Institutional Repository (IR) Practices in Libraries of Bangladesh: A Study on Some Selected Libraries

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Abstract

This study was aimed to examine the Institutional Repository (IR) practices for the period of 2013-2016 by exploring their growth and development, maintenance, technologies used, search and access features, challenges and opportunities etc. in surveyed some libraries of Bangladesh. In Bangladesh nine libraries/ institutions were claiming the existences of IR which were also enlisted by DOAR (Directory of Open Access Repositories) of which 6 libraries were purposively selected to conduct the survey. A structured questionnaire comprising of 40 separate questions was designed for quantitative analysis of gathered data. All of the surveyed libraries commented that the concept of IR was not completely new but was evolved somehow in new package. The findings revealed that there were some problems that hampered the advancement of IR development in Bangladesh. Finally a sustainability model for IR based on some opportunities and challenges was recommended.

Keywords: Institutional Repository (IR); Directory of Open Access Repositories (DOAR); Digital Repository (DR); Open Access (OA); Registry of Open Access Repositories (ROAR); Scholarly Communication.

Introduction

In library and information center the concept and development of Institutional Repository (IR) based service is expanding speedily with the advancement of research and emerging technology. In Bangladesh like many other developing countries it is a new phenomenon though it's not new in developed countries. Due to escalating journal subscription cost and shrinking library budget almost all of the libraries, academic and research based special libraries in particular, have been taking initiatives to set up digital repositories based facilities to their users. Smooth scholarly communication and open access facilities are also another two main reasons behind of this initiative.

IR development is still in the process of establishing guiding principles and best practices. Actually there are no standard and established cases across the world to follow and learn about development options, challenges and risks [1]. Without having a clear concept and strategies of IR it becomes sometimes difficult to implement repository based practice properly in developing countries. In Bangladesh few libraries are trying their level best to effectively execute this emerging technology as an add-on service. In doing so, they are facing various challenges and at the same time also creating some opportunities for other interested groups. Bangladesh entered into digital repository based world by setting up an institutional repository at ICDDRB (International Centre for Diarrhoeal Disease Research, Bangladesh) library in 2005 [2]. Currently nine libraries and institutions altogether have this facility so far.

Institutional Repository (IR) Initiatives in Bangladesh

Computer came into Bangladesh in 1964 with the installation of an IBM 1620 machine at Atomic Energy Commission in Dhaka and libraries began to use it in the early 1980s though a drastic progress has been

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observed after 1996 [3]. Internet came to Bangladesh in early 1990s but full-fledged Internet service began in the country on 4th June 1996 [4]. According to Internet World Stats [5] the Internet penetration rate was very poor until 2011 (0.4% in 2010 and 3.5% in 2011). Since the inception of 3G mobile Internet service in 2012 the number of Internet users grows noticeably (31.9% of the total population in 2015).

There is no national record of the total number of functional open access institutional repository in Bangladesh. Open DOAR (Directory of Open Access Repositories) and ROAR (Registry of Open Access Repositories) are two world wide recognized directories keeping statistics of open access repositories through out the world. In 2013, Open DOAR[6] listed the name of only three repositories from Bangladesh. These were BRAC University Institutional Repository (http://dspace.bracu.ac.bd/); Independent University, Bangladesh (IUB) Library Digital Repository (http://dir.iub.edu.bd:8081/); International Centre for Diarrhoeal Disease Research Bangladesh (ICDDR,B) Digital Repository (http://dspace.icddrb.org/dspace/).

In 2015, they listed four more names of IR from Bangladesh named: Daffodil International University (DIU) Institutional Digital Repository (http://dspace.daffodilvarsity. edu.bd:8080/); Eastern University Digital Library (http://gsdl.easternuni.edu.bd/greenstone/cgi-bin/library.cgi); Islamic University of Technology Digital Library (http://lib.iutoic-dhaka.edu/); Dhaka University Institutional Repository (http://repository.library.du.ac.bd/). In 2016, Open DOAR listed two more names of organization, e.g. East West University and Department of Disaster Management, Peoples Republic of Bangladesh (http://kmp.dmic.org.bd/) of which East West University library maintaining two institutional repositories (http://gsdl.ewubd.edu/greenstone/cgi-bin/linux/library.cgi and http://dspace.ewubd.edu/).

