



Institutional Repositories and Open Access Initiatives in Bangladesh: A New Paradigm of Scholarly Communication

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Abstract

Nowadays, open access (OA) in its diverse forms constitutes the most interesting and promising model for the research output of an academic or research institution. The purpose of the present study is to discuss the situation of OA in the developing world, with a focus on Bangladesh. The study also addresses why OA is important for developing countries and which initiatives have been taken in Bangladesh. Finally, we discuss some challenging issues of OA and suggestions on how to overcome these issues. It is rather obvious that developing countries have always faced a lack of research information and were unable to afford sufficient subscriptions to journals. The other side of the picture is the poor dissemination of the research outcome in the developing world. In Bangladesh, only three organizations have their institutional repository and have a reasonable number of local OA journals. We will identify some problems that impede the process of building open access IR, or more generally an OA environment in

Bangladesh. We are convinced, however, that we will witness in the near future a sustainable growth of open access initiatives, with more open access literature and digital repositories.

Key Words: open access; institutional repositories (IR); scholarly communication; developing countries; Bangladesh

1. Introduction

The open access initiatives facilitate the free availability and distribution of scholarly communication. For the developing world they offer a means to solve the problem of inaccessibility of scientific information, which was primarily due to financial constraints. The most important problem for scholars and researchers in universities and research organizations of developing countries is the lack of access to the current literature in their subjects. Since important research output is most often published in journals with high subscription fees, collecting the required journals exceeds the capacity of most libraries. Moreover, in developing countries also the research infrastructure and the capacity to absorb scientific and technical knowledge are weak, leading to low levels of scientific output and further under-development (Okerson, 2004). In a recent study of the comparative performance of the world's major science producing countries, King (2004) found that researchers in eight countries — led by the US, the UK, Germany and Japan — produce almost 85 percent of the world's most cited publications, while another 163 countries, mostly developing ones, account for less than 2.5 percent. The open access movement addresses this barrier by arguing for the free availability of literature on the public internet and permitting all users to use it for any other lawful purpose (Krishnamurthy, 2008). Open-access (OA) literature is digital, online, free of charge, and free of most copyright and licensing restrictions. What makes it possible is the internet and the consent of the author or copyright holder (Suber, 2012). The two routes to open access recommended by the Budapest Open Access Initiative (OAI) are institutional repositories (IRs) and OA journals. Both offer proven mechanisms for closing the information gaps in ways that are appropriate for low income countries. IRs are now established in all continents with the largest repositories being found in Europe, North and South America, Japan, India and Australia (Cullen & Chawner, 2009). The establishment of OA policies and their implementation in developing countries

may offer new channels of dissemination of their scientific work among their colleagues world-wide. This may be significant for its long-term preservation and for the inclusion of this research in the global knowledge pool. In the context of a developing country like Bangladesh, however, the problems are still enormous and we have to go a long way, due to various limitations.

2. Significance of the Study

While the open access (OA) movement has been a topic of major debate and interest around the world, in the developing countries it has been seen as an unprecedented opportunity for providing equality of access to essential research information and for raising awareness of the national research output. The problems that developing countries have always faced with respect to research information are the inability to afford subscriptions to journals and the difficulty to integrate the national research output into the global knowledge. In these issues, OA may help by creating access to information (reading) and by increasing world-wide awareness of the local research output (writing) (Dekeyser, 2012). The limited circulation and awareness of scholarly publications in Bangladesh has resulted in a lower visibility of its academic output in the global research community. Bangladesh does not stand alone with these problems, although it is one of the least developed and most populous nations in South Asia with a literacy rate of 47.9% (CIA, 2012). The status of the Information and Communication Technologies (ICTs) in Bangladesh is far from impressive, as access to ICT in Bangladesh is not satisfactory. But some initiatives of government and private institutions are now breaking the ice towards countrywide ICT access. The 1980s were considered as the beginning of the automation era for libraries and information centres in Bangladesh. The libraries of the International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR,B) and of the Agricultural Information Centre (AIC) were pioneers in creating bibliographic databases in specialized fields, using microcomputers (Khan, 1989). The Internet arrived in Bangladesh with UUCP e-mail in 1993 and IP connectivity in 1996. Nowadays, use of computers and Internet has dramatically increased in Bangladesh, although a significant digital divide remains throughout the country. Table 1 shows the access to ICT in Bangladesh.

Table 1: Access to ICT in Bangladesh¹.

