standards. The OA movement will improve the global science system by demonstrating existing alternative strategies and techniques that are not part of the mainstream science systems, but do yield the same results with research executed with standard methods. The OA movement upholds the dictum that knowledge should be a common heritage of man, a right that should be made available to all persons. The OA movement will address the question of the digital divide, which is actually largely due to information discrimination, a situation that can be likened to apartheid, since the pattern of information wealth has been observed to follow race and colour and similar paths. If the developed countries are sincere about bridging the divide, then one of their first priorities will be to address the glaring need of African intellectuals, namely, freeing scientific publications from undue censorship.

Expected Impact of the Open Access Movement on African Scholars

African scientists suffer a two-way publication isolation, which can be addressed by embracing the OA Movement. Using empirical bibliometric evidence, Garfield (1983) showed that the publications of scientists from developing countries, which appear in the mainstream journals of the West, are hardly read by scientists from the West. Among others, this situation arises from a dissonance between the publication policies of higher educational institutions in developing countries and the real essence of science. While the scientist is primarily expected to develop knowledge in order to contribute to problem solving in his environment, the weakness of the scientific communities in most developing countries compels their higher educational institutions to demand that the publications of their scientists be channelled through journals in the West as an indication of merit in the global community of scientists. Hence, the scientist in Africa, for instance, seems to be publishing in order to be recognized to have contributed some knowledge to the international market of ideas, rather than one whose research products contribute to meeting local needs. Secondly, when developing countries' scientists publish in local journals, their articles are

not usually accessible to fellow scientists in the developed world because these local journals rarely go beyond the borders of their countries; they are not available in an electronic format, and are not often well cited in international databases. The OA movement will impact upon this condition in various ways. These include:

Africa / North information flows

There is a need for information produced in Africa (the South) to be transported to the North (countries in Europe and North America), which may not, on their own, buy or subscribe to African journals. Empirical evidence shows that the pattern of scientific information commerce tilts in favour of the developed countries, whose journals are often considered more qualitative and capable of developing the sciences of African countries (Altbach and Teffera, 1998; Gray 2004). There is, however, a need to address the fact that research outputs exist in Africa, which will definitely benefit the North, but hardly get to the North. According to Layashi Yaker (1994:2), United Nations undersecretary general and executive secretary of the Economic Commission for Africa:

Africans are engaged in scientific research and writing and that they are trying to make their findings available to their fellow Africans and to the wider world as well. That is one part of the equation: the other is bringing to Africa this information as well as information produced from around the world so that African scholars, decision makers, and policy makers can make informed plans and recommendations for the future of this region. This is the vital foundation on which we can build our development efforts.

The stark reality is that there is a structural imbalance in the flow of information. The OA movement will address this imbalance, since its philosophy is to promote wider access to information. On the other hand, access to new knowledge by scholars from the South will contribute to obliterating the notion that articles from Africa are often based on antiquated data and ideas. Hence, there are chances

that science in Africa will improve; the rate of rejection of scientific manuscripts will reduce, and the quality of the articles will improve considerably.

Development of scholarly journals

A major characteristic of science in the South is the inadequacy of publication sources through which scientists can express themselves. The OA movement promotes the production of journals in electronic format, which is cheaper and easier for African scientists. The movement will increase the number of outlets available to Southern scientists. Scholarly societies will easily enhance and advance knowledge and promote the work of their members. The OA movement may not altogether improve the quality of articles coming from the South, or even improve the research infrastructure or systems, the improvement will rather be in greater readership and the visibility of the scientists. There is, however, fear that the current attitude of scientists from the developed countries to Southern journals might be carried over to the electronic journal counterpart, such that Southern databases may not be accessed or optimally used by scientists from developed countries. Empirical studies are required to establish the extent to which users of scientific databases are biased by socioeconomic and cultural factors. A similar enquiry, with regard to the pattern of use of African journals in the Library of Congress of the USA, was made by Moravcsick (1987).

Strengthening national science systems

Improved access to scientific publications will contribute to closing the gap in the research culture in Africa. This is very important because physical access to global scientific publications may not be sufficient enough to advance local knowledge production. Open Access will spawn IT connectivity, which is necessary for consolidating human networks and partnerships required to build a strong research culture. Open Access will improve the link between academic programmes and the productive sector; between the networking of local scientific groups and their international peers; and encourage 'brain gain' by attracting foreign professionals, in addition to improving the government/industry/university relationship.

