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Online Information Resources Availability and Accessibility: A Developing Countries' Scenario

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Abstract

Researchers from developing countries have been facing problems in accessing scientific literature emanating from their own countries and beyond for many years. This scenario has partly been attributed by constraints related to the inability of institutions from least developed nations to pay subscription for published literature due to inhibiting costs. Developments in information and communication technologies (ICTs) provide an opportunity to ease the availability of scholarly content to end users in both developed and developing nations. This paper examines the extent to which developing countries have taken advantage of the new developments in ICTs to improve scholars' accessibility and usage of scientific literature. Through a meta-analysis approach, core literature review published from 2005 to 2014 is used to assess the availability and usage of online scholarly content, as well as factors affecting effective exploitation of online scholarly information resources. The study reveals that although various initiatives capitalising on ICTs developments have eased the problem of availability of scholarly content in most developing countries, there are still obstacles to effective usage of online scholarly literature. Information Literacy (IL) delivery strategies and adoption of discovery tools are recommended for improving the accessibility and usage of online scholarly literature in the developing countries.

Keywords: Africa, Developing Countries, Discovery Tools, ICTs, Information Literacy, Library Consortia, Online Information Resources

Introduction

The availability and accessibility to scholarly information is very important for researchers' productivity. As an input in the research process, it is only justifiable to blame researchers' low research productivity if they have access to timely and relevant information resources. It is commonly reported that most developing countries fail to subscribe to scholarly content of their choice in order to satisfy information needs of the scholarly community (Ezema, 2009; Dulle, 2010; Islam, Alam and Sultana, 2011; Tariq, 2011). This is partly due to high subscription cost of scholarly literature. Although there many associated causes, scanty information resources probably play a role to the low knowledge contribution of developing countries to the global scholarly output pool. Developing countries' nations have been acknowledged to contribute less than 3% of the visible global literature (King, 2005; Gray, 2007; Ezema, 2009).

Current developments in ICTs have been acknowledged to bring both opportunities and challenges on the availability and accessibility of scholarly literature in developing nations (Frame, 2004; Gyamfi, 2005; Tilvawala, Myers and Andrade, 2009; Thanuskodi, 2012;). Due to reduced publishing and distribution costs of electronic publications as compared to their print counterparts, some publishers are no longer producing print journals. For example, a survey of publishers in 2008 found that over 90% of all scholarly journals were available online (Cox, 2008; Research Information Networks (RIN), 2010). As such, utilising ICT developments, publishers have also changed their business model from selling individual journals into journal bundles [christened as

"Big Deals"] (Look, Sparks and Henderson, 2005; Hahn, 2006; Ngozi, 2010; Tariq, 2011). With such kind of an arrangement, it is increasingly becoming difficult for individual libraries to afford the purchase of journals in bundles. Thus, many libraries are increasingly forming consortia to consolidate their purchasing power for electronic journals. It is evident that consortia building has been gaining momentum throughout the world (Carbone, 2007; Ossa, 2010; Gaur and Tripathi, 2012). According to Gaur and Tripathi (2012) for example, the International Coalition of Library Consortia (ICOLC), listed around 200 library consortia throughout the World by 2012. Some examples of existing library consortia in Africa include: South African Bibliographic and Information Network (SABINET); Free State Libraries and Information Consortium (FRELICO); Gauteng and Environs Library Consortium (GAELIC); Eastern Seaboard Association Libraries (esAL); CAPE Libraries Cooperatives (CALICO); South African National Library and In-formation Consortium (SANLiC) [all from South Africa]; Consortium of Nigerian Libraries (CONLIB); Consortium of Tanzania Universities and Research Libraries (COTUL); Consortium of Uganda Universities Libraries (CUUL); and Kenya Libraries and Information Services Consortium (KLISC) (Shibanda, 2006; Ngozi, 2010).

