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Citation: Fox, Moya and Hanlon, Susannah (2015) Barriers to Open Access uptake for researchers in Africa. *Online Information Review*, 39 (5). pp. 698-716. ISSN 1468-4527

Published by: Emerald

URL: <http://dx.doi.org/10.1108/OIR-05-2015-0147> <<http://dx.doi.org/10.1108/OIR-05-2015-0147>>

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Barriers to Open Access uptake for researchers in Africa

Moya Fox and Susannah Hanlon

Abstract:

Purpose – The purpose of this paper is to explore the extent of visibility of researchers in African countries, in the Open Access (OA) arena and aims to identify main causes of reduced uptake in OA in Africa.

Design/methodology/approach – Extent of visibility is explored by quantitative analysis of institutional repository and OA journals data sets followed by qualitative analysis of OA foundation documents and literature on OA in Africa published mainly between 2003 and 2013.

Findings – Visibility in institutional repositories or OA journals for African researchers remains low. Causes include insufficient educational support for librarians and administrators in required new roles; inability of national, organisational and technological infrastructures to support OA; impracticality of western-based and costly publishing models; and disincentives relating to intellectual property and researcher perceptions. Complex language and literacy issues also inhibit engagement. Recommendations include strong OA advocacy, development of support initiatives, integration of international knowledge for local conditions and vice versa, sensitive preservation of indigenous knowledge and development of mechanisms of funding and research assessment mechanisms, which are economically and technically viable.

Originality/value – Earlier attempts were made to raise awareness about the lack of uptake of OA in Africa. This paper shows that the situation has hardly changed and now requires urgent attention. Otherwise OA will not “become the default method for distributing new peer-reviewed research in every field and country” by 2022 (BOAI, 2012).

Keywords: African research visibility, Barriers to Open Access, Preservation of indigenous knowledge, Publishing funding mechanisms.

Introduction

The human right to access knowledge is considered to be of vital importance for developing countries (Rens and Kahn, 2009). Initiatives such as Research4Life (www.research4life.org/), providing developing countries with “free or low-cost access to academic and professional peer-reviewed content online” alongside the increasing number of journals being indexed through the Directory of Open Access Journals (DOAJ) (<https://doaj.org/>), has enhanced access to research in African nations.

However, this is only one part of the OA equation. The United Nations (1966) identifies that even more at stake is the cultural right to contribute knowledge to society.

Researchers in Africa are still seen as consumers of, rather than contributors to, the global information sharing society (Nwagwu, 2013), although Porrett (2008) has discussed how the International Development Research Centre repository can contribute to disseminating African research. However, in advocating OA, Swazi librarians Muswazi and Yumba (2007) only reported on its potential for access and made no mention of dissemination.

The original definition of OA for peer-reviewed research literature specifies absence of “financial, legal or technical barriers” (Budapest Open Access Initiative (BOAI), 2002) as crucial to OA success. Yet, in Africa, these are among some of the most pervasive barriers.

Laying “the foundation for uniting humanity in a common intellectual conversation and quest for knowledge” (Budapest Open Access Initiative 10 (BOAI 10), 2012) cannot be achieved without understanding and working towards overcoming such restrictions.

The purpose of this paper is to: first, examine the extent of visibility via publication for researchers in Africa; and second, investigate barriers that prevent this and their possible causes.

Literature review

Issues such as language barriers (Bowdoin, 2011; Chalabi and Dahmane, 2012; Tijssen, 2007), funding deficiencies (McKay, 2011) and technological shortfalls (McKay, 2011; Nwagwu, 2013) are all cited by researchers as reasons why the OA movement has failed to make its mark in so many African nations.

Technological progress requires new skills. Van Wyk and Mostert (2012) highlight challenges faced by support staff when learning new techniques for implementing OA.

There is also evidence of more traditional bibliographical barriers, e.g. lack of indexing and abstracting (Peterson, 2003) and inappropriate archiving (Hürlimann et al., 2011). Perhaps lack of visibility goes beyond OA and has its roots entrenched in African traditional information curation.

Gondwe (2010) hints at cultural differences when examining researcher motivation to publish. For example, preservation of indigenous knowledge is raised as a potential driver for OA (Nwagwu, 2013; Van Wyk and Mostert, 2012; Tijssen, 2007), while Moahi (2012) states that to attract funding and protect such knowledge, there is a need to document and promote it, paradoxically, by emulating western scholarly publishing. Moahi is, however, unequivocal in criticisms of western influence on Africa’s education systems.