Zezeza (1997a, 1997b) has identified an Africanist intellectual system which does not follow the path of Western scientific ethos, but produces knowledge that works, and should therefore be recognized. Accordingly, the products of this system are often lost through the vetting processes of western publishing houses, university presses, peer review networks, and citation and bibliographic conventions. Hence, the views and vision of African science do not seem to be accommodated in modern science. Open Access will address this imbalance.

The OA movement will encourage the indexing of local sources. There is evidence that scientific data resources in Africa are hardly ever indexed (Nwagwu, 2005a). They are, therefore, often unavailable and inaccessible. The lack of databases of African science has led to several unfounded and sometimes baseless conclusions about scientific activities in Africa. For instance, *Index Medicus*, which indexes more than 3000 journals worldwide, included four Nigerian serials. In contrast, a search of MEDLINE, using 'Nigeria' in any of the fields, yielded 4613 citations. Thus, information on Nigeria is often published elsewhere (Akhigbe, 1992: 22). This would have been different if there were local databases in Africa.

Although there may not be as much research activity in Africa as there are in developed countries, there is clear evidence that more is being done than is reckoned (Nwagwu, 2005b, 2005c). It would rather be suggest that much of the African research outputs that meet the standards of the Northern databases are often organized and indexed in the North and, therefore, are available. Also, African research products available in the Northern databases were likely developed using Northern sources, or developed in Africa but published in sources outside Africa, or even developed and published in the few African sources that are indexed by the Northern databases (Nwagwu, 2004). Whatever the case, there is no suggestion that information on Africa is mainly published elsewhere. But much of the African research outputs that are published locally are not indexed and are, therefore, not accessible or available. The OA movement will encourage local database initiatives and this will, in turn, contribute to improving the visibility of African scientists.

Building the Open Access movement in Africa

How can an Open Access movement be built in Africa? This crucial question must be answered if the strategy of Open Access is to benefit African scientists. Currently, all Open Access initiatives are characterized by the construction of websites containing resources which scientists are expected to use. In the absence of deliberate and organized efforts by communities in Africa, it is yet to be proved whether the strategy of 'build it and they will use it' will suffice in making the movement vibrant. Moreover, participation in the Open Access movement would require the construction of websites, a luxury many African journals might not be able to afford now.

There is a need for a global community of stakeholder groups – librarians, authors, etc – who will come together to champion the cause of the Open Access movement. This is not a difficult task: the Internet will facilitate the connection of all stakeholders. Non-profit foundations at both global and national levels will promote the growth of OA. Some world information bodies, such as the International Federation of Library Associations (IFLA), and international organizations, such as IDRC and the UN, which promote research on information activities, have the necessary means to develop and nurture such foundations. They seem to be committed to disseminating information widely in developing countries (Moller, 2004).

Building the Open Access system in Africa will require investments by national governments because of the huge financial implications of designing tools, providing platforms for management, and making the technology available. Moreover, there has always been the fear that, left to market forces alone, private organizations might not be willing to invest in scientific databases since research is always a long-term investment, with unpredictable returns. Also, the 'free rider' and 'public good' status of information, for which it is quantifiable only in terms of publications, seem to make information a superficial good (Braunstein, 1981; Folster, 1988).

Perhaps the most important step towards the mobilization for Open Access would be to target the researchers and scientists in higher institutions and other research institutes. While mobilization and awareness will be required to prepare the scientists to cooperate with the movement, individual institutions

can actually initiate local Open Access in which articles written by scientists are made freely available to other scientists. A typical example is the open content, which is part of the Integrated Information Strategy of the University of Western Cape (UWC). UWC has also launched its Information into Knowledge Campaign, part of which involves the creation of a Centre of Excellence in Open Initiatives, with a strategy to adopt open content, open source, and open collaboration. UWC is developing a software to support these initiatives (Keats and Beebe, 2003).