In 2013 ROAR [7], on the other hand, mentioned that four institutions were maintaining IR in Bangladesh. The names of these repositories are International Centre for Diarrhoeal Disease Research Digital Repository, Bangladesh; IUB Library Digital Repository; BRAC University Institutional Repository and Institutional Repository of Bangabondhu Sheikh Mujib Medical University, Bangladesh. In 2015, they added 6 more IR in their list.

The name of these Institutional repositories are: two institutional repositories of East West University (EWU) Library; National Library Digital Repository (http://180.211.164.156:8020/greenstone/cgi-bin/linux/library.cgi); Daffodil International University

Institutional Digital Repository; Islamic University of Technology (IUT) Digital Library (http://lib.iutoic-dhaka.edu/greenstone/cgi-bin/library.cgi); Eastern University Digital Library. DOAR have already listed 2600 IR throughout the world. In figure 1, the country position of Bangladesh in terms of having IR is not at satisfactory level. On basis of registry of DOAR, there are only 10 IR throughout the country.

Literature Review

Institutional Repository or Digital Repository may be defined as a digital archives system of all kinds of knowledge materials/objects including research papers, journal articles, letters, notes, handouts, class lectures, term papers, research report/monogram, book, thesis/dissertations, teaching-learning-research materials etc, deposited by institutional members, support staff, researchers, teachers, students etc, or by the other external entity that might fit to the object submission objectives of institution, organized/maintained/operated by the parent institution/library for immediate dissemination to ensure free flow of scholarly, research and Open Access (OA) communication.

Thibodeau [8] evaluated the success of digital repository from five dimensions: *service* (functionality for members of the community); *orientation* (place in the continuum between preservation and access where the repository operates); *coverage* (content of IR); *collaboration* (alone or collaboration in functions); and *state* (maturity in the development of the IR). Interest in Open Access (OA) publishing has arisen for many reasons-technological, financial, ethical, political and scholarly… students as one of many contributors in OA repository are interested in OA publishing mainly for advancing their carriers [9].

Institutional repositories have the capacity to change the paradigm of traditional library culture and help to advocate for new ways for organizing, managing and disseminating scholarly information… libraries all over the world can also get benefits of IR by providing scholarly communication platforms, electronic publishing services, digital preservation support, storage for learning materials and courseware, knowledge management, and a unified platform for users to access the research output in the open access domain irrespective of geographic boundaries [10].

The benefits of having repositories in libraries and institutions are of manifolds [11-13]:

- Certainly accelerate scholarly communication;

- Reduce the information poverty in third world countries;

- Increase development of subject;

- Enhance access to all related document;

- Expedite the opportunities of research, experiments and study for researchers, teachers, scientists, scholars and learners;

- Increase visibility, usage and impacts of scholarly materials.

Obstacles to the development and deployment of full-fledged Institutional Repository vary from country to country, institution to institution. In this case, few problems are common as for example legal and copyright issue, technological issue, institutional and government support etc. In few cases the development and growth of institutional repositories have largely been affected by country's socio-economic and political situation [14]. The fear of losing authorship right later on is another reason most people especially students avoid submitting their research work in repositories. Therefore researchers, especially research students, might be anxious on depositing their materials for several reasons as for example, confidentiality of their work, exact ownership of the copyright, the chance of publishing their works later on etc [15].

Singh [16] observed that open access repositories in India are increasing among higher education and research institutions and that are playing roles for dissemination of research output of the institutions to the wider community. Ghosh and Das [17] thought that the future of open access institutional repository in India depends upon proper policy and sustainable framework. Pre-defined strategies and conditions are very much important in the advancement of IR development. Palmer, Teffeau and Newton [18] conducted a case study on three progressing IRs of United States where they found that long term goal and success targets were not pre-defined for IR initiatives. Bossaller and Atiso [19] described sharing habits and feelings of scientists and librarians on scholarly communication in relating to the roles of IR from Ghanaian context.

Chowdhury et al [20] conducted a study on the development of IR using Dspace from Bangladesh perspectives where they compare the existing status and service of mainly two repositories. Rahman and Islam [21] reviewed issues and strategies of Institutional Repositories in Bangladesh where they explored the potentiality of IR in Bangladesh and also stated its current status and provided some

guidelines. Shoeb [22] investigated the possibility for setting up procedure of institutional repository in a university of Bangladesh.