Gondwe (2010) believes the attempt by the Forum for African Medical Editors to copy the impact-driven model of western publishing is a significant failure. Smart (2007) concurs that the type of publishing industry required to support dissemination of research in Africa does not exist there, confirming that the impact-based funding reward structure is questionable (Smith, 2013).

Forcing researchers to chase impact and prestige as a key means to attract funding will inevitably lead to vital African-based research remaining inaccessible to those who need it most, as subscription charges of western publishers are simply too prohibitive.

Nwagwu (2013) and Butler (2013) raise concerns about “predatory” journals or journals belonging to “questionable scholarly open-access publishers” (Beall, 2014) and generally considered to be scams aiming at eliciting money from unsuspecting researchers. However, some of the journals on Beall’s (2014) list, despite their dubious origin, could still be the only means to publication available (Nwagwu, 2013).

Increasingly common amongst scholarly publishers is the application of an article processing charge (APC), used to fund OA publishing (Solomon and Bjork, 2012). Bowdoin (2011) perceives such exclusion from funding opportunities as an infringement of cultural rights. Some publishers have an APC fee-waiver policy (BioMed Central, 2013; Taylor and Francis, 2011), though the rationale is unclear.

Institutional and subject-based repositories offer an alternative to traditional publishing for increasing visibility of research outputs. A good example of this is the successful African subject-

based repository, the Global Neglected Tropical Diseases Database (www.gntd.org/login.html). Here the need to share data is the more pressing motivation for publication than achieving impact.

Research question

The research question is:

RQ1. Whether OA uptake in African countries continues to be at a low level and if so, what are the barriers to this and why do they exist?

Thus the research aim is: to investigate the extent to which, and the reasons why, OA, as a means to communicate research outputs from Africa to the global research community, has still not been more widely embraced within African nations.

The objectives formulated to achieve this are:

1. investigate OA uptake throughout Africa through statistical analysis of institutional repositories and OA journals;
2. analyse OA foundation policy documents, to identify and categorise factors influencing low participation of African nations in the early development of the OA movement; and
3. analyse, through literature, perceptions of researchers and other stakeholders as to the purpose, process and relevance of OA in Africa, exploring reasons for low uptake and identifying key areas for improvement.

Methods

A mixed method approach was taken in order to meet the above objectives.

Quantitative analysis

Data were extracted and analysed from internet platforms designed to collate information about repositories and OA journals.

Data sets

Green OA was analysed using:

- ranking web of universities: Webometrics (<http://webometrics.info/>);
- directory of Open Access repositories: OpenDOAR (www.opendoar.org/).

The registry of Open Access repositories (<http://roar.eprints.org/>) – was unavailable due to a harvesting failure.

Gold OA was analysed using:

- DOAJ (data were extracted under a creative Commons (CC) BY-SA license).

African Journals On-Line (AJOL) (www.ajol.info) – was also considered but OA policies for the hosted journals were often difficult to find.

Analysis criteria

The data headings used in each of the data sources and the issues identified during the initial literature survey were taken into consideration in the development of the analysis criteria.

For OA repository data the following analysis criteria were used:

- number of repositories;
- language used on repository interface/portal;
- repository software; and
- usability of repository URL.

For OA journal data, the following analysis criteria were used:

- number of OA journals per country;
- publication language;
- discipline;
- publication fee;
- CC license; and
- publisher information.

Qualitative analysis of foundation documents

The qualitative analysis of the literature began with a critical content analysis of the following OA foundation documents:

- Budapest Open Access initiative (BOAI, 2002);
- Bethesda statement on Open Access publishing (Suber, 2003); and
- Berlin declaration on Open Access to knowledge in the sciences and humanities (Max-Planck-Gesellschaft, 2003-2015).

And the later additions to these statements:

- ten years on from the Budapest Open Access initiative: setting the default to open (BOAI 10, 2012); and
- mission statement at the Berlin 11 Open Access Conference of the Max Planck Society (Max-Planck-Gesellschaft, 2013).

The documents were evaluated in terms of potential barriers and significant factors contributing to lack of opportunity for researchers in African countries to be able to fulfil the requirements of OA.

These sources were analysed using coding procedures (Strauss and Corbin, 1998) to identify categories of factors and themes, which may have negatively affected the ability of researchers in Africa to participate and engage with the OA movement from its inception.

Qualitative content analysis of the literature

Evidence of behaviour, perceptions and attitudes towards the OA movement from research stakeholders in Africa was gathered through content analysis of secondary published literature. This included commentaries, journal papers, conference outputs and statements made on the subjects of scholarly publication and OA in Africa. Interestingly Nwagwu (2010) comments on African conference proceedings being generally unpublished in journals. Early investigation found that authors were publishing about OA both in inter-disciplinary and in Library and Information Science journals.