Some authors like Rogers (2009) and Weicher and Zhang (2011) expressed concerns regarding the "Big Deals" by citing problems of ownership and perpetual access to information resources subscribed through most consortia arrangements as some of the drawbacks of the new journal marketing system. It is acknowledged that most of the licensing arrangements used in subscription of e-resources allow libraries to use rather than own content (Bist, 2005; Rogers, 2009; Ossai, 2010). This kind of arrangement makes it impossible for scholars to have access to such resources once subscription is cancelled by their respective institutions. This is unlike the conventional purchase of print journals whereby subscription cancellation did not affect access to back issues since they remained part of the journal collection of an institution. Having realised such a problem, some publishers make it possible for perpetual access arrangements even though at additional costs (Hahn, 2006; Rogers, 2009; Gaur and Tripathi, 2012).

The other problem with "Big Deals" is that despite libraries having a big list of journals to access, some of such journals are irrelevant, and given choice is not in the priority list of subscribing institutions (Look et al., 2005; Hoskins and Stilwell, 2011). Furthermore, despite the acknowledged low production and distribution costs, some commercial publishers are also blamed for unrealistic pricing of scholarly content beyond the affordability of most developing countries (Bist, 2005; Dulle, 2010; Weicher and Zhang, 2011). Interventions by organisations such as the Electronic Information for Libraries (EIFL) and International Network for the Availability of Scientific Publications (INASP) are playing a significant role in ensuring developing countries purchase journals bundles from publishers at affordable prices. EIFL and INASP, for examples, negotiates with publishers to provide special and low journal subscription rates to developing countries' consortia (Harle, 2010; Tariq, 2011). For example, according to Harle (2010), INASP through its Programme for the Enhancement of Research Information (PERI) made it possible for developing countries to have access to over 23,000 full-text journals at a discounted prices offered by different publishers.

The UN funded programme known as Research for Life (R4L) is another recognisable initiative geared towards making online scholarly literature available to developing nations. This programme aims at facilitating access to high quality electronic journals to developing Nations. Currently, the four UN managed schemes including AGORA (Access to Global Online Research in Agriculture), ARDI (Access to Research for Development and Innovation), HINARI (Access to Research in Health) and OARE (Online Access to Research in the Environment) provide access to more than 20,000 electronic journals in various research fields, free of charge and or at subsidised cost to low and middle income countries respectively. Furthermore, through open access initiatives (Open Access Journals (OAJs) and Open Access Repositories (OARs) a variety of online information resources are accessible free of charge to end users (Dulle, 2010; Wandahl, 2009). For example, as observed from the Directory of Open Access Journals (http://doaj.org/), over 9,000 journals were available to users without price limitation by January 2015.

Based on the above observations, at the moment, the availability of scholarly content may not be considered as serious issue to most of the developing nations as it used to be some years back. In fact, some authors have the view that certain developing countries to date may not be differentiated with developed nations in terms of the available scholarly journals in both quality and quantity aspects (Wandahl, 2009; Harle, 2010; Tariq, 2011). The current concern is about inadequate usage of the available online scholarly information resources by the user community from developing countries. The main objective of this study, was to find out [through literature review] current developments on usage of online information resources and identify key constraints affecting effective exploitation of the resources in question. Specifically, the study attempted to answer the following questions:

- What is the current state of the availability and usage of online scholarly content in developing countries?
- What does the existing body of literature reveal about factors contributing to limited usage of online scholarly information resources?
- What are the gaps in the existing body of literature on this topic for future research?

Online information resources, also referred to as online scholarly information resources or simply scholarly content as used in this study imply peer reviewed publications [such as electronic books, electronic journals] made available and accessible on the Internet through subscription or open access means.

Conceptual Framework

This study was guided by the Quadratic Usage Framework (QUF) as illustrated in Figure 1. QUF is normally recommended in explaining factors that influence the acceptance and usage of a technology (Mardis, Hoffman and Marshall, 2008; Mtega, Benard and Dettu, 2014). According to developers of the Quadratic Usage Framework, the usage of any technology is affected by both technical and philosophical factors (Mardis, Hoffman and Marshall, 2008). Technical factors comprised the existence of the technology and competence of individuals in using such a technology. On the other hand, philosophical factors include individuals' cultural and personal values. In the context of this study, the usage of online information resources is based on the application of the Internet [technology]. Based on this model and the context of the study, the *technology* refers the Internet and accompanied facilities [computers, electricity, smart phones] making it possible for individuals to access online information resources. C*ompetence* consists of factors that affect the individual's skills, education, knowledge, and experience which impact their ability to use the technology to access online information resources. In this study, awareness on the existing information resources and information literacy on part of users is considered to shape the individuals' ability to access and utilise online information resources.