Objectives of the Study

The main aim of this study was to reveal IR based systems and services of the university and special libraries of Bangladesh. Besides, this study has been carried out with a view to the following objectives:

i. To state the growth and development of IR based real scenario in Bangladesh;

ii. To explore the different features/aspects related to IR practices and compare among several selected libraries in Bangladesh;

iii. To identify some problems, opportunities and challenges in the growth and development of IR; and

iv. To prescribe a sustainable model for IR.

Materials and Methods

A survey research method has been applied to explore the status and service of Institutional Repository (IR) system in Bangladesh. Six institutional repositories from Dhaka (capital city of Bangladesh) have been selected purposively as sample. The core data for this study have been collected mainly with the help of a structured questionnaire; both open and closed-ended questions are included in formulating questionnaire.

The questionnaire was designed to cover various issues, including basic information on IR system; maintenance, software and technologies used for IR; search and access, opportunities and challenges etc. The theoretical framework for this study has also been constructed by reviewing necessary secondary documents, such as books, journal articles, web materials, etc. All the gathered data have been analyzed by using modern statistical method and presented in tabular, graphical and theoretical form.

Study Areas

Among the 9 libraries and institutions of Bangladesh which are currently maintaining and also planning full-fledged Institutional Repository (IR) for their users, 6 pioneering and leading libraries relating to providing IR services have been purposively selected as study areas (Table 1).

Table 1: Surveyed libraries

Sl. No.	Name of the Libraries	Library Types	URL of IR
1.	BRAC University Library (BRACUL)	University Library	http:// dspace.bracu.ac.bd/
2.	Independent University Bangladesh, Library (IUBL)	University Library	http://div.iub.edu.bd:8081
3.	East West University Library (EWUL)	University Library	http://dspace.ewubd.edu/
4.	Eastern University Library (EUL)	University Library	http://gsdl.easternuni.edu.bd/greenstone/cgi-bin/library.cgi
5.	Daffodil International University Library (DIUL)	University Library	http://dspace.daffodilvarsity.edu.bd:8080/
6.	International Centre for Diarrhoeal Disease Research Bangladesh Library (ICDDRBL)	Special Library	http://dspace.icddrb.org/dspace/

Results

A: Basic Information on Institutional Repositories of surveyed libraries

IR system in Bangladesh is really new phenomenon. Most of the libraries under survey initiate the concept more recently. In this case ICDDRB library plays pioneering role. This library claims that they introduced IR system in 2004. The main users of university centered IR are the students, staff, teachers, researchers whereas the IR of one special library serve their researchers and doctors (physician) (Table 2).

Half of the total libraries under survey don't have any statistics about the number of users visit per day in their IR homepage. All types of users irrespective of authorized and non-authorized have the same right to access the content of IR of the libraries without paying any charge. Open DOAR and ROAR are online directories of existing IR regarding the growth and status of repositories throughout the world. All of the IRs of libraries under survey have been registered by DOAR/ROAR (Table 3).

The most common question in relating to IR is that why do they provide IR service to users. They were given four options to indicate all of which is related with the objectives of IR. All of the libraries under survey think that they introduced IR system for ensuring easy access to information while 83.3% libraries under survey consider it for ensuring smooth scholarly communication. 66.7% libraries think the IR system may eliminate research gap by ensuring best use of modern technology (Table 4).

B: Maintenance of IR

In 2013 two libraries didn't provide information regarding number of items being uploaded in IR (Table 5). ICDDRB library has the highest number of items (5659 items) uploaded in IR, which is followed by BRACUL (4131) and EWUL (1285).

There are different types of items the surveyed libraries prefer to upload in their repositories. Table 6 represents that the preferred category of uploaded items under surveyed libraries are research paper/ internship report (100%), thesis/dissertation (83.3%), conference proceeding (66.7%), books and journal (66.7%), unpublished document (66.7%), audio-visual/ multimedia object (66.7%) and pre/post print publication (50%). While 16.7% respondents deposit cross-institutional research product in their repository.

Respondent libraries were asked to indicate the type of subject areas they consider for their items' submission. Table 7 depicts that 83.3% libraries under survey prefer items on business administration, health science and CSE for their IR. While 66.7% libraries prefer items on language, social science, humanities, development studies and economics subject for their repository.