In order to capture as much information as possible, literature was sourced from three databases: Scopus, Web of Science and LISA, using the following search terms each time:

- OA Africa; and

- scholarly publishing Africa.

The results were filtered by assessing the title and abstract of the papers found, in order to ensure alignment with the scope of the research aim. After removing duplicates, a total of 66 documents were analysed. Other constraining factors were prohibitive costs of access, and interpretation problems due to poor translations of non-English material.

To ensure consistency of analysis, the following considerations were used to interrogate the literature:

- authors' relationship with OA and scholarly publishing;
- authors' perceptions and understanding of OA;
- reasons for writing the journal paper;
- authors' opinions concerning scholarly publishing in general;
- authors' perceptions of benefits or disadvantages of OA; and
- perceived barriers to OA and whether any solutions are offered.

The analytic process continued following a system of conceptualisation, categorisation and coding and verifying relationships (Strauss and Corbin, 1998).

Data presentation

The overall statistical analysis from the data sets identified earlier highlighted that 27 out of 52 African countries had neither repositories nor OA journals. Seven countries had repositories but no OA journals and six countries had OA journals with few having more than one journal, unlike most of the countries which had both.

The 12 countries with both repositories and OA journals were Algeria, Cameroun, Egypt, Ethiopia, Ghana, Kenya, Nigeria, Rwanda, South Africa, Tanzania, Tunisia and Uganda. South Africa had the most repositories and the second highest number of OA journals, while Egypt had the highest number of OA journals.

Repositories

Number of repositories

Ensuring that the numbers of repositories accounted for was correct did prove difficult, due to duplication or need to disambiguate between the way institutions and repositories are named. For example, the University of Botswana Research, Innovation and Scholarship Archive also was described as UBRISA.

In total, 89 African repositories were finally identified across the two data sets. Of the 52 African countries, 20 had some form of repository activity whereas 32 had no repositories at all. South Africa had the most (29 repositories), followed by Kenya with ten.

Language used on repository interface/portal

Where ambiguity occurred due to multiple languages being identified, or where the repository URL was broken, making the language unidentifiable, the principal web site of the organisation was located. The language there was taken to be the one most likely to apply to the repository concerned. In the nine cases where this was not possible, the language was recorded as "unknown".

Three languages were used to host the remaining repositories: English (70), French (seven) and Portuguese (three). Arabic was mentioned by some, but only as a second language into which the web site could be translated.

Repository software

Differences in descriptive metadata between the sources were problematic when accounting for the software platform, in that software described as “unknown” in one data set was more accurately described in another.

The URLs of 18 repositories were broken and were therefore inaccessible for identifying their software platform.

The most commonly used software was DSpace with 56 repositories, followed by Eprints which had eight (Figure 1). It would be worth considering whether the languages of the user support communities influenced the users in their choice of software platform.

Usability of repository URLs

The 18 items with broken URLs were investigated at organisational level to see whether the repository was located elsewhere within the main web site. Sometimes this was the case. Also URLs are not always visible outside the countries where they originate. Other causes for the broken URLs are likely to include internal political issues, restrictive government policies on regulations of telecommunications industries or poor telecommunications infrastructures resulting in erratic internet access.

OA journals

Number of OA journals

A total of 595 journals were identified through DOAJ with by far the largest number being published in Egypt (441) followed by South Africa (67) and Nigeria (39) (Figure 2). Only 18 out of 52 countries had organisations or publishers hosting OA journals.

Publication language

Some journals were recorded as being multilingual, so the data here corresponds to languages being used, rather than language per journal. The language most commonly used was English (587), followed by French (26), reflecting the westernisation of global research publishing. It is no surprise that Afrikaans also has a reasonable presence in the African publishing landscape (16).

Discipline

Medicine (216) and health sciences (219) were found to be the most common subjects of the African OA journals investigated.

It would have been interesting to also find out what cataloguing standards are applied by DOAJ and whether keywords are relied on more than formal cataloguing taxonomies.

What is also noticeable is the lack of significant numbers of journals concerning African history or indigenous knowledge. Of the 880 journals listed in DOAJ with the subject heading “History of Africa” only three originated from Africa itself. This raises the question of who is writing about Africa. The qualitative analysis in the next section highlights the importance to Africa of traditional indigenous knowledge and its preservation, not just from a historical perspective, but also from a medical and cultural one.

Publication fee or APC

The data stored in DOAJ has the following options: Yes, No, Not Yet and CON (Conditional on author circumstances). The data collected does not indicate exact costs but does show that 79 per cent, i.e. 471 of the journals listed, do apply an APC.