Cultural values include factors encompassing organisational settings and institutional policies. For example, an institution having in place a policy enforcing information literacy programme is likely to improve usage of online information resources at that particular institution. Finally, *personal values* are the individuals' preferences, beliefs, traditions, and trust that shapes their choice of whether to use or not to use online information resources. Behavioural change from using print versions of scholarly content to electronic or online information resources for example may require changes in personal values. Unless users of online information resources consider such information credible, they are less likely to prefer content from the Internet (Thelwall and Harries, 2004; Metzger, 2007).

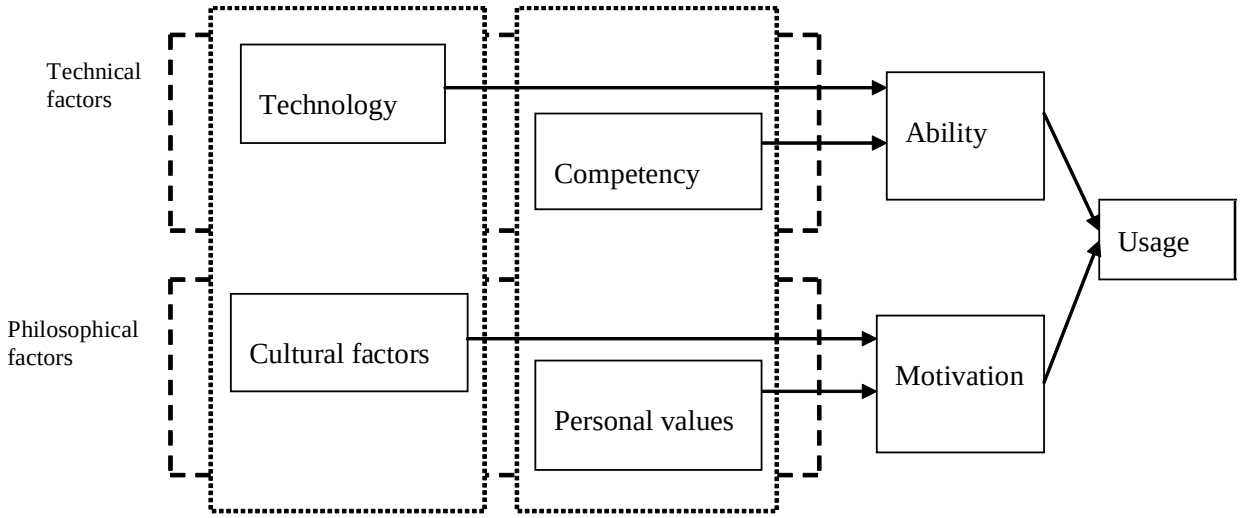

Figure 1: Quadratic Usage Framework (QUF) (Mardis, Hoffman and Marshall, 2008:24)

Research Methodology

The study adopted a meta-analysis approach of literature review to assess the current trend on the availability and factors affecting usage of online information resources in developing countries. Meta-analysis is a research approach through which related studies are identified and systematically reviewed to draw some insights about a subject under investigation (Mark, et al, 2008; Moore, 2005). According to Webster and Watson (2002), a good literature review and analysis is important to inform about the existing body of knowledge in a research discipline and discover areas needing further research attention. Searches [through combination of various research concepts) were conducted using the LiHub Kiox (a discovery tool) and Google scholar to retrieve scholarly documents about the availability and factors affecting usage of online scholarly resources developing countries. LibHub Kiox was used so as obtain relevant search results from across various online information resources that are subscribed by the Sokoine University of Agriculture [author's duty station] while Google scholar was necessary to complement literature obtained from the discovery tool in question. All searches were narrowed so as to obtain scholarly documents written in English language and published between 2005 and 2014, the period during which a number of initiatives for provision of online information resources to most developing countries have been in existence (Dulle, 2010; Harle, 2010; Tariq, 2011). Sorted on relevance basis, 1623 potentially relevant citations were identified from the first 100 search results of each query. These citations were assessed from their titles and abstracts for inclusion in the study. From the list of 183 full articles deemed relevant after omitting those with restricted access, 58 core scholarly documents were found to be relevant for the purpose of this study. Research findings presented below are envisaged to reflect the reality on the ground with respect to the availability and associated factors affecting effective usage of online information resources in developing countries.