Year & Category	2005	2010
Computer access	1.36%	3.01%
Internet & E-mail access	0.20%	1.39%
Computer access in urban areas	4.88%	8.58%
Computer access in rural areas	0.17%	0.97%

Source: Bangladesh Bureau of Statistics (BBS), HIES 2010 (Partial)¹.

In Bangladesh, there are now 31 public and 54 private universities (UGC, 2012). In order to keep these universities competitive in the race of higher education and scholarly communication, open access policies could play a vital role by creating awareness of the work carried out at the university. There are a variety of factors that pose serious challenges to scholarly publishing in Bangladesh. These have been documented in a number of publications (Islam & Chowdhury, 2006; Shoeb, 2010; Chowdhury, Uddin, Afroz, & Sameni, 2011). The present study will largely treat the awareness issues of OA in Bangladesh. Since there have been no studies on the present status of OA scholarly communication in this country, this study will explore the present status and challenges of scholarly communication and simultaneously recommend key issues in developing open access in Bangladesh. We hope that this study may trigger further research in Bangladesh and beyond.

3. Objectives of the Study

The prime objective of the study is to focus on the different aspects of OA in developing countries and on the OA status in Bangladesh. More specific objectives are:

- To focus on Open Access Institutional Repositories (OAIR) and their importance for scholarly communication.
- To examine the present status of OAIR and OA initiatives in Bangladesh.
- To provide wider accessibility, visibility and distribution of scholarly work of Bangladeshi universities. In this respect the present study suggests some directions for improvement of OAIR in Bangladesh.

4. Research design

This is a literature-based discussion paper which examines the problems of open access IR in developing countries providing pragmatic suggestions that would address the challenges of making Bangladeshi scholarly publications internationally accessible. Initially, a substantial amount of literature has been reviewed in preparation of the study project. The research design focuses on the issues described below.

4.1. Data collection

One of the first steps in the data-gathering process was the identification of all the institutional repositories in Bangladesh. To compile the list of institutional repositories the author used various sources of information such as the professional literature, search engines (especially Google), Directories of archives/repositories such as the Directory of Open Access Journals (DOAJ), the Directory of Open Access Repository (OpenDOAR), Blogs and Open source software websites.

For the university repositories, the study focused on the websites of public and private universities listed on the website of the University Grants Commission of Bangladesh (UGC, 2012). Moreover, discussions were held with staff members of some leading libraries in order to understand their future plans for institutional repositories. In this way views were exchanged, opinions shared and this led to the decision to describe the understanding of the current situation of IR in Bangladesh.

4.2. Analysis

After analysing the DOAR, DOAJ and 85 university websites, it was found that only three organizations have a repository that is registered in OpenDOAR². These are the BRAC University Institutional Repository, the IUB Library Repository and the International Center for Diarrhoeal Disease Research Digital Repository, Bangladesh (ICDDR,B). We considered only those IRs that were fully operational. IRs in the planning or testing phases were excluded from the study. Moreover, it was observed that many institutions are on their way to prepare a repository. Besides repositories, there are

23 Bangladeshi journals listed in the DOAJ. This work was originally carried out between June and August 2012.

5. Open Access and Scholarly Communication in developing countries

The Berlin Declaration of Open Access to Knowledge³ states that establishing open access as a worthwhile procedure ideally requires the active commitment of each and every individual producer of scientific knowledge and holder of cultural knowledge. Examples of Open Access repositories from around the world can be found using the OpenDOAR service. At present the Directory of Open Access Repositories has over 2200 listings around the world and DOAJ has enlisted more than 8600 OA journals from 121 countries in different disciplines. By nature they are digital, online, free of charge, and free of most copyright and licensing restrictions. For the OA movement the Budapest⁴, Bethesda⁵, and Berlin definitions of open access are fundamental and significant. Despite of all the limitations, in recent years many publishers, funding bodies, and renowned scientists have provided support to the OA movement, and thus strengthened the scientific prominence of freely available science.

5.1. Access

Diverse initiatives targeted at improving access to science, technology, and medical research in the developing world have arisen from the 1990s onwards. Two of the most high profile international initiatives are HINARI and AGORA. HINARI provides free or reduced-rate access to over 2000 medical, biomedical and social sciences journals for researchers working in designated developing countries, via an interface with publishers' websites. Positive feedback from users in Asia, Africa, South America, and Eastern Europe testifies for the value of this resource. A sister UN program, AGORA (Access to Global Online Research in Agriculture) operates in a similar way for agricultural research publications. However, Suber and Arunachalam (2005) were critical of these services and said that "insofar as they satisfy demand, they reduce the urgency of deep reforms that will bring about a superior, OA system of scientific communication".