CC licenses

A study of the adoption of CC licences by African OA journals showed that 436 (73 per cent) had chosen the most liberal CC-BY license, whilst 139 (23 per cent) had no license at all. The conclusion could be drawn that in the majority of cases the application of a CC-BY license has been done in support of the principles of sharing, dissemination and re-use which underpin the OA movement.

Publisher information

Hindawi Publishing Corporation was found to be the most prolific in Africa, predominantly active in Egypt (415 out of 441 journals). Hindawi hold a virtual monopoly in Egypt. The number of papers produced by African researchers and published by Hindawi, being reasonably high, already demonstrates the benefits to African researchers of publishing locally as opposed to abroad (Baker, 2008; Ocholla et al., 2012).

Based in South Africa, AOSIS (19 journals) is Africa's second largest publisher of OA journals. The third most prominent publisher is the South African Stellenbosch University (10).

The following section looks at the results of the content analysis of early documents which have come to form the foundation of the OA movement today. Also key factors were identified as possible explanations for lack of awareness of and engagement with OA.

Data analysis

Open coding was carried out initially on the foundation documents and then carried over to the open coding conducted on the peer-reviewed literature. At first and taking the lead from the literature, the coding was organised into three categories: technological, sociological and cultural. While the latter could be argued to be a subsection of the second category, the coding showed it to be a substantial area in its own right.

As these are very broad categories, further analysis on the coding was conducted, yielding categories that reflected, more specifically, problematic areas surrounding visibility in OA for publishers in Africa. Nine additional categories were added:

- engagement;
- national and organisational infrastructure;
- knowledge resources – including indigenous knowledge;
- language;
- literacy – including digital, information and basic literacy;
- publishing practice – including funding structures;
- research practice;
- skills and education; and
- telecommunications and/or technological infrastructure.

The qualitative analysis based on the review of the literature is organised under the three headings of technological, sociological and cultural factors. The added categories are interwoven within the narrative rather than being shown separately as mutually exclusive headings. This allows for natural flow and shows the complexity of their inter-relationships.

Analysis of foundation OA documents

The most obvious barrier identified early in the content analysis process was that of the technological requirements of OA. Igun (2005) reported that Africa enjoyed “only 1% internet connectivity in the world scale”. The International Telecommunications Union (ITU) (2015) reports that fixed broadband subscriptions remain low in penetration (0.5 per cent of the world total) and household internet access is only found in 10 per cent of households in Africa. This is despite double digit growth. Yet for the OA movement, such telecommunications infrastructure is vital to its success.

In each of the foundation documents, the need for radical change from the current system of traditional scholarly publishing practice to a new open system was clearly identified. However, a clearly defined and structured path towards attaining this ideal could not be found. Although national and organisational infrastructure recommendations, such as policy changes, new funding and administration procedures are made, none of these are achievable without sufficient commitment and willpower at government levels. Furthermore, African librarians and administrators will need to adopt new roles in developing, managing and promoting their knowledge resources. This requires further commitment to skills training and education.

Further investigation into participation in these early documented statements showed that there was a significant lack of engagement from developing and underdeveloped nations. For example, of the 679 organisations who put their names to the BOAI (2002), only 35 of these came from Africa, and together, they only represented 18 of the 52 African nations.

This does not automatically mean that there is no activity towards OA, just that it has not been documented. For example, in Madagascar it seemed the only route available to achieving OA had come from a single OA journal. Yet later research revealed a Madagascan repository, MADADOC, containing grey literature pertaining to rural development and the environment (Rahaingo-Razafimbelo and Randrianato, 2011).

Potential disincentives that come to mind on reviewing the foundation documents with regard to publishing practice include a sense of threat to intellectual property and funding structures based on western influenced reward systems aligned to impact.

The issues identified above were then used to inform the next stage of the study, that of the content analysis of literature concerning the African OA movement.

Content analysis of literature

The analysis was undertaken in chronological order to develop a conceptual timeline of how OA developed in Africa between 2003 and 2013. Of the earliest documents written between 2003 and 2006, few mentioned OA, despite librarian authors discussing electronic publishing, technology and critical roles for librarians in developing countries (Igun, 2005; Omekwu, 2006). This led to the interpretation that lack of awareness was itself a barrier inhibiting discussion and advocacy. Despite the ten-year span of the study, early telecommunications and technological infrastructure and knowledge resource issues such as internet connectivity, the technology gap and the preservation of indigenous knowledge, are still being raised in 2013 (Nwagwu, 2013).

