DIGITAL PRESERVATION ACTIVITIES OF INSTITUTIONAL REPOSITORIES IN SOME SELECTED PUBLIC UNIVERSITY LIBRARIES OF BANGLADESH: AN ANALYTICAL STUDY

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Abstract

The purpose of the study is to describe and analyze the present condition of digital preservation of institutional publications in the libraries of higher educational institutions especially in public universities of Bangladesh. It describes the authors' observations regarding the preservation of institutional publications in public university libraries. To explain the situation, university repository sites and literatures were reviewed, librarians were interviewed and finally primary and secondary data were collected from the repository administrators of seven public university libraries in Bangladesh where digital preservations are made through IRs. DSpace, the open source institutional repository software is adopted in these university libraries for the digital preservation because of its user friendly and effective modules. This paper will help library professionals to choose the Open Source. IRs. DSpace, the open source institutional repository software is adopted in these university libraries for the digital preservation because of its user friendly and effective modules. This paper will help library professionals to choose the Open Source The study identified some challenges to establish IR software for open access to digital preservation and finally recommended suggestions to overcome the issues.

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Keywords
Digital preservation, Institutional repository, Higher educational institution, Public university, DSpace, Bangladesh.

Introduction

"The advent of digital technologies and the internet has revolutionized the activities of information creation, organization, preservation and scholarly communication. The immense ability of these technologies to access, interpret and create digital information has increased its level of importance in the continuum of literacy, changes the working pattern of information professionals as well as users' information seeking behavior (Alam and Islam, 2011)." "Advent of technological advances have added prestige to the professional, provided its application are used effectively to benefit the users of information providing them whatever whenever wherever information is needed (Chandel and Mezbah-ul-Islam, 2011)." New movement in the world is developed to ensure free access to intellectual output of research scholars from different angles of education. "The thinking about digital preservation over the past few years has advanced to the point where the needs are widely recognized and well-defined. The libraries of universities and research organizations will be benefited through demonstration and sharing the experience of institutional repositories (Chowdhury et al., 2011)." The higher educational libraries, in this sense, have been playing a major role since evolution of digitization in Bangladesh. What are the achievements during this time? What obstacles are they facing to develop the process? The main focus of this study is to review the present status of the university libraries of Bangladesh in terms of adoption of technologies, especially in digital preservation.

Objectives

The prime objective of the study is to explore the present scenario of digital preservation of university publications in public university libraries of Bangladesh with the help of Institutional Repository Software (IRS). More specifically, the objectives of the study are:

- To get an overview of the current digital information resources available on the repository software in public university library.
- To identify the faculty-wise or subject-wise IRS.
- To examine most useful repository software for digital preservation.
- To find out the problems and provide recommendations to overcome the existing problems of digital preservation.

Review of Literature

A number of substantial studies have been already done on digital preservation activities in Bangladesh. Mostofa, Begum, & Mezbah-ul-Islam (2015) discussed the roles of IR in enhancing higher education and scholarly communication in Bangladesh. They showed the present scenario and impact of IR in higher education and tried to show the relationship of IRs with educational research and scholarly communication. Tabassum, Roknuzzaman, & Islam (2015) explored "the factors that influenced usage of digital libraries based on a case study of East West University Digital Library (EWUDL) in Bangladesh". Chowdhury et al. (2011) particularly focused on the development of institutional repositories using DSpace software in Bangladesh, and provided a review of the current situation and examined the prospects of Institutional Repositories (IR). They described the concept of IR, highlighting the development and progress of IR in Bangladesh and encouraged the establishment of IR in the libraries of respective organizations/ institutions. Islam & Akter (2013) focused on the different aspects of OA in developing countries and on the status of OA in Bangladesh. They focused on Open Access Institutional Repositories (OAIR) and their scholarly communication and suggested some directions for improvement of OAIR in Bangladesh.

Referring to the challenges of digital preservation in Bangladesh, Alam (2012) commented, "Establishment of digital preservation system and digital library system is difficult, expensive and long-term process. Particularly in the developing countries, like Bangladesh, the process comes across some serious challenges. The creation and maintenance of digital libraries is very expensive. Costs are incurred for production, for ongoing provision of access, and for preservation of the digital information. The cost to develop and operate a distributed architecture for long-term archiving, migration, and backup of digital materials will be high. The greatest challenge toward digitization programs in Bangladesh is the continuing cost of assembling content and providing access to the inhabitant of the country." Shoeb (2010) described the procedure of setting up an IR at the Independent University, Bangladesh (IUB), using DSpace open source software."