Findings

Findings are organised in thematic areas on the basis of the study research questions as presented in the introductory part of this paper. The availability of online scholarly content in developing countries is highlighted before dwelling into a discussion of factors affecting the usage of such information resources. Gaps requiring the attention for future research are presented before concluding the study.

Availability and Usage of Online Information Resources

The documented evidence reveals a big improvement on the availability of online scholarly literature in most

of the developing countries unlike during print dominated era (Wandahl, 2009; Harle, 2010; Tariq, 2011). According to Harle (2010), basing on the Thomson Reuters/ISI Journal Impact Factor rankings as a proxy measure, European universities were comparable to those from Africa in terms of the availability of top journal titles in the year 2009. It is however acknowledged that the usage of online journals made available to developing countries does not conform to the available online scholarly resources being provided through various initiatives to such countries (Shibanda, 2006; Harle, 2010; Gakibayo, Ikoja-Odongo and Okello-Obura (2013). For example, Gakibayo, Ikoja-Odongo and Okello-Obura (2013) reports low usage of electronic resources at Mbarara University despite the abundance availability of such information resources at the institution in question.

A previous study by Shibanda (2006) also revealed low utilisation of online information resources that were provided to Kenyan institutions through the PERI programme. Similar findings are presented by Harle (2010) who observed researchers' complaints about literature availability at four African universities [National University of Rwanda, University of Dar es Salaam, University of Malawi and the University of Nairobi], despite the fact that about 79% of the top-ranked international journals were available online for free access at such institutions. Furthermore, Oyedapo and Ojo (2013), in their study at Obafemi Awolowo University in Nigeria, reveals that only 6% of the respondents reported to frequent use of online information resources made available at their respective institutions.

It is beyond reasonable doubt that low usage of online information resources is a concern to sponsors who make it possible for developing countries to access freely or at subsidised cost the resources at are valued millions of dollars. Several factors contribute to low exploitation of electronic resources in developing countries. Factors affecting access and usage of online scholarly content as revealed by various studies are discussed below.

Factors Limiting Exploitation of Online Information Resources

A variety of factors have been documented as contributing to less usage of online information resources in developing countries**.** Factors that are commonly cited to influence the usage of online information resources in the developing countries are discussed in the following sections.

Perpetual Access Rights

Contrary to print resources, most online resources are not purchased but licensed for access (Carbone, 2007; Gaur and Tripathi, 2012; Ngozi, 2010). Even though some providers of electronic databases provide licencing options for perpetual access, studies report that most consortia in developing countries do not bother considering aspects of access beyond the subscription period due to additional costs involved (Bist, 2005; Ngozi, 2010; Gaur and Tripathi, 2012). To some extent, this is also a commonly reported problem, even in developed countries (Hahn, 2006; Rogers, 2009). For example, as survey by Rogers (2009) reveals that less than 20% of libraries in New Zealand's tertiary educational institutions had their online resources licenced for long-term access. Even though none of the reviewed studies have reported empirical evidence as to how user communities are affected by the existing licenses, there is no doubt that researchers are likely to be frustrated whenever they do not to get journals they used to access before subscription cancellation by their respective institutions.