Technological barriers

In developed countries technology has progressed to the point that fundamental components are taken for granted. Internet access is seen as universal and the tools required to obtain access are readily available, although, as Castells (2005) identifies, the networked society is not, by any means, inclusive.

Further to Igun (2005) and ITU's (2015) figures on internet connectivity in Africa, Mekuria and Sutherland (2006) describe African internet access as "very patchy and often crippling expensive". This is yet another cost depriving African researchers of access and opportunities for increasing visibility. Such restriction of current knowledge resources inhibits researchers' abilities to produce research deemed to be of an acceptable relevance and standard (Pearce, 2003) and plays a destructive role in the African research cycle.

In writing to promote UPSPace, the University of Pretoria's institutional repository, Olivier (2007) highlights the need for engagement from the research community. Smith et al. (2007) conducted a behavioural study of researchers attempting to access health information, revealing an important insight into researcher practice. Large numbers of researchers in the five countries investigated access the internet via internet cafés, concurring with ITU's (2015) figures on household internet access.

Technological infrastructure deficiencies in libraries clearly have an impact on African researchers' online visibility and engagement and on their ability to support electronic knowledge resources. In 2006 only 35 per cent of African libraries had their own webpages and only 15 per cent of university libraries had fully functional automated systems (Rosenberg, 2006). Later, Omekwu and Echezona (2009) go on to describe many African university web sites as being "digitally dead", meaning there is no parent site with which to affiliate a repository.

These national and organisational infrastructure issues can be synthesised with the impact of technology on academic libraries and their staff in Africa. Gbaje's (2013) paper on the retraining of Nigerian librarians mentions repositories only as digitisation projects. He does not mention OA or the skills needed to manage these, such as metadata creation, intellectual property awareness and maintenance and marketing skills. The impression obtained from the literature is that many African librarians work in isolation, making it difficult to share knowledge resources and pass on newly learned skills.

Technological issues in Africa also apply to scholarly publishing practice in general. Pearce (2003) describes such difficulties as the "extraordinarily high costs of importing the machinery" and the "poor postal system".

It often appears that technological factors are the predominant reason for lack of engagement with OA. But the sociological and cultural factors which undermine technological advancement in Africa are potentially the greater concern.

Sociological barriers

The term "sociological" is "concerned with social questions and problems of human society" (Chambers, 2015), while "socio-economic" is a term which helps describe more specific issues. Certainly economic factors almost always co-exist with some other societal factor creating a series of complex causes of problems in society.

Economic and political problems hamper investment in, and development of, power, telecommunications and technological infrastructures. There are extremes in complexity between African nations and the larger global community. "Scientific communities in developing countries, and especially in LDCs, have too often functioned in a vacuum separated from their societies. Special efforts should be made to design national research plans that are relevant to national needs and contribute to economic growth" (Network of African Science Academies, the Inter-American Network of Academies of Sciences and the Science Council of Asia et al., 2008).

This statement highlights the gap between those attempting to undertake research in poor working conditions and policy makers from the international arena, but does not explain this.

Regarding publishing and research practice, global research assessment is driven by those who dominate the knowledge market, in which Africa has only a small stake when compared with the west (Ondari-Okemwa, 2007; Ocholla et al., 2012). Journal Impact Factors are often a poor means of assessing African research (Ezema, 2010a). Concerning indigenous knowledge, often cited as a potential driver for OA, “(scholars) are totally eclipsed based on the weight of their research work on a global scale, irrespective of their impact on their immediate dependent communities” (Nwagwu, 2010).

The influence of the west is not limited to research assessment. Further issues range from skills and technology shortcomings to restrictions relating to the management of knowledge resources using systems imported through colonial ideologies. For example, western cataloguing and archiving techniques are already documented as being unsuitable in the African context (Peterson, 2003).

Problems also exist with the language and geographic limitations of Dewey and Library of Congress subject headings (Peterson, 2003). For example, western-formulated standards such as DublinCore and OAIPMH, when combined with the English bias of the software platforms (Chalabi and Dahmane, 2012) required to support OA and used to transfer knowledge from old systems to new, may not accurately reflect the digital curation needs of Africa.

Poorly stocked libraries lead to outdated research which in turn leads to authors’ papers being rejected. This correlates with repeated references to the negative impact of the west (Pearce, 2003; Lor and Britz, 2005; Winterbottom and North, 2007), in that poorly funded African researchers cannot compete with wealthier western researchers regarding quality and currency of research. An ironic consequence is that wealthier countries are writing about Africa, while so little is able to emerge from the continent itself (Raju et al., 2013).