5.2. Publishing

Several initiatives for setting up OA journals in the developing world have become rather successful. They include:

- **Bioline International**⁶: This a not-for-profit scholarly publishing cooperative committed to providing open access to quality research journals published in developing countries. They provide a platform for the distribution of peer-reviewed journals (currently from Bangladesh, Brazil, Chile, China, Colombia, Egypt, Ghana, India, Iran, Kenya, Malaysia, Nigeria, Tanzania, Turkey, Uganda and Venezuela).
- **SciELO**⁷: SciELO, Scientific Electronic Library Online is a model for cooperative electronic publishing of scientific OA journals on the Internet. It was especially conceived to meet the scientific communication needs of developing countries, particularly in Latin America and the Caribbean.
- **African Journals Online (AJOL)**⁸: It is the largest and pre-eminent collection of peer-reviewed, African-published scholarly OA journals. In partnership with hundreds of journals from all over the continent, AJOL works to change the landscape, so that African-origin research output is available to Africans and to the rest of the world.
- **The Electronic Publishing Trust for Development (EPT)**, established in 1996, promotes open access to the world's scholarly literature and the electronic publication of bioscience journals from countries experiencing difficulties with traditional publication. India is home to many OA journals that charge no author-side fees. All 10 journals of the Indian Academy of Sciences and all four journals of the Indian National Science Academy are OA journals. INSA has already produced free-access electronic versions of back volumes for all its journals, and the Indian Academy of Sciences has launched a similar digitization project for its back run. Medknow Publications, a company based in Mumbai, has helped 30 medical journals make the transition from print to electronic open access and most of them are doing much better now than before (Suber & Arunachalam, 2005).
- Several publishers have also taken steps to increase the ability of researchers in developing countries to both access and contribute to academic literature by offering free or reduced price access to journals and/or waiving author charges. To review and develop these

moves will be an important task for organizations such as the Task Force on Science Journals, Poverty, and Human Development, set up in 2005 by the Council for Science Editors (CSE) as a forum for journal editors. Many others are listed in the DOAJ. Encouraging usage statistics are available from the services listed above. OAJs are, therefore, providing an important service for the distribution of national research output for developing country researchers, which is not otherwise readily available.

5.3. Information and collaboration

The provision of resources is not sufficient to improve access. Awareness of OA remains low in the developing world. As the drive towards open access to science gathers momentum in developing countries, encouraging the best use of available resources is the next logical step. Since its inception in 1992, the International Network for the Availability of Scientific Publications (INASP), a UK-based charity, has worked with partners across the world to facilitate access to online publications through workshops, training, library capacity building, and skills development.

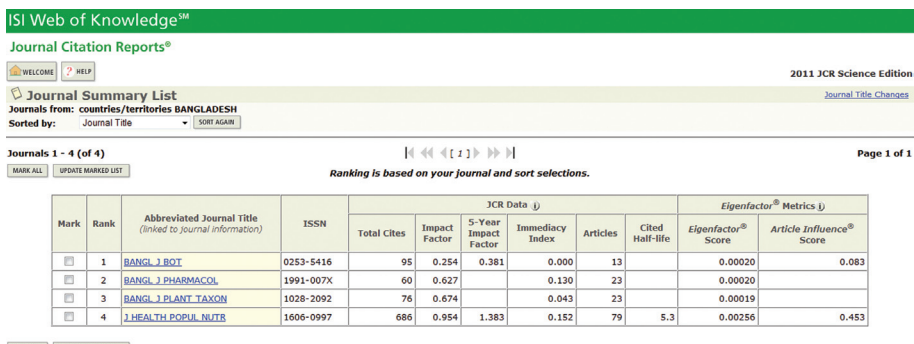
6. Perspective of Bangladesh

A major challenge of Bangladeshi scholarship is poor visibility of research findings coming out of the country and it has been identified by Shoeb (2010) and by Islam and Alam (2011). As a result, much published works obtained a very low impact. In addition to this, also limited readership of the quality papers in the country and low citations from colleagues also contributed to this poor visibility and to low impact factors. Visibility of publications is usually associated with the extent in which a published work is read and/or cited by other scholars and in a broader perspective with the contribution of a paper to the increase of human knowledge. Looking at journal visibility, Zainab and Anuar (2008) remarked that journal visibility is sometimes synonymous with journals that have achieved some measure of impact in the global scholarly community. This means that for Bangladeshi publications to achieve visibility they must have secured a reasonable impact in the growth of knowledge and this cannot be obtained when the papers are neither read nor cited by others. In case of online databases, Web of Science (WoS) offers a true

cited reference index, which is still the best tool for discovery and the only method of retrieving accurate citation counts. Four journals from Bangladesh are listed in the WoS Journal Citation Reports (JCR) (Figure 1).