There are three types of indigenous document from institutional product's point of view viz., institutional document, institutional member's research product and cross-institutional research product. Respondents were asked to indicate which types of materials they normally emphasized most in terms of selection for their repository. The surveyed libraries normally emphasize on Institutional document and Institutional members' research product (100%) and while cross-institutional research product (33.3%) were given less priority for item selection (Table 8).

The items to be selected for submission to repository should have undergone through proper review of subject expert. 100% recognize the fact by saying that all of them have subject expert for review items and metadata creation. Respondents were also asked to comment their item submission policy whether it has been defined or don't have such policy. Table 9 shows that all of the surveyed libraries' items submission policies are defined & stated. Meta data harvesting is an important feature to which search effectiveness depends on. Many different metadata schemes have been developed as standards across disciplines, such as library science, education, archiving, e-commerce, and arts. Respondents were asked whether they follow any such standard for maintaining uniformity

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in metadata creation. As usual all of the surveyed libraries have been following standard for metadata harvesting.

C. Software and Technologies used for IR

There are dozens of software used for building up IR. But in Bangladesh only two/three software are being used in this case. Dspace is the most popular software for building up institutional repository in the libraries under survey (83.3%). Only EUL (16.7%) use Greenstone software for building up and smooth functioning of institutional repository (Table 10).

D. Search and Access

Without any exception all of the libraries under survey have multi-language feature, specially, Bengali script browsing facility. In retrieving items form IR, browsing options play important role. It's also the indication of structured organization of items in the repository. Respondent libraries were given some sample browsing options. Beyond them they may also indicate some others if there is any other browsing options. All of the surveyed libraries indicated author, title, subject as user browsing options to retrieve items from IR (Table 11). The downloading facility of full text items of surveyed libraries is freely accessible to all irrespective of institutional and cross-institutional member (Table 12).

E. Advantages, Impact and Comment of Librarians

Respondent libraries were provided some options of advantages of having IR in which they were asked to provide their opinions. All of the respondent libraries think that having IR may support in teaching and learning and also it may open universal accessibility of its deposited learning content. While 66.7% libraries think that IR have the advantage of one stop source and easier way to discovery of its
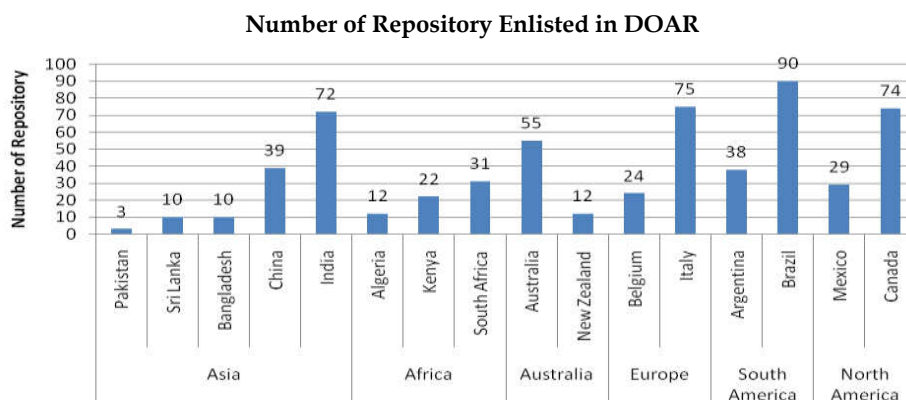
content and in the long run it will be prestigious as well as more exposure for its institution as it support to scholarly communication (Table 13).

After being introduced IR in the libraries under survey whether their institutional members accept it positively for scholarly communication or not were asked. The result shows in Table 14 that the institutional members took it pretty positive for smoothing scholarly communication. 66.7% surveyed libraries observe that there is a positive on-going impact among institutional members for scholarly communication after IR being introduced.

The entire libraries under survey think that the creation and implementation of IR is the sole responsibility of library professionals. All the libraries under survey reckon (Table 15) that there should have national level mechanism to promote and integrate IR initiatives and national level awareness. The concept of IR is an emerging one in library field though cent percent libraries under survey thought that the concept of IR was old but it was evolved in new package.

F. Challenges and Opportunities

Developing a balanced and focused institutional repository might be some challenging and risky tasks. Surveyed libraries were asked to mention such type of challenges they have already been faced. Table 16 represent that 66.7% respondents under survey treated 'copyright issue' as a major threat to developing a resourceful IR. Some (33.3%) respondents indicated motivational issue, archival issue and technological issue as challenges. Library might also face several problems during development and maintenance period. Respondent libraries under survey were also asked to point out those problems. 'Low rate of participation' was the main problem for all libraries while some mentioned unconsciousness on IR (66.7%) as problem.