Lack of political will to ensure economic support of knowledge resource centres, such as libraries and repositories, immediately places the researcher in Africa at a disadvantage before even beginning to consider the practicalities of publication in an OA environment.

Omekwu (2006) highlights Africa’s “brain drain”, which affects the potential for knowledge to be central to social and economic initiatives. Engagement also depends on perceptions about OA. These are evolving from simply recognising that there may be benefits to be gained, to the fuller realisation of how OA can actually contribute to the development of society in Africa (Nwagwu, 2013).

Ultimately, from a national and organisational infrastructure viewpoint, OA needs the support of policy makers at all levels. Without political leadership favouring OA attempts to contribute to the movement, it will remain isolated and experimental (Chalabi and Dahmane, 2012). The digitisation project at University of Pretoria of African elephant anatomical sketches (Breytenbach and Groenewald, 2008) illustrates that motivation for using repositories can come from a local level, especially as a means to safeguard and disseminate grey or non-digital resources.

Cultural barriers

Chambers’ (2015) definition of culture includes care, training and cultivation; it also states that culture is also about customs, ideas and values of a society or civilisation at a particular time.

At this time, custodians of knowledge resources need support through access to relevant skills training and education, in order to fulfil their new OA roles. The importance and value of preserving indigenous knowledge needs to be recognised. Addressing issues of language and literacy are also vital for the sustainability of Africa's knowledge resources, research and publishing practices.

In Dulle and Minishi-Majanja's (2009) assessment of researchers' perspectives on OA, they found that Tanzanian researchers were not using OA for dissemination. Literacy issues, in particular those of poor digital literacy and publishing skills were seen as major contributors to lack of engagement and it was recommended that librarians should focus on providing skills training and education in these areas.

The success of OA in the west has largely been underpinned by support from a predominantly literate public. Africa, according to John-Okeke (2009), continues to struggle to raise literacy levels of many of its population. This will affect public support for OA, as those who are supposed to benefit from it the most will still be excluded simply by not being able to read.

OA, like any other new concept, generates a certain amount of concern and fear. Mavodza and Ngulube (2011) described OA as providing "alternative sources of information, potentially relegating the importance of the library to insignificance and making investment in library resources a waste". This shows, to some extent, the cultural shift the OA movement requires regarding OA publishing practice and acceptance.

Electronic Information for Libraries (EIFL) (www.eifl.net/) recognises that in order to attract funding, libraries need to engage with activities which improve their local communities (Segbert-Elbert, 2010). In terms of national and organisational infrastructure, this is achieved through the establishment of library consortia and the appointment of regional OA coordinators. At the time of writing, there were 17 coordinators in African nations but many African countries still have none.

Ahmed (2007) suggests that African researchers should start digitising unique African knowledge resources to produce a reservoir of usable knowledge, purchasable by foreign researchers. It is logical, though clearly against the principles of the OA approach to research and publisher practice. Ezema (2010b) reminds us that the database AJOL, two years after its establishment, was assessed on its ability to generate income through subscriptions. Its purpose, it seems, was to raise the visibility of African research, not to give it away for free.

The fear that sharing indigenous knowledge will lead to exploitation through, for example, theft of intellectual property (van Wyk and Mostert, 2012) must be overcome. Otherwise the OA potential to provide a platform for the safeguarding and preservation of local research and indigenous knowledge is lost. Moahi (2012) investigates cultural challenges surrounding the preservation of indigenous knowledge, including ownership identification and intellectual property protection. One possibility for encouraging engagement may be to highlight the benefits of formal documentation as a means to ensure ethical research and publishing practice.

Much indigenous knowledge takes the form of oral transmission or grey literature, which leads to another cultural barrier for African researchers: that of language, from which stems several issues:

- academic discourse is dominated by English (van Weijen, 2012);
- poor command of English can lead to paper submissions being rejected; and
- the meaning of cultural issues relating to indigenous knowledge may be lost in translation, already a potentially expensive process.

Conclusion and recommendations

Conclusions

First objective: investigation of OA uptake in Africa through statistical analysis of repository and OA journals data.

Africa continues to lag behind in the global OA movement, although there are emerging successes: Egypt with its impressive number of OA journals and South Africa boasting the largest number of repositories. However, between these continental northern and southern extremes there are African countries where OA has little impact.

There appears to be a preference towards OA journals. It was also found that the majority of OA journals based in African countries focused on disciplines related to medicine and that there are disciplines where more is being written about the African perspectives by researchers who are not from Africa.

Second objective: analysis of OA foundation policy documents, to identify and categorise factors influencing low participation of African nations in the early stages of the OA movement.