In the United States, the Open Access movement has received a massive publicity, courtesy of public statements that endorse and promote the movement. There are declarations by a wide range of stakeholders, including funding agencies, public interest groups, library organizations, academics, not-for-profit organizations and government agencies (Moller, 2004). Many government agencies, such as the Public Library of Science (PloS) in the US and Biomed Central in the UK, have done so much to promote OA (Gray, 2004). Between February and July 2004, the Science and Technology Committee of the UK House of Commons conducted an official inquiry into the availability of scientific publications, giving attention to the question of Open Access journals. The Committee requested written submissions from commercial publishers, not-for-profit and open access publishers, research councils, leading academics, and librarians. These stakeholders later faced a public hearing session, as the committee worked towards determining what measures should be taken by the government to ensure that researchers, teachers, and students have free access to the publications they read. In Canada and Australia, there are Open Journal System Initiatives, which aim to assist journals to go online and become Open Access. These initiatives provide a journal management system that requires little or no technical expertise (Moller, 2004).

There are, however, several pockets of activities in Africa, which show that African scientists are conscious of the implications of the poor access to scientific publications. A major recent initiative is the Open Access journals system (CODOAJ) by the Council for the Development of Social Science Research in Africa (CODESRIA) – it is available free of charge (www.codesria.sn/codoaj). The Association of African Universities (AAU) has also

expressed significant concern regarding this problem (<http://www.aau.org/english/members.htm>). Beyond the efforts of these NGOs, expression of concern and action by high-level national bodies, as in the developed countries, is yet too novel for governments of African countries.

Also, there is presently an opportunity for African scholars to place their journals in the Directory of Open Access Journals (DOAJ), a project of Lund University libraries, Sweden, as well as other Open Access archives. There are also opportunities for African journal publishers to join organizations, such as Bionline, which provides access to research journals produced in Africa through the DOAJ. Moller (2004) has, however, shown that despite these noble opportunities, many countries in Africa are yet to utilize the privilege offered by these resources to internationalize their research sources, except for a few (including Kenya, South Africa, Uganda, and Zimbabwe).

Factors affecting the Open Access movement in Africa

From the foregoing, many African countries, which ought to be the prime beneficiaries of the Open Access movement, have not embraced the movement. Even at the individual institution level, adequate concern about access to institutional publications has hardly been expressed. Except in South Africa, where the University of Western Cape has launched an open content project, no other institutional open content initiative has been identified. All the efforts aimed at liberalizing the access to scientific publications originated from either the United States or the United Kingdom and are by both government and non-government agencies and associations. Initiatives from associations of libraries, associations of provosts, and other high-ranking scientists, as seen in the developed countries, are not yet identifiable in Africa. Editors of local journals should, therefore, prey on the relative non-existence of Western competition to sell their journals and, thus, probably play nonchalance to the problem of universal access to scientific papers. Significant scholarship in the OA movement is not even identifiable. Libraries and social scientists should have, by conventional wisdom, embarked on studies that could generate debate on why African scholars deserve uncopyrighted access to scientific papers of developed

countries. Rather, African scholars seem to be satisfied with some coping mechanisms, in which retrospective and back-number journals are bequeathed to their scientists by retiring scholars from the North or by some form of benevolence of developing countries' institutions and international agencies.

The dangerous consequences of this negligence for further isolation of Africa and its scientists are not obvious now. But one can learn from the Internet revolution. African countries only started participating in and initiating programmes to contribute to and govern the Net in the latter part of the 1990s, with the consequence that there is today little African influence at all levels of the Internet (Nwagwu, 2005a). There is no assurance that the open content initiatives being championed by Western scholars and associations will ultimately be of benefit to Southern scholars. There could be, for instance, peculiar policy positions and requirements in developing countries, which could make the initiatives serve better the purpose and meet the needs of their countries' scholars. But such positions cannot obtain except African scholars express consciousness about the negative impact of poor access on scientific content. This also applies to the efforts by different communities to reap from the wealth of the present electronic revolution. For instance, the question of digital preservation, namely, the identification and retainment of appropriate information originally created digitally (and not on paper), has not yet been addressed. Some electronic journals are presently available at no cost. If the current observed pattern, in which journals first capture their audience and then request the audience to subscribe to the journals in order to have continued access, is a good signal, and if the library of the future would be digital, then it is right to expect African countries to start addressing the problems of digitization and other related issues. It is only in this way that Africa would have a reservoir of usable knowledge that can be bought by scientists from other regions. As a matter of fact, the effort of developed countries to free scholarly publications from the stranglehold of publishers and to enhance the wider dissemination of scientific articles free of charge can be considered a largesse that African scientist and science community would grab.