Number of Repository Enlisted in DOAR

Fig. 1: Worldwide Growth of Institutional Repository: Focus on Bangladesh

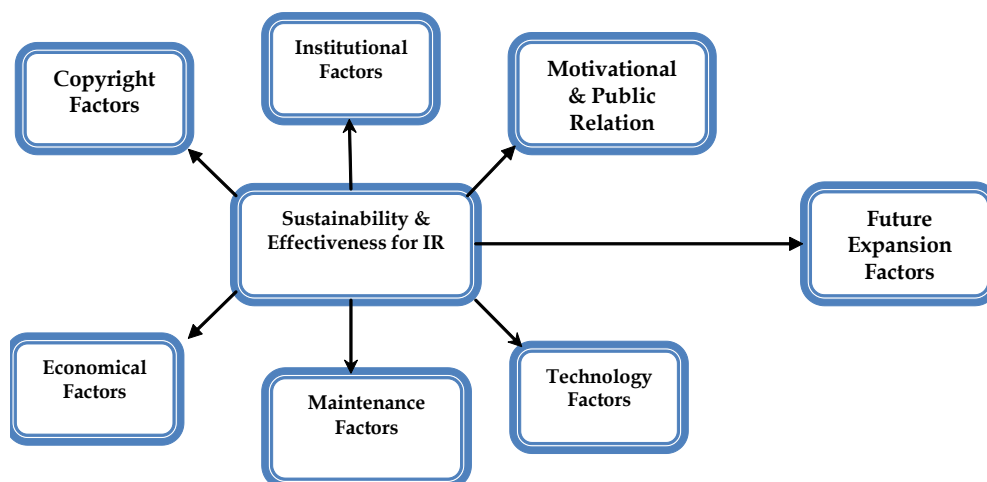[Source: Open DOAR, (2016). Countries and organizations. Available at: http://www.opendoar.org/countrylist.php]

Fig. 2: Sustainability model for IR

Table 2: Inception year and users of IR

Surveyed Libraries	Inception year	Student	Teachers	Staff	Researchers	Doctors (Physician)	Others
					Main users of the IR		
BRACUL	2007	✓	✓	✓	✓	x	x
IUBL	2011	✓	✓	✓	✓	x	x
EWUL	2010	✓	✓	✓	✓	✓	x
EUL	2012	✓	✓	✓	✓	x	x
DIUL	2012	✓	✓	X	✓	x	x
ICDDRBL	2005	x	x	X	✓	✓	x

Table 3: Visiting users' number, DOAR/ROAR enlistment and nature of IR system

Surveyed Libraries	Number of users visit IR homepage per day	DOAR/ROAR Enlistment	Open to all with charge	No charge but open to all	Member only
				Nature of IR	
BRACUL	Data not available	Yes	x	✓	x
IUBL	Data not available	Yes	x	✓	x
EWUL	300	Yes	x	✓	x
EUL	150	Yes	x	✓	x
DIUL	Data not available	Yes	x	✓	x
ICDDRBL	10	Yes	x	✓	x

Table 4: Reasons to launch IR (multiple responses)

Reasons to launch IR	BRACUL	IUBL	EWUL	EUL	DIUL	ICDDRBL	Number (%)
Ensuring smooth scholarly communication	✓	✓	✓	✓	✓	x	5 (83.3%)
Eliminating research gap	✓	✓	✓	✓	x	x	4 (66.7%)
Ensuring easy access to information	✓	✓	✓	✓	✓	✓	6 (100%)
Ensuring best use of modern technology	✓	✓	✓	✓	x	x	4 (66.7%)

Table 5: Number of items uploaded

Surveyed libraries	Number of items uploaded in IR	
	2013	2016
BRACUL	1430	4131
IUBL	100	179
EWUL	Data not provided	1285
EUL	4	378
DIUL	Data not provided	771
ICDDRBL	3740	5659

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Table 6: Category of items (multiple responses)