Most of the 85 universities in Bangladesh publish some journals in their respective disciplines. The majority of these journals are in printed form only and very few of them are accessible via the internet. Since only four journals are cited by the WoS JCR, it is not difficult to guess at the low standing of the other journals. Research in low-income countries like Bangladesh is compromised by multiple factors: resources may be limited, equipment less than optimal, and basic infrastructure, such as electricity supplies, unreliable. An important impediment is the lack of access to current research. While the number of specialized academic journals in the world continues to rise, the average price of a scientific journal has risen four times faster than inflation for the past two decades, resulting in an 'access crisis' in which libraries are forced to cancel journal subscriptions (Suber & Arunachalam, 2005). Most university libraries in Bangladesh are not subscribing any more journals for years. The biggest threat to scientific research in Bangladesh is not the scarcity of financing, nor the often poor training of the students; it is the absence of information, and this in both discussed directions: the availability of information and the communication of newly obtained information (Dekeyser, 2012). Due to the absence of the three most important channels for the dissemination of scientific information (personal communications, conference contributions and scientific literature) this has always been the first and worst threat to the research capabilities of Bangladesh.

Fig. 1: Web of Science Journal Citation Report⁹.



6.1. Open Access Initiatives — Bangladesh Scenario

Open access to scholarly literature has received increasing attention in the academic, research and publishing circles over the last few years and has been a hot topic for debates and discussions (Zhang, 2007). Bangladesh is in the forefront of the developing world as well as of the South Asian region in terms of women empowerment, attaining MDG awards, economic growth and the way to scientific productivity. Research and development establishments and some of the higher institutions in Bangladesh are engaged in advanced studies. These organizations have developed worldwide recognized expertise in their respective areas. While these institutions have reasonably good information provision facilities that support scholarly communications, the others are trying to do the same. The problem is mainly related to availability, awareness, accessibility of literature and proper dissemination.

The situation in Bangladesh has improved to a considerable extent in recent years. Gartner, Inc. has identified the top 30 countries for globally sourced activities in 2010–2011. In Asia Pacific regions, Bangladesh is one of the best IT outsourcing countries. This is the first time that Bangladesh has been listed in the top ranking by any global research company (Outsource Offshore, 2010). National Information and Communication Technology (ICT) policy (2002) states that ICT use in every sector shall have to be accelerated in terms of information generation, utilization and applications. Institutional Repositories (IR) and Digital Library (DL) are relatively new concepts in Bangladesh. IR may be considered as the first step towards open access to research output. Library professionals in Bangladesh understand and realize the benefits of open access, yet there have been very few open access initiatives at higher learning institutions. The Government of Bangladesh also issued the Right to Information (RTI) Act 2009 in the Bangladesh Gazette on April 6, 2009, encouraging open access libraries and information centres.

6.2. Institutional Repositories in Bangladesh

Institutional repositories are widely developed and maintained in different areas of research around the world. In developing countries like Bangladesh, it has been seen as an unprecedented opportunity to provide

equality of access to essential research information and to raising awareness of national research. OpenDOAR listed 2200 registered Open Access Repositories worldwide. Among them 82.7% are institutional, 10.6% disciplinary, 4.3% aggregating and 2.4% are governmental. For Bangladesh, OpenDOAR listed three repositories¹⁰. Figure 2 shows the home page of one of the leading repositories in Bangladesh.