From the literature review, it is found that a number of studies have been conducted on concept, roles, factors, development of IR, procedures to set up IR, open access IR and challenges toward digitization through IR in Bangladesh. But comparatively fewer initiatives have been taken to assess the condition of IR in public university libraries of Bangladesh to measure the satisfaction level of library users. Besides, hardly any initiative has been made to conduct comparative analysis of available

resources. It is observed that DSpace is the best solution to use as digital library software. It has an extensive modular capacity that can be used to expand the collection as per requirement. Some research mentioned that the theses and dissertations should be included in institutional repository. They suggested that, digital publications should also be included in the institutional repositories. They discussed on the use of institutional repository software, but attention was mainly focused on the optimizing the effectiveness of the library services. Although it is very difficult to determine which one offers the highest benefit, DSpace is one of the most widely used software for developing IRs.

Methodology

A total of seven public university libraries, namely Bangladesh Agricultural University (BAU) Library, Bangladesh University of Engineering and Technology (BUET) Library, Chittagong Veterinary and Animal Sciences University (CVASU) Library, Dhaka University (DU) Library, Rajshahi University (RU) Central Library, Sher-e-Bangla Agricultural University (SAU) Library, Khulna University of Engineering and Technology (KUET) Library, were purposefully selected for this research. The websites of these university repositories were used as a vital source of information for conducting this research. Besides this, literatures on digital preservation and IR from national and international arena were reviewed to clarify the concept of digital preservation and IR. To determine the present scenario of digital preservation by public universities, a survey has been carried out in selected libraries. A structured questionnaire was prepared and distributed to the librarians/repository administrators through e-mail and Facebook messenger. Majority of the respondents returned the filled-out questionnaire and the received data was analyzed properly.

Operational Definition
Digital library/repository/Preservation

The term "Digital library" has become one of the most frequently used terms in the library and information science (LIS) arena (Shuva, 2014). The term digital library and digital repository are synonymous, and both are a type of information retrieval system (Shoeb, 2010). Digital Library Federation (2004) developed DLs working definition as "Digital libraries are organizations that provide the resources, including the specialized staff, to select, structure, offer intellectual access to, interpret, distribute, preserve the integrity of, and ensure the persistence over time of

collections of digital works so that they are readily and economically available for use by a defined community or set of communities."

"The digital libraries are libraries with the same purposes, functions, and goals as traditional libraries - collection development and management, subject analysis, index creation, provision of access, reference work, and preservation (Rahman, 2011)."

The digital preservation through a digital library helps in the collection, preservation and dissemination of digital publication and intellectual outputs of research scholars of an institution to meet up the demand of information seekers through online.

Institutional Repository

Institutional Repository is a digital archive of the intellectual outputs and publications produced by institution's faculty member, research scholars and students of the institution those are reachable to all both inside and outside of the institute.

"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" (Islam and Akter, 2013). According to Basefsk (2009), "the Institutional Repository (IR) concept was born out of competition for who was going to be responsible for dissemination of an institution's intellectual product via the internet. Institutional Repositories (IRs) have been considered one of the disseminating and preserving methods for scholarly research publications. However, the success of IR is dependent on the contribution of researchers and faculty members (Alemayehu, 2010)." In the last few years, a great number of open source digital repository software have been developed and used in different institutions of the world to preserve and disseminate research output freely. DSpace, Fedora, Invenio, Greenstone, SLiMS, Eprints, etc are some of the commonly used software.

Data Analysis
Present scenario of IR in Public University Libraries

To have a holistic understanding of the present state of different university libraries that are using institutional repository software for preserving the publications and intellectual output of the institute, we observed their web sites and searched the collection. There are a total of 147 universities in Bangladesh, of which 103 are private, 42 public and 3 are international (UGC, 2018). Among them 7 Public

university libraries, 10 private university libraries and 1 international university library use IR software for digital preservation of the institutional publications. Of them, 7 public university library repository activities were analyzed in this study. Table 1 shows the repository scenario of public university libraries that are practicing digital preservation through institutional repository software.