Analysis of the foundation documents quickly led to the realisation that OA may have come too soon for Africa. While the network society (Castells, 2005) has expanded very rapidly, it has also created an information divide which threatens to exclude African researchers attempting to attain greater visibility in the global research sharing society.

Visibility issues proved to be more complex, due to hierarchies created through journal rankings and citation indices. Further causes include poor and intermittent internet access, subscription paywalls, language barriers and literacy rates.

Further examination of the foundation documents highlighted OA's reliance on sound telecommunications and technological infrastructures being in place, the provision of relevant skills training and education to support new roles for librarians, key custodians of knowledge resources and the existence of sound national and organisational infrastructures for supporting OA publishing practice.

Third objective: analysis of perceptions of researchers and other stakeholders as to purpose, process and relevance of OA in Africa, exploring reasons for low uptake and identifying areas for improvement.

Among the contributing factors affecting African researchers' ability to contribute to the global information sharing society was that western processes and research practices were not serving Africa's research community well.

The effect of western journal impact requirements was to steer research away from the areas where it is needed most and to drive a culture of publishing only in prestigious journals. Even where OA is an option, there are prohibitive cost implications through the application of APCs.

Perhaps the greater concerns are barriers to OA, unintentionally implemented by the West, while still in pursuit of financial gain at Africa's expense. For example, there are language issues in that English is so often the preferred language for publication. A further issue is the dependence on written knowledge resources, which creates access barriers to vital orally delivered indigenous knowledge. Also identified is the fear of exploitation of such knowledge, if it were made visible to

the international research community, due to unclear and weak intellectual property protection policies for the creators and owners of that knowledge.

However, the problems might not be insurmountable.

Recommendations

Use and develop support initiatives

Two initiatives – EU-funded AfricaConnect (2015), a project to establish quality internet connections for African research and education, and UK-registered ICT for development charity, Computer Aid International (2009-2015) – have been developed to create better ICT support in Africa.

The opportunity also exists to create a framework for OA in Africa with established consortia, such as those maintained through EIFL, capable of training and supporting librarians and administrators in OA development. Included in this, and considering the vast geography of Africa, it is suggested that several online OA support communities are required, similar to the UK-based Repositories Support Project (2006-2013), which during its seven-year duration provided repository training programmes, including staffing requirements (Robinson, 2007).

Promote advocacy skills

Advocacy is crucial to OA if the many cultural barriers linked to poor engagement and lack of awareness of OA's benefits are to be overcome. Fear of exploitation can be tackled by establishing further and more widely accessible education on CC licensing and the benefits of documentation as a means of securing intellectual property rights.

In terms of research and publishing practice Nwagwu (2010) concludes that the emphasis on impact is wrong for Africa whereas emphasis on research relevance analysis, ensuring that impact at local level is given far higher precedence, would be more suitable.

Paul Brink (2013) suggests African researchers and other stakeholders create a single African journal database, with its own Impact Factors that would more accurately reflect African research.

However, there could be a time when the next generation of researchers abandon traditional publishing methods. Gray and Burke (2008) discuss integrating repositories with Web 2.0 capacity. If self-archiving and social media are used to disseminate and promote research, Web 2.0 generated altmetrics could potentially replace journal Impact Factors.

Foster collaboration and sustainability through further development of local repositories

Regarding knowledge resources, it became clear that more was being written about the establishment and potential of subject-based (Sibley et al., 2007; Breytenbach and Groenewald, 2008; Hürlimann et al., 2011; Rahaingo-Razafimbelo and Randrianato, 2011) rather than institutional repositories (Olivier, 2007; Dulle and Minishi-Majanja, 2009; Segbert-Elbert, 2010).

First, this indicates that communities with similar research interests are beginning to collaborate to bring together collections of data.

Second, subject-based repositories' capacity for long-term sustainability, due to not being dependent on just one funder, affects a larger group. This may help secure their longevity and maintenance. Furthermore, the driver for creating repositories is less about showcasing an institution's work and more about preservation and collection of data from numerous geographically diverse sources.

Integrate local knowledge with global knowledge and vice versa

As shown, Africa does not necessarily benefit from replicating western methods due to its extreme diversity as a continent, as well as serious adversities faced by its peoples. Adversity can, however, lead to innovation, as demonstrated by the increasing use of solar power in Africa (McEachran, 2013). Further potential can be found in podcasting technologies, whereby their functionality could, if used ethically, aid successful preservation of orally transmitted indigenous knowledge. Alegi (2012) highlights podcasting as having potential to complement traditional scholarly publishing.