Table 2 shows some features of the IRs in Bangladesh registered in OpenDOAR. According to OpenDOAR only ICDDR,B has a registered OAI interface (allowing harvesters to retrieve their metadata). On the other hand, the University of Bielefeld harvester BASE¹² contains the metadata from BRAC but not from ICDDR,B. From this we conclude that from these three repositories only the IUB one does not have an interface for exposing the standard OAI-PMH metadata. From the above descriptions, some ideas may be obtained about the services and functionalities of these three repositories. All are functioning well with the built-in functionalities. All are organized under three broad sections designated as “Communities”, “Sub-communities” and “Collections”. Information can be searched by various criteria such as author names, title words, subject terms and any word in the original document and they yield results sorted by relevance. Most items in the repository are available as original full-text documents or full resolution images and videos. Furthermore, the World Health Organization (WHO) country office for Bangladesh also hosts an institutional repository¹³ but it is not registered with OpenDOAR. This IR is an archive of the information material from the WHO Country Office for Bangladesh.

Fig. 2: Digital Repository of ICDDR,B¹¹.

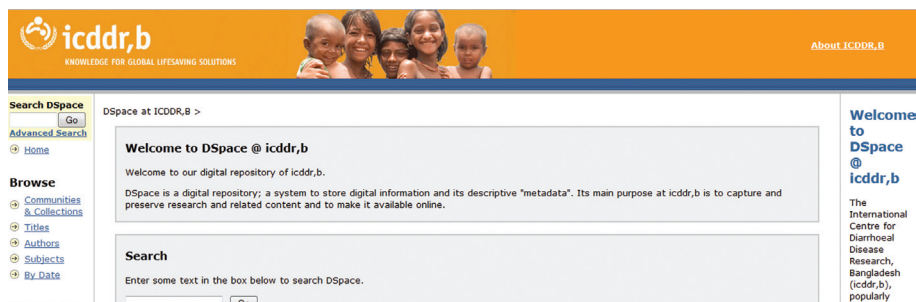


Table 2: Some features of the IRs in Bangladesh.

Name & Features	ICDDR,B Repository	BRAC, University Repository	IUB Library Digital Repository
Repository type Description	Research Center This is a subject repository providing access to research into Diarrhoeal Disease. Some items are only available to registered users.	Higher Academic This site provides access to the output of the institution. The interface is in English. The Digital Institutional Repository program is funded by the International Network for the Availability of Scientific Publications (INASP). Users may set up Atom and RSS feeds to be alerted to new content.	Higher Academic This site provides access to the research output of the institution. The interface is available in English.
Software	DSpace	DSpace	DSpace
Subject	Special	Multidisciplinary	Multidisciplinary
Size	3961 items (2012-10-30)	1547 items (2012-10-30)	64 items (2012-10-01)
Contents	Articles; Conferences; Special	Articles; Conferences; Theses; Unpublished; Books	Theses; Unpublished; Special
OAI Interface	Yes	Yes	No
ROAR ID	1184	1570	2481
Homepage	http://dspace.icddrb.org/dspace/	http://dspace.bracu.ac.bd/	http://dir.iub.edu.bd:8081/

6.3. Open Access Journals in Bangladesh

Open Access (OA) provides access to the full-text content of scholarly and peer reviewed journals. A number of scholarly journals covering a wide spectrum of subjects are published in Bangladesh. Many of these journals are peer reviewed and indexed and abstracted in premier indexing and abstracting periodicals. But the availability of these journals outside Bangladesh and the South Asian Association for Regional Cooperation (SAARC) region is very limited, due to the absence of strong distribution channels in other regions. The open access movement makes it possible for Bangladeshi journals to reach the target audience of the world’s research communities. More than 94 Bangladeshi research periodicals are now providing free access to their full text contents.

Figure 3 shows the number of journals that are available in the Banglajol database. The publishers of these journals publish print-on-paper journal issues,

Fig. 3: Bangladesh Journals Online (Banglajol)¹⁴.

Bangladesh Journals Online Home About Subjects Search Register

Bangladesh Journals Online

New Journals:
[International Journal of Pharmaceutical and Life Sciences](#) joined on 15/12/2012.
[The Arts Faculty Journal](#) joined on 13/12/2012.
[Bangladesh Journal of Library and Information Science](#) joined on 13/12/2012.
[Bangladesh Journal of Medical Education](#) joined on 06/12/2012.
[Bangladesh Pharmaceutical Journal](#) joined on 17/11/2012

New Issues:
[International Journal of Pharmaceutical and Life Sciences](#) Vol.1(3) 15/12/2012.
[The Arts Faculty Journal](#) Vol.4 13/12/2012.
[Bangladesh Journal of Library and Information Science](#) Vol.2(1) 13/12/2012.
[Eastern Librarian](#) Vol.23(1) 13/12/2012.
[Bangladesh Journal of Zoology](#) Vol.40(1) 10/12/2012.