Unreliable Power Supply

Without power, it is impossible for researchers to gain access to online information resources. Unreliable power supply has frequently been cited as among the challenges that frustrate researchers in their attempts to access and use electronic resources in developing countries (Bist, 2005; Gyamfi, 2005; Ngozi, 2010; Oyedapo and Ojo, 2013). A study Oyedapo and Ojo (2013), for example, points out "frequent power outage" as the most significant factor that interfered researchers' access to online scholarly content. Similarly, Wema and Manda (2011) found frequent electrical power cuts as among the concerns of online information users in Tanzania. Also, in a previous study by Smith et al. (2007) that involved five African countries (Cameroon, Gambia, Nigeria, Tanzania and Uganda), it was revealed that power supply largely interrupted the usage of online information resources in the study area. Furthermore,

teachers and students at Baba Farid University of Health Sciences in India ranked electric failure as the second problem after information literacy which hindered them to effectively exploit online scholarly information resources (Manhas, 2008). Such a state of affairs suggests the need for feasible and concrete solutions to the problem of electricity availability problem in developing nations. Even though it is an expensive venture in terms of initial costs, developing countries' research institutions may consider investing in solar energy as a way of providing back up power supply for sustainable access to online information sources.

Inadequate ICT Infrastructure and Sporadic Internet Access

A state of the art ICT infrastructure is important for researchers to benefit from online information resources. Problems related to unavailability of networked computers and stable Internet connectivity have been frequently cited as contributing to less usage of online information resources in developing countries (Watts and Ibegbulam, 2006; Echezona and Ugwuanyi, 2010; Ossai, 2010; Harle, 2010; Wema and Manda, 2011; Islam, Alam and Sultana, 2011; Gakibayo, Ikoja-Odongo and Okello-Obura, 2013; Oyedapo and Ojo, 2013;). For example, during a survey involving four African Universities in 2009, Harle (2010) found that 20-30 students shared a single computer. Similar findings are reported by Smith et al. (2007) indicating hardware, Internet connections and computing facilities as hindrances to online information access in institutions that were involved in the study.

However, in recent years, the situation is significantly improving such that it is unlikely to find a research student or staff without a laptop (Harle, 2010; Manhas, 2008). Wireless connections invested in many institutions guarantees all individuals with a laptop to benefit from institutional Internet connection. Despite the notable constraints related to Internet connectivity, the reviewed literature also indicate significant improvement being made as a result of several countries getting connected to undersea Fibre Optic cables with high speed Internet. Such developments are reducing the problem of slow Internet and high connectivity costs which have persistently been reported to hinder usage of online information resources in Africa (Echezona and Ugwuanyi, 2010; Harle, 2010). Furthermore, capitalising on current ICTs developments, researchers can use their smart phones to access internet at relatively low cost.

Inadequate Awareness on the Availability of Information Resources

Awareness on part of online information users is very important for them to use of specific online information resources. Several studies point out that low researchers' awareness on the accessible online information resources at their respective institutions is a key hindrance to usage of such resources (Frame, 2004; Harle, 2010; Islam, Alam and Sultana, 2011; Gakibayo, Ikoja-Odongo and Okello-Obura, 2013;). A study by Harle (2010,) for example, reports that only 40% of the respondents from ACU survey that involved 240 researchers claimed to have a high or good level of awareness while the majority were unaware about a range of accessible journals at their respective institutions. This state of affairs is probably a result of inadequate campaigns to make users informed on the available information resources at their institutions. Lwehabura (2008) and Wandahl (2009) also cite the abundance of the available online resources to be a source of confusion on part of users. Well designed and targeted [relevant content to specific user groups] awareness creation campaigns are recommended in the existing literature to reduce confusion and make information users well informed on information resources suitable to their information requirements (Harle, 2010; Islam, Alam and Sultana, 2011).

Instead of relying on traditional promotion campaigns, many studies have also recommended the use of Web 2.0 tools in order to increasing the awareness on the available library resources to promote usage of online information resources (Curran, Murray, and Christian, 2007; Godwin, 2007; Chua and Goh, 2010; Harinarayana and Raju, 2010; Luo, 2010; Tripathi and Kumar, 2010). Studies evaluating the extent of adoption of Web 2.0 application and impact on usage of online information resources in developing countries need attention in future research.