Table 1: Public University Library Repository and URL

SL	University library name	Used IR	URL
1.	Bangladesh Agricultural University (BAU) Library	DSpace	http://dspace.bau.edu.bd/
2.	Bangladesh University of Engineering and Technology (BUET) Library	DSpace	http://lib.buet.ac.bd:8080/xmlui/
3.	Chittagong Veterinary and Animal Sciences University (CVASU) Library	DSpace	http://101.2.160.165:8080/
4.	Dhaka University (DU) Central Library	DSpace	http://repository.library.du.ac.bd/xmlui
5.	Rajshahi University (RU) Central Library	DSpace	library.ru.ac.bd:8080/handle/123456789/155
6.	Sher-e-Bangla Agricultural University (SAU) Library	Customized/ DSpace	http://www.saulibrary.edu.bd/daatj/public/index.php http://archive.saulibrary.edu.bd
7.	Khulna University of Engineering and Technology (KUET) Library	DSpace	http://library.kuet.ac.bd:8001/jspui/

Source: Individual university websites

Institutional Repository collections in Public Universities

Public university libraries are playing an important role in preserving and distributing the intellectual output of their faculty, researchers and students. Table 2 shows the number and types of repository collections in public university libraries of Bangladesh.

Table 2: Institutional Repository Collection in Public University

SL	Name of the university library	Record	Type
1.	Bangladesh Agricultural University Library	1435	MS Thesis
2.	Bangladesh University of Engineering and Technology Library	4750	MS Thesis, Calendar, prospectus, syllabus, course curriculum
3.	Chittagong Veterinary and Animal Sciences University Library	61	Power Point, proceedings, image, thesis, report, syllabus, clinical & production report
4.	Dhaka University Central Library	822	MPhil & PhD thesis, Manuscript, Research work, article, thesis
5.	Rajshahi University Central Library	8	-
6.	Sher-e-Bangla Agricultural University Library	4653	MS & PhD Thesis
7.	Khulna University of Engineering and Technology Library	340	Thesis, report
	Total	12069	

The use of Digital Library Software (DLS) for managing institutional repositories in university libraries all over the world as well as in Bangladesh is on the increase. Following is an overview of IR in public university libraries of Bangladesh.

Bangladesh Agricultural University (BAU) Library

"BAU central library has a collection of over 1,84,942 volumes and 2,000 periodicals. The number of journals is 151. The library has copies of M.S and PhD theses. Besides the central library, the Faculty of Agricultural Economics & Rural Sociology has its own library which contains reference books and journals in the field of Agricultural Economics (BAUL, 2018)." Table 3 demonstrated that 6

communities-based publications are available in the repository of BAUL and the number of publications is 1,435. Publication type is only MS Thesis.

Table 3: Community-based Publication in BAU Institutional Repository

SL	Community	Record	Type
1.	Faculty of Agricultural Economy & Rural Sociology	75	MS Thesis
2.	Faculty of Engineering and Agricultural technology	101	MS Thesis
3.	Faculty of Agriculture	752	MS Thesis
4.	Faculty of Animal Husbandry	97	MS Thesis
5.	Faculty of Fisheries	215	MS Thesis
6.	Faculty of Veterinary Science	195	MS Thesis
	Total	1435	

Source: BAU Institutional Repository (on 30 August 2018)

Bangladesh University of Engineering and Technology (BUET) Library

"BUET Central Library provides services to collect, preserve, and distribute digital material. Repositories are important tools for preserving an organization's legacy; they facilitate digital preservation and scholarly communication (BUET Institutional Repository, 2018)." There are 4,750 publication items under 4 communities in the repository. Table 4 shows status of the publications of BUET institutional repository.

Table 4: Community-based Publication in BUET Institutional Repository

SL	Community	Record	Type
1.	Academic Calendar	21	Calendar, prospectus, syllabus, course curriculum etc
2.	Dissertation/Theses	4114	MS Thesis
3.	Publications	01	MS Thesis
4.	Question Papers of BUET	614	MS Thesis
	Total	**4750**	

Source: BUET Institutional Repository link (on 30 August 2018)

Chittagong Veterinary and Animal Science University (CVASU) Library

"The Chittagong Veterinary and Animal Sciences University Central Library was established in 1995 along with the Chittagong Government Veterinary college. CVASU central library is providing digital library service to its patrons since 2012. Theses, dissertations, clinical and production reports are available in digital library. ATIZ Book Drive DIY (book scanner) is being used for scanning books, journals, conference proceedings, theses, dissertations, newspapers etc., to building a digital library" (Digital Library – CVASU, 2018). Six communities-based publications are available in the CVASU library repository. These communities include another 12 sub-communities (CVASU Repository, 2018)." Table 5 reflects the community-based records in the repository of CVASU. It shows that the number of publications is 61. The publications/ collection types are PowerPoint presentations, proceedings, image, thesis, clinical and production report, etc.

Table 5: Community-based Publication in CVASU Institutional Repository

SL	Community	Record	Type
1.	