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and also provide online access to the same content. Bangladesh Journals Online (BanglaJol) is a service to provide access to Bangladesh published research and to increase worldwide awareness of indigenous scholarship. BanglaJol is a database of journals published in Bangladesh, covering the full range of academic disciplines. For the interoperability, these journals provide structured metadata via OAI-PMH and these describe at present 8660 articles.

There are several programs, like HINARI and AGORA, in which journal publishers donate electronic subscriptions to developing countries. In Bangladesh, it was initiated in June 2007 and supported by the International Network for the Availability of Scientific Publication (INASP). With the exception of one library, the National Health Library and Documentation Centre (NHLDOC), all libraries have access to online databases and are members of the Bangladesh INASP-PERii Consortium (BIPC). A Memorandum of Understanding was signed in 2006 between the Bangladesh Academy of Sciences (BAS) and INASP, granting Bangladesh membership to this network. Through this network, a large number of journals from world-renowned publishers are made available to the Bangladesh stakeholders who can freely download the articles. Later on, all public and private universities, research institutes and laboratories in the country were informed of this network and were invited to join. This resulted in a substantial number of universities and research organizations participating in the network.¹⁵

DOAJ focuses only on journals that provide full text, are peer reviewed and scholarly. Currently, it is estimated that 20% of all published scientific papers are in Open Access (Hitchcock, 2012). A total of 23 Bangladeshi journals are listed in the DOAJ (Table 3).

6.4. Initiatives for Open Source Software

For the development of open access archives in Bangladesh, Free and Open Source Software (FOSS) packages are being used. In this area, an initiative has been taken for various training programmes and workshops. They are conducted by the East West University Library, BRAC University and Library Association of Bangladesh (LAB). Recently a four-day long training workshop on “Application of Greenstone Digital Library Software” has been arranged by the East West University Library collaboration with the University of Waikato, New Zealand. Besides these, BRAC University successfully completed the project “Open Source Discovery Tool VuFind” for BRAC University Ayesha Abed Library with support from INASP, UK.

7. Findings

While awareness of OA in the developing world remains low, more scientifically advanced nations have already recognised the benefits of OA and are making fast progress both in converting journals to OA and in establishing interoperable institutional repositories. The present status in Bangladesh is not satisfactory since only three organizations have their repository and few others are on the way to building one. Moreover, discussions with the library professionals have revealed that organizational authorities are not aware of the repository system and that they are comfortable with the conventional library system. They do not feel the necessity of digital repositories and to some extent the concept is not familiar to them. Chowdhury *et al.* (2011) concluded that the information systems, both in the public and private sectors of Bangladesh, are not effective due to a lack of understanding the values. This results in an inadequate allocation of financial resources by the respective authorities for building repositories. Despite the fact that a good number of journals are available through open access, the scenario is not so hopeful

Table 3: Bangladeshi OA Journals in DOAJ (n=23)¹⁶.

SL	Journal Name	ISSN	Subject	Publisher	Start (Y)	Added to DOAJ
1	Bd. J. of Pharmacology	1991007X	Therapeutics	Bd. Pharmacological Society	2006	3/18/2008
2	Bd. J. of Plant Taxonomy	10282092	Botany	Bd. Association of Plant Taxonomists	2005	4/3/2009
3	Bd. J. of Veterinary Medicine	17297893	Animal Sciences	Bd. Society for Veterinary Medicine	2003	4/15/2009
4	Journal of Medicine	19979797	Internal Medicine	Bd. Society of Medicine	2006	2/9/2009
5	J. of Naval Architecture and Marine Engineering	18138535	Mechanical Engineering	ANAME ¹⁷	2004	3/26/2009
6	J. of Plant Tissue Culture & Biotechnology	18173721	Plant Sciences	Bd. Association for Plant Tissue Culture	2007	3/9/2009
7	J. of Scientific Research	20700237	Science (General)	Rajshahi University	2009	5/12/2009
8	Bangladesh Journal of Anatomy	1817065X	Anatomy	Anatomical Society of Bangladesh	2009	10/11/2010
9	Bangladesh Journal of Medical Science	22234721	Medicine (General)	Ibn Sina Trust	2009	3/30/2010
10	Cardiovascular Journal	20710917	BSGC ¹⁸	Cardiovascular Medicine	2010	12/14/2010
11	Chemical Engineering Research Bulletin	3797678	Chemical Technology	BUET	2008	2/17/2010
12	J. of Bd College of Physicians and Surgeons	10150870	Surgery — Medicine	Bd College of Physicians and Surgeons	2006	2/19/2010
13	Journal of Dhaka Medical College	10280928	Medicine (General)	DMCTA ¹⁹	2009	11/3/2010
14	Stamford Journal of Pharmaceutical Sciences	19997108	Pharmacy	Stamford University	2008	1/11/2011
15	Journal of Bangladesh Society of Physiologist	19951213	Physiology	Bd. Society of Physiologist (BSP)	2006	7/27/2011
16	Journal of Bangladesh Academy of Sciences	3788121	Science (General)	BAS ²⁰	2008	10/27/2010
17	JAFMC, B ²¹	19925743	Medicine (General)	Armed Forces Medical College	2008	10/4/2011
18	IJIDCS ²²	22191127	Computer Science	IJIDCS Press	2011	7/9/2011

(Table 3: Continued)

SL	Journal Name	ISSN	Subject	Publisher	Start (Y)	Added to DOAJ
19	International Journal of Biosciences	22206655	Biology	International Network for Natural Sciences	2011	8/26/2011
20	Bangladesh Veterinarian	10125949	Animal Sciences	Bangladesh Animal Health Society	2008	10/27/2011
21	Bangladesh Journal of Otorhinolaryngology	17288835	Otorhinolaryngology	Society of Otolaryngologists & Head Neck Surgeons of Bangladesh	2008	02-05-2012
22	International Journal of Natural Sciences	22211012	Natural Sciences	Sylhet Agricultural University	2011	25-05-2012
23	International Journal of Science and Advanced Technology	22218386	Electrical Engineering, Energy, Biology	IJSAT Publishers	2011	31-05-2012

when compared with the large number of universities in Bangladesh. Other factors that contribute to the lack of OAIR's in Bangladesh are insufficient awareness of open access IR, epileptic power supply and lack of trained ICT personnel. This is a clear indication that the movement of the green road to open access through institutional repositories in Bangladesh is still in its age of infancy. Certainly, none of the issues discussed here are insurmountable, but they do require resources. Despite free software and relatively easy implementation requirements, IR's cost money. Content recruitment in particular requires a significant commitment. It has become increasingly clear that institutions with the intent of implementing a successful IR must be willing to allocate sufficient funds to provide a certain level of service and to properly promote the repository on campus. Ultimately, the long-term survival of IR's will depend on how well we can address these and other issues, both individually and as a community. If we can continue and build on our cooperative efforts, these should lower the barriers for the implementation and management of IR's in Bangladesh, and eventually contribute to the development of a comprehensive nationwide network of institutional repositories. So, it is now time for the universities of Bangladesh to reconsider and to establish such repositories in order to make their digital collections permanently

available and simultaneously to overcome the access barriers within the particular language periphery.

Although our research has reached its aims, there were some unavoidable limitations. First, because of time limitations, the research was conducted by visiting the respective websites and through informal communications with the information professionals of those organizations. Therefore, the study should have involved more participants at different levels in order to allow a generalization of the results.

7.1. Recommendations and prospects of OAIR in Bangladesh

In some informal conversations, it was observed that most of the university library personnel articulated and recognised the need of institutional repositories for their universities. The following major activities immediately need to be implemented by the authorities of these institutions in Bangladesh.

- **Creation of awareness.** The focus of this activity should be the stakeholders in the university system, particularly the administrators such as vice chancellors, registrars, librarians, and the university council members. Raising awareness should be done through national conferences, workshops, and symposiums and experts in these matters should be invited for these activities.
- **Government sponsorship.** Setting up OA journals and IR's is a capital intensive venture and, therefore, it would require government intervention. The poor funding of universities in the country makes it even more imperative since individual institutions will find it very difficult or nearly impossible to develop IR's on their own. The Federal Government could assist universities by selecting first a few universities (probably the first generation universities), while others will follow gradually.
- **Open Access policy:** Many developing country institutions are now producing policies about Open Access to their research output. Each university involved should establish a special committee for OA and IR policy. However, since all universities in Bangladesh have more or less the same infrastructure and objectives, a form of national coordination may be useful. These committees should assess the IT related infrastructures and the specific requirements for each university.

They should be composed from Computer Science faculty members, personnel from the Central Information Technology Division, Library staff and people responsible for the research of the university. The committee will develop the repository and formulate the policies.

- **Software:** A number of OA Software products are now available to create and maintain institutional repositories (e.g., EPrints, DSpace, FEDORA, Greenstone, etc.). As a result, the challenges in setting up an institutional repository are now seen as having less to do with technology but more with managerial aspects. Previous investigation (Shoeb, 2010) revealed that DSpace got the highest preference as IR software in Bangladesh, so DSpace could be used by these institutions.
- **Intellectual Property (IP) and licensing concern:** In determining the policies to be adopted concerning the Intellectual property of deposited material, we studied the policies that other similar organizations had developed for IR's. For instance, Lam and Chan (2007) and Sutradhar (2006) at the Hong Kong University of Science and Technology and Indian Institute of Technology (IIT), Kharagpur, India developed some standard policies. In Bangladesh, universities could adopt similar policies after assessing them. The important thing is to keep it relevant, useful and valid.
- **Content Submission to the IR:** Submission policies describe the policy of submission of the digital contents into the repositories. Self archiving is the most common procedure for this, where the authors themselves deposit their works in the repository.

8. Conclusion and future research

Despite different limitations of academic research in Bangladesh, initiatives towards Open Access have been taken by different institutions, but on a very small scale. It may be hoped that universities, libraries and different organizations will begin to investigate the OAJ and IR idea, and that their approaches will cover a wide spectrum of services and content. Establishing IR's in Bangladesh could substantially improve the dissemination of research findings from the country. Ultimately, the long-term survival of IR's will depend on how well we can address these and other issues, both

individually and as a community. If we can continue and build on our cooperative efforts, this should lower the barriers for the implementation and management of IR's in the country, and eventually contribute to the development of a comprehensive nationwide network of institutional repositories. However, an official statement or declaration on open access — as has been made in various other countries during the last decade — could favourably strengthen the development of such a framework for the open access literature. As this paper is focused only on initiatives, problems and recommendations, an in-depth review of this study is needed for each university, in order to establish what is applicable for its own setting, infrastructure, and needs. Various library networks, library consortia and library associations are also encouraging their member institutions to establish institutional repositories or open access archives. Library and information science professionals are concerned about open access issues. Library associations are holding conferences, seminars and workshops at the national level to provide a platform for discussion on the open access movement. In the near future, we would expect to see a sustainable growth of open access initiatives, open access literature and digital repositories in Bangladesh.

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Notes

¹ Source: Bangladesh Bureau of Statistics (BBS), Household Income and Expenditure Survey (HIES) 2010 (Partial).

² <http://www.opendoar.org>.

³ www.zim.mpg.de/openaccess-berlin/berlin_declaration.pdf.

⁴ <http://www.soros.org/openaccess/read.shtml>.

⁵ <http://www.earlham.edu/~peters/fos/bethesda.htm>.

⁶ <http://www.bioline.org.br/>.

⁷ <http://www.scielo.org>.

⁸ <http://www.ajol.info/>.

⁹ Source: http://admin-apps.webofknowledge.com/JCR/JCR?RQ=LIST_SUMMARY_JOURNAL.

¹⁰ <http://www.opendoar.org/find.php?CID=19&title=Bangladesh>.

¹¹ <http://dspace.icddrb.org/dspace/>.

- ¹² <http://www.base-search.net/Search/Results?lookfor=country%3Abd&type=all&ling=1&thes=&refid=dcresen&newresearch=1>.
- ¹³ <http://whobangladesh.healthrepository.org/>.
- ¹⁴ <http://www.banglajol.info/>.
- ¹⁵ Bangladesh Academy of Sciences. Bangladesh INASP-PERI Consortium. See <http://www.bas.org.bd/about/inasp-peri-consortium.html>.
- ¹⁶ www.doaj.org/doaj?func=journalsByCountry&cId=17&year=2012&uiLanguage=en.
- ¹⁷ ANAME: Association of Naval Architects and Marine Engineers.
- ¹⁸ BSGC: Bangladesh Society of Geriatric Cardiology.
- ¹⁹ DMCTA: Dhaka Medical College Teachers Association.
- ²⁰ BAS: Bangladesh Academy of Science.
- ²¹ JAFMC,B: Journal of Armed Forces Medical College, Bangladesh.
- ²² IJIDCS: International Journal on Internet and Distributed Computing Systems.