There are other issues related to the pattern of access to Internet resources and other information

and communication technologies (ICT) (Chisenga, 1999). Despite having a very rapid rate of Internet penetration, Africa still lags behind in Internet connectivity. This is very crucial because much of the efforts in the electronic revolution to free scientific publications from the publisher are linked to Internet facilities. Scientists who are not connected to the Internet are automatically excluded from publishing in and benefiting from a growing number of journals published on the Net. This is because many new journals are created online, while old ones now have online versions. Furthermore, the new ICT applications are frequently designed without considerations for the social and environmental realities of the developing countries (Anyimadu, 2003). As pointed out by Arunachalam (2000), the gulf between the levels of information and communication technology in the developed and the developing countries tends to widen further with the rapid expansion of the Internet in the West and the speedy transition to electronic publishing; and this can lead to increased brain drain and dependence of African scientists on foreign aid of various kinds. Indeed, for many scholars, electronic publication has failed to address the problem of accessibility; one of its promises – lower costs, irrespective of who has to pay for them in the end – is simply not happening fast enough. In fact, there are strong indications that consumers (scholars, their libraries and institutions) are paying for the development of electronic versions of scholarly information (Create Change, 2000).

There is a hype about the tendency of the Internet and other ICTs to reduce the reliance on paper and other printed resources for scientific communication, and the consequent reduction in the prices of such media. At the beginning of the ICT revolution, there were speculations that the differences in information access between the developed countries and Africa countries would be obliterated. But publishers now develop information warehouses; franchising electronically-published resources and making them available only to fee-paying subscribers, thus creating a new form of problem in the economics of serials. Electronic publications, which once seemed to be capable of ending the isolation of African scholars, are presently as exorbitant and difficult to access as their printed-paper versions. Subscription rates are very high, coupled with the stringent conditions for using or sharing them. For instance, certain conditions for subscription and use of electronic

resources sometimes require that the subscriber does not share the resources with non-subscribed users. This condition has been observed by moralist information consumers, who also wish to maintain a good relationship with the information suppliers. A library belonging to an old member of a faculty or the library of a big institution, who has unwanted printed resources and old publications, can bequeath the same to other persons or institutions. In the electronic era, this kind of expectation is actually made difficult by the fact that subscription conditions sometimes restrict the use of published materials to the institution or individual who pays the subscription fee.

In fact, information and communication technologies are, by their very nature, cultural. As noted by Keniston (1998):

... the content of software is determined not only by the language, but by deep, underlying, usually implicit and unacknowledged (because thought to be natural) assumptions inherent in the software itself. Software carries with it a view of the world, of people, of reality, of time, of the capabilities of users, which may or may not be compatible with any given and social context.

Presently, ICT is yet to be universalized; universalization can only be realized when all the languages of the world are digitalized. Presently, African languages, for instance, are yet to make any meaningful input to the Internet. The Internet is overwhelmingly American-based, English-speaking, and Western-focused. As at June 2005, roughly 73 per cent of the estimated 72.4 million host computers were in the US, 80 per cent in English-speaking nations, and more than 90 per cent of the Internet operated out of Western countries (ISC, 2000). With regard to the online language, as at May 2005, the English language dominated, with 35.2 per cent, followed by Japanese, with 13.7 per cent, and Spanish, 9 per cent (GIS, 2005). This distribution is very different from the distribution of languages around the world, in which the population is dominated by Chinese, followed by English, and then Spanish. Of course, the distribution of languages in science is, again, very different: English being, by far, the dominant one. The uneven use of local

languages in science is of course not exclusive to the Internet, but is only being epitomized by it. More generally, the loss of linguistic and cultural diversities among social systems is exacerbated by some technical systems. Among colleagues and peers, there has been a gradual acceptance of the use of English as a lingua franca; and, at least, for the foreseeable future, there is little reason to expect any change in this trend.