Users' Interest on Usage of Search Engines

Several studies have documented users' preference of searching online scholarly content through search engines such as Google at the expense of other authoritative scholarly databases (Asemi, 2005; Griffiths and Brophy, 2005; Markland, 2005; Lwehabura, 2008; Nazim, 2008; Harle, 2010; Islam, Alam and Sultana, 2011; Sadeghi - Ghyassi et al., 2013). For example, according to Harle (2010), researchers in Africa and elsewhere have a tendency of consulting search engines especially Google in their information search endeavours. This view is supported by Lwehabura (2008) who established that 82% of 545 respondents acknowledged depending on Google search engine to address their scholarly information needs. Under such circumstances, users are liable to missing the high quality resources provided through scholarly databases subscribed by their respective institutions (Markland, 2005).

To partly address the problem of over dependence on search engines by online information searchers at the expense of subscribed information resources made available through specific databases [such as Emerald], discovery tools are increasingly being recommended (Aymonin et al., 2011; Caplan, 2012; Clarke et al., 2006; Cmor and Li, 2012; Abdala and Taruhn, 2007; Fagan et al., 2012; Markland, 2005; Pradhan et al., 2011; Yang and Wagner, 2010). Fagan and Mandernach (2012) defines discovery tools as web software that searches information resources from various online sources through a unified index and subsequently presenting search results in a single interface. Most of such tools are designed like the Google-style of making it possible for users to search information from a single point instead of visiting different scholarly databases individually (Caplan, 2012; Cmor and Li, 2012; Fagan et al., 2012). Discovery tools are also commended for their minimal authentication requirements [identification and passwords] since at most the user is required to have a single identity and password to access all registered information resources in the tool in question (Cmor and Li, 2012; Frame, 2004; Wandahl, 2009). Examples of the currently available discovery tools include: EBSCO Discovery Service, Ex Libris Primo, LibHub, OCLC WorldCat Local, and Serials Solutions Summon (Aymonin et al., 2011; Fagan et al., 2012). Fagan et al. (2012) acknowledged increased usage of online scholarly content by researchers as a result of usage of discovery tools in information search. It should be noted however that the documented evidence reveals there are few studies that have been devoted in performance evaluation of the discovery tools especially in developing countries.

Low Levels of Information Literacy Skills

The aspect of information literacy is not a new concept in libraries but its importance is increasing due the changing information landscape. Information literacy (IL) is perceived as an individuals' ability to recognise the need for information, locate, search and retrieve such information as well as conform to its ethical use (Gyamfi, 2005; Tilvawala, Myers and Andrade., 2009). A shift from print sources to online information resources has posed challenges on the part of users in terms of finding and eventual use of scholarly literature. According to Gyamfi (2005), "the information explosion, coupled with changes in technology, constitutes a barrier to information acquisition for people who cannot use the available tools to locate, retrieve, organise and use information."

The existing evidence acknowledge the inadequacy of information literacy skills among researchers from developing countries as the main factor leading to low exploitation of online information resources (Lwehabura, 2008; Tilvawala, Myers and Andrade, 2009; Harle, 2010; Wema and Manda, 2011; Gakibayo, Ikoja-Odongo and Okello-Obura., 2013; Oyedapo and Ojo, 2013; Sadeghi-Ghyassi et al., 2013). Some authors like van Dijk, (2006) and Tilvawala, Myers and Andrade (2009) believe that the current digital divide between developed and developing nations is shifting to usage skills rather than ownership of the technology. It is thus important to close such a gap through adequate investment in information literacy training along with acquisition of ICT facilities and online information resources. This is probably the reason why Tilvawala, Myers and Andrade (2009) consider investments in ICT facilities and other resources as wastage of effort without solving a core problem of low information literacy. It is on this understanding that several scholars consider it important for higher learning and research institutions to invest in information literacy training catering for students and research staff in order to improve usage of the available online information

resources (Gyamfi, 2005; Hinson and Amidu, 2006;Watts and Ibegbulam, 2006 Tella;, 2007; Nazim, 2008; Lwehabura, 2008; Gakibayo, Ikoja-Odongo and Okello-Obura., 2013; Oyedapo and Ojo, 2013; Sadeghi-Ghyassi et al., 2013;). Despite some institutions taking up the recommended measures, there is a general global problem of intended beneficiaries to rarely attend such information literacy training due to a variety reasons including tight schedules or just reluctance (Appleton, 2005; Georgina and Olson, 2008; Harle, 2010; Pierce, 2009).