Schöpfel and Soukouya (2013) state: “we can learn from global experiences but need to adjust them to local conditions”. Each government needs to commit to building the national and organisational infrastructure required to support OA publishing and the creation of locally based knowledge repositories, if African nations are to benefit from greater access and contribution to the global research sharing society.

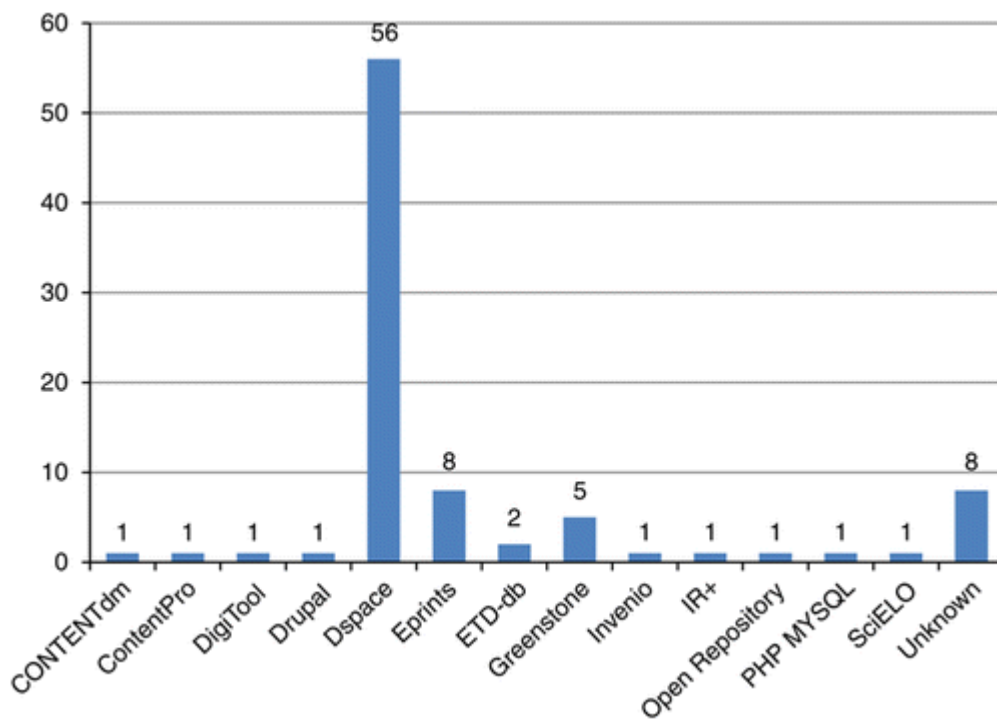


Figure 1 Collated statistics: repository software use as a percentage

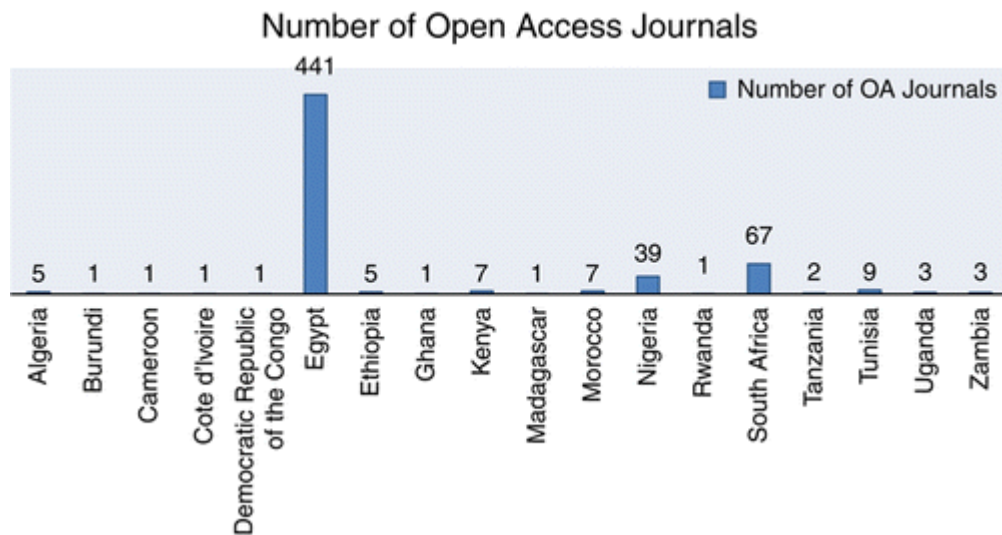


Figure 2 OA journals by country

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