Nwagwu (2005b) has also shown that the idea of applying electronic devices to index scientific literature is yet too novel for many African countries to embrace; this will impinge on the internationality of science in Africa. In this regard, the true state of science in Africa, the output and limitations, cannot be established, and Africa would not be helped except there is a grounded establishment of the true level of science in the communities. This is crucial because all OA efforts are ICT-driven.

Initiatives for the participation of African scholars in the Open Access movement would benefit from the input of policy makers. Scientific information and its utility in policy circles, however, seem not to be well-embraced. The government of India has expressed concern over the fall in the volume of biomedical publications in India (Arunachalam, 2000). The UK House of Commons has also discussed extensively on the problem of inaccessibility to scientific publications in the UK (House of Commons, 2004), as well as the activities of the Senate of the USA in improving access of their scientists to the Internet. Such initiatives are not in Africa. Aiyepoku (1982) has reported a low-level awareness and use of information by policy-makers in Nigeria. There are also other problems, such as the absence of countervailing sectoral information/informatics policies, which could guide and characterize the nature and pattern of deployment, in addition to the information role of information technologies.

Conclusion

This paper presented a somewhat extensive review of the ongoing initiatives in the quest to free scientific articles from the control of the commercial publisher; initiatives which will help the scientific community in Africa. It discussed the factors that challenge the possibility that these initiatives can be harnessed to give Africa a significant place in the global scientific

information chain. Although, it does appear that free access to scientific publications will mainly benefit Africa, there are also components of African research outputs, which will definitely benefit the countries of the West. For now, much of Africa's indigenous knowledge systems have not been tested out on 'Western problems' and modern science, which is fastidious and finite, seems to veil the chances of this expectation. OA will bring such knowledge to the fore.

Commercial publishers worry about who bears the cost of production of scientific publications (Moller, 2004). Several models of payment exist – such as are made by authors, research institutions, professional bodies, funding agencies, etc – some of which have been proved to be workable (Suber, 2003; Wellcome Trust, 2004). Advocates of Open Access are not in anyway expecting publishers and investors to 'commit economic suicide' in order to satisfy the needs of scientists. The 'free' in OA does not imply a decision to give contents away free – it is not free of control or free of good financial rewards. Lessig (2004) has explained the meaning of the 'free' in OA, in addition to highlighting the possible models of payment. Hence, the economic viability of OA is not in doubt. Studies are, however, required to test the workability of these payment models in Africa and other developing regions.

While the digital divide has been recognized as a threat to the expected global economy, the pattern of scientific activities tends to show that we might end up in a new Dark Age unless we redesign an information-oriented democracy for the 21st century. The fact that there is no expectation that information should flow in and out of Africa and other developing regions implies that a true global economy cannot be realized, since a global economy must ride on the wheels of information. Whatever might emerge as a global economy will be skewed in favour of the information-haves, leaving behind the rich resources of Africa and other regions, which are often regarded as the information have-nots. As a matter of fact, the current pattern of the globalization process is leaving something very crucial behind, namely, the multi-faceted intellectual 'wealth' and 'natural resources' of Africa. Indeed, the beauty of a truly globalized world would lie in the diversity of the content contributed to the GII by all member countries. A less than multicoloured global community that omitted variety and diversity cannot be considered to be truly global.

The need to ensure the free flow of scientific articles should, therefore, be pursued by developing countries with vigour. African countries should, as a matter of priority, adopt collaborative strategies with agencies and institutions in the developed countries, where research infrastructure are well-developed and the quest for access to scientific publications is high. African scholars should also identify with movements aimed at liberating scholarly articles from the undue control of agencies that have commercial interests. They should form local groups, which will then seek liaison with those in the developed world. Very importantly, efforts to enhance access to scientific publications should start locally. Even within institutions in most African countries, access to articles written by scientists is very limited. Local institutions should initiate local literature control services with the sole aim of making the content available to scientists. If properly initiated, institutions can network with each other so that, within a given country, access to scientific publications can be easy. Such an initiative has been ongoing in Nigeria under the aegis of the National University Commission's NUNet Project. But a more serious examination of the strategy and content of this network can be carried out as the result of this undertaking, which can be considered protracted, begins to manifest.

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