Category of items	BRACUL	IUBL	EWUL	EUL	DIUL	ICDDRBL
Thesis/dissertation	✓	✓	✓	✓	✓	x
Research Paper/ Internship report	✓	✓	✓	✓	✓	✓
Conference proceeding	✓	✓	X	x	✓	✓
Pre/Post print publication	x	✓	X	✓	x	✓
Books and journal articles	x	x	✓	✓	✓	✓
Teaching & learning objects	x	✓	X	✓	x	X
Unpublished document	✓	✓	X	✓	✓	X
Dataset	x	✓	X	x	x	✓
Audio-visual/ multimedia object	✓	✓	✓	✓	x	X
Software	x	x	X	x	x	X
Cross-institutional research product	x	✓	X	x	x	X
Others	x	x	✓	x	x	X

Table 7: Subject areas

Subject areas of Items	BRACUL	IUBL	EWUL	EUL	DIUL	ICDDRBL	Number (%)
Business administration	✓	✓	✓	✓	✓	x	5 (83.3%)
Language	✓	✓	✓	✓	x	x	4 (66.7%)
Social Science	✓	✓	✓	✓	x	x	4 (66.7%)
Humanities	✓	✓	✓	✓	x	x	4 (66.7%)
Health science	✓	✓	x	✓	✓	✓	5 (83.3%)
Natural science	✓	x	x	✓	x	x	2 (33.3%)
Pharmacy	x	x	✓	x	✓	x	2 (33.3%)
Medical science	x	x	x	✓	x	✓	2 (33.3%)
Development studies	✓	✓	✓	✓	x	x	4 (66.7%)
Economics	✓	✓	✓	✓	x	x	4 (66.7%)
CSE	✓	✓	✓	✓	✓	x	5 (83.3%)
Science	✓	✓	x	✓	x	x	3 (50%)
Others	x	x	x	✓	✓	x	2 (33.3%)

Table 8: Types of materials emphasized most in depositing (multiple responses)

Surveyed libraries	Most emphasized types of selected items		
	Institutional document	Institutional members' research product	Cross-institutional research product
BRACUL	✓	✓	x
IUBL	✓	✓	x
EWUL	✓	✓	x
EUL	✓	✓	✓
DIUL	✓	✓	✓
ICDDRBL	✓	✓	x

Table 9: Availability of subject expert, metadata harvesting standard, and submission policy

Surveyed libraries	Availability of subject expert	Standard for metadata harvesting	Items submission policy
BRACUL	Yes	Yes	Yes
IUBL	Yes	Yes	Yes
EWUL	Yes	Yes	Yes
EUL	Yes	Yes	Yes
DIUL	Yes	Yes	Yes
ICDDRBL	Yes	Yes	Yes

Table 10: Types of software being used for IR

IR Software	BRACUL	IUBL	EWUL	EUL	DIUL	ICDDRBL	Number (%)
Dspace	✓	✓	✓	x	✓	✓	5 (83.3%)
E-prints	x	x	x	x	x	x	-
Fedora	x	x	x	x	x	x	-
Greenstone	x	x	x	✓	x	x	1 (16.7%)
Others	x	x	x	x	x	x	-

Table 11: Language features and browsing options

Surveyed libraries	Language features		Browsing options				
	Availability of multi-language feature to access	Bengali script browsing facility	Author	Title	Subject	Date	Others
BRACUL	Yes	Yes	✓	✓	✓	✓	✓
IUBL	Yes	Yes	✓	✓	✓	✓	X
EWUL	Yes	Yes	✓	✓	✓	✓	X
EUL	Yes	Yes	✓	✓	✓	✓	X
DIUL	Yes	Yes	✓	✓	✓	x	X
ICDDRBL	Yes	Yes	✓	✓	✓	✓	X

Table 12: Downloading features

Surveyed libraries	Downloading facility of full text item	
	Limited within institutional member	Freely accessible (irrespective of institutional and cross-institutional member)
BRACUL	x	✓
IUBL	x	✓
EWUL	x	✓
EUL	x	✓
DIUL	x	✓
ICDDRBL	x	✓