A study by Harle (2010) for example revealed that only 22% among 240 researchers who were involved in his survey acknowledged to have benefited from information literacy trainings. Despite reluctance by some potential beneficiaries, studies indicate that rarely do information literacy trainees get dissatisfied at the end such trainings (Dulle and Lwehabura, 2004; Appleton, 2005; Wema and Manda, 2011). This implies that participation reluctance to information literacy training by most individuals is due to ignorance on the importance of such trainings and it is thus necessary to device mechanisms to ensure sufficiency attendance. As such, a number of studies suggests inclusion of information literacy training in institutional curricula for students (Badke, 2005; Barnard, Nash, and O'Brien, 2005; Arp et al, 2006; Lwehabura and Stilwell, 2008; Tarrant, Dodgson, and Law, 2008; Hart and Davids, 2010). Other recommended means cited for widening participation in information literacy training include: faculty outreach sessions, creation of path finders, provision of friendly WebPages, librarians and faculty collaborations, and use of Web 2.0 tools (Galvin, 2005; Stevens, 2007; Floyd, Colvin, and Bodur, 2008; Mounce, 2010;). Studies evaluating the impact of these approaches in developing countries' environment may be of practical adoption for institutions wishing to improve their information literacy delivery mechanisms.

Research Gaps

The following are some of the evident research gaps as deduced from a synthesis of the reviewed literature:

- The extent to which developing countries researchers are affected by the current online resources' licenses needs a further investigation. Although it is theoretically beyond reasonable doubt that the scholarly community from developing countries suffer from the current "big deals" which do not take seriously the aspect of perpetual access, it might be interesting to establish the extent to which scholars are affected with such arrangements.
- There is also a gap in literature with respect of how researchers in developing countries are taking advantage of new ICTs' developments including smart phones to cope with problems related to their institutional Internet connectivity for effective exploitation of online information resources.
- The other area which is not adequately researched is on the extent to which emerging technologies [Web 2.0 inclusive] are being exploited in developing countries in marketing of the available online information resources. Investigating the impact of such technologies where they have been used in developing countries and sharing lessons may impact on others who have not tried to implement similar strategies.
- Moreover, the aspect of less participation of academic and research staff in information literacy training programmes needs further investigation in order to come up with appropriate strategies. Researching and documenting stories about changes in attitudes of faculty who happen to benefit from information training programmes can be of use in attracting individuals who have not yet made decisions to participate in future similar trainings.
- Furthermore, there is a need for more studies on adoption and usability of discovery tools in developing countries. There is scanty information on how such tools are being employed in developing countries and how they are contributing in accessibility and usage of online information resources. It is equally important for more evaluation studies to assess precision and recall ratio of discovery tools in comparison to searching individual databases.

Conclusions and Recommendations

Developments in ICTs have revolutionised the scholarly publishing industry, just as it has been true for other sectors in both developed and developing world. As a result of various ongoing initiatives including PERI, R4L and open access, developing countries' researchers are comparable to those from the developed world in terms of opportunities of having access to a state of art scholarly content. This study aggregated various independent studies about factors affecting effective exploitation of online information resources in developing countries. It is evident from this study that developing countries' researchers are still disadvantaged in having access to the readily available literature due to a variety of constraints including unstable power supply, inadequate internet connectivity and inadequate information literacy skills.

Reviewed studies provide a variety of solutions towards improving the usage of online information resources in developing countries. Many studies emphasise on improving the existing ICTs and supportive infrastructure for effective exploitation of the available online information resources in developing countries. Unfortunately, the potential of discovery tools in facilitating access and usage of online information resources in developing countries have received little attention. It is thus recommended along with strategies to strengthen information literacy among students and academics that developing countries' research institutions should also consider investing in discovery tools. Since subscription to discovery tools is another cost venture for individual institutions, it is important for universities and research institutions to consider utilising their country library consortia to jointly acquire licences of such discovery tools. This is expected to reduce expenses that would have been incurred by individual institutions. Equally important is the marketing of the acquired discovery tools to intended users so that they are known and utilised effectively. This will reduce isolated efforts of marketing individual information resources and probably contribute to higher usage of the available online information resources in developing countries.

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