Table 13: Advantages of IR

Advantages	BRACUL	IUBL	EWUL	EUL	DIUL	ICDDRBL	Number (%)
One-stop-source	✓	✓	✓	✓	x	x	4 (66.7%)
More exposure	✓	✓	✓	✓	x	x	4 (66.7%)
Universal access	✓	✓	✓	✓	✓	✓	6 (100%)
Easier information discovery	✓	✓	✓	✓	x	x	4 (66.7%)
Long term presentation	✓	✓	✓	✓	x	✓	5 (83.3%)
Wide range of content	x	✓	✓	✓	x	x	3 (50%)
Prestigious for institution	✓	✓	✓	x	✓	x	4 (66.7%)
Supportive to teaching and learning	✓	✓	✓	✓	✓	✓	6 (100%)
Supportive to scholarly communication	✓	✓	✓	x	✓	x	4 (66.7%)

Table 14: Impact of IR

Surveyed Libraries	Positive Impact	Modes of Impact		
		Short term impact	Long term impact	On-going impact
BRACUL	Yes	x	x	✓
IUBL	Yes	x	x	✓
EWUL	Yes	x	x	✓
EUL	Yes	✓	x	X
DIUL	Yes	x	x	✓
ICDDRBL	Yes	x	✓	X

Table 15: Librarians' remarks on IR

Surveyed libraries	Remarks of the Librarian on IR		
	Sole responsibility of librarian for development	Essentiality of national level mechanism	Old wine in a new bottle
BRACUL	Yes	Yes	Yes
IUBL	Yes	Yes	Yes
EWUL	Yes	Yes	Yes
EUL	Yes	Yes	Yes
DIUL	Yes	Yes	Yes
ICDDRBL	Yes	Yes	Yes

Table 16: Challenges and problems faced while developing IR (multiple responses)

Challenges and Problems	BRACUL	IUBL	EWUL	EUL	DIUL	ICDD RBL	Number (%)
Challenges							
Sustainability issue	x	x	x	x	x	x	-
Publicity issue	x	x	x	✓	x	x	1 (16.7%)
Motivational issue	✓	x	x	✓	x	x	2 (33.3%)
Economical issue	x	x	x	x	x	x	-
Archival issue	x	x	x	✓		✓	2 (33.3%)
Technological issue	x	x	x	✓	✓	x	2 (33.3%)
Copyright issue	✓	x	✓	✓	x	✓	4 (66.7%)
Problems							
Low rate of participation	✓	✓	✓	✓	✓	✓	6 (100%)
Low awareness common to IR	✓	x	✓	✓	✓	x	4 (66.7%)
Conflict with copyright act	x	x	x	✓	x	✓	2 (33.3%)
Ever changing technology	x	x	x	x	x	x	-
Financial problems	x	x	x	x	x	x	-
Administrative complexity	x	x	x	x	x	x	-
Technical problem	x	x	x	x	✓	x	1 (16.7%)

Discussions

According to the statistics of OpenDOAR [23] only nine libraries or institutions across the country have Institutional Repositories (IR) of which six have been selected randomly for current study. The present research is the facts and findings that have been gathered since last three years. Though ICDDRB library has played a pioneering role in the establishment of IR in Bangladesh yet majority percent libraries under survey adopted this technology from 2010 to 2012. ICDDRB library has also been playing leading role by submitting 5659 items in its IR while BRACU library has also uploaded 4131 items so far. Thesis/dissertation, research paper/ internship report, conference proceeding, books and journal articles are the main categories of items reflected in the majority of the repositories for submission. All the libraries give most priority on institutional document together with institutional members' research output for submission as their item submission policy is defined and stated. The students, teachers, researchers and staff members are the main users of these IRs. They provide IR services to users without any charge. Everyone can download and upload items from/to the repositories. The library officials inspire their users to upload items to the repository directly though this task is performed by their staff members most often. All of the libraries think that the easy access to information through IR will ensure smooth scholarly communication in the long run.

Dspace is the most popular software in this part of the world as it is easy to use, handle, upload/ download items, customize, and it has also user friendly interface and in particular it is open source software. In choosing right type of software, technical and performance factors have been considered most often by the surveyed libraries. The respondent libraries prefer multi-lingual features in browsing and user interface. Arranging seminar and workshop is the best way to motivate users in the use of IRs. All of the librarians under survey think that 'universal access' and 'supportive to teaching and learning' are the two advantages of having IR in their libraries.

Before going to develop IR, surveyed libraries thought that copyright issue might be the real threats. A noteworthy number of respondents also put their comment accordingly. If we consider service of IR to the users, all the libraries under study think that it's pretty effective. For institutional support, scholarly communication and long time preservation IRs are engaged exclusively. It has been observed a positive on-going impact of IR in library services and activities.

Recommendations and Sustainability Model for IR

Sustainability and effectiveness of IR in the road of open access depends solely on several factors which have been depicted through the Figure 2.

Copyright Factors

It seems that copyright issue is congenital dilemma for IR. For eligibility of content and clearing the content right, copyright clearance tools (e.g. SHERPA/ RoMEO) can effectively be used. Infringement of copyright act can also overcome by:

- Negotiating with government, third party, global publishers, e-database etc. to flexible the issue someway;

- Ensuring consensus with conflicting parties,

policies and agreement on information generation or re-production;

- Involving the big parties like Google or Yahoo etc. to work out on it;

- Arrange awareness growing program among students and young researchers regarding like how to avoid infringement of copyright and plagiarism etc.

Institutional Factors

Without having profound support from parent organization IR can't be sustained. Institutional support can be achieved by:

- Synergistic efforts to make a solution, if any problem arises;

- Increasing willingness and enthusiasm among support staffs and contributors;

- Developing a separate research domain to work on it;

- Supplying well trained manpower, emerging technologies, and sufficient fund.

Motivational and Public Relation Factors

The effectiveness of IR heavily rely on proper motivation and public relation activities on support staff and contributors. Advocacy and promotions are needed to make the content of IR attractive to the users. These include following activities:

- Arrange seminars, symposiums, webinars, hands on training, workshop etc. on theory and practice of IR for professionals as well as non-professionals;

- Inform current information and activities relating to IR to contributors, support staffs and young professionals;

- Involve mass people by arranging discussion program; releasing news in media; bringing out handout, brochure, manual etc. like printed publication on IR, circulating news and message on online forum, blog, social networking site etc.;

- Inspire information producer like author, editors, researchers, students etc. in using and submitting items to IR for accelerating scholarly communication;

- Arrange program on author's right, intellectual property right, depositing policy, pre-print and post print deterrent, obligation of institution, journal and research supervisor etc;

Economical Factors

The steps to be taken to overcome the economic barriers for setting up and sustaining repository include following:

- Develop network system and consortia on IR;

- Allocation of fund jointly;

- Arrange fund generating program continuously.

Maintenance Factors

These include followings:

- Promote sustainable infrastructural development;

- Enhance better security system to protect data embezzlement, theft and fraud;

- Regular update of software and security system;

- Regular risk analysis and taking up possible protection;

- Develop standard repository and archiving system;

- Ensure better service standard to the users;

- Maintain exact policy for metadata and harvesting.

Technological Factors

The emergence of repository management software, such as DSpace, EPrints, Digital Commons, and Fedora has facilitated the technical aspects of repository implementation, making it a reasonable prospect for many institutions [24]. These include followings:

- Choosing right type software and allied technologies fit to the need of the users, institution and selection parameters;

- Ensure proper maintenance, development and customization;

- Development of IT expert and ensure regular training.

Future Expansion Factors

Possible mechanisms for future expansion policy include:

- Formation of a team consisting of staff members, contributors, and experts for collaborative efforts and future development;

- Construct a common platform for sharing views and opinions creating IR based wiki, video-

sharing website, blog, SNS group, online solution group, mail group, news feed etc.;

• Arrange global exchange program on IR.

Conclusion

The development and wider acceptance of emerging technologies, Internet in particular has brought revolutionary change in bringing the results of research to everyone. Without any doubt these new technologies make it possible to access substantial amount of information expediently and instantaneously. But in the case of getting quality research materials, the probability of freely accessible relevant resources is very limited. The effectiveness of a research result can only be measured when it is effectively used, shared and applied by others. Hence, open access institutional repository have exposed new gateway of hopes for professionals and research scholars.

In Bangladesh 9 libraries/institutes listed by DOAR have developed open access repository system for smoothing scholarly communication to which 6 progressing IR initiatives were studied using survey method. The development and application level of IR in this region if we compare with developed countries remains at primary stage. It has been found in the present study that Dspace is the most popular software for the libraries of Bangladesh due to easy to use, handle and customize. Most of the libraries are facing some challenges in terms of providing full-fledge repository services where copyright and legal issues were getting prime importance in this respect by the libraries under survey. Low rate of participation and below par awareness are the most important problems for the development of repository in this part of the world. Realizing the growing importance of IR in enhancing institution's academic quality more action plans for its sustainable development will be taken at national and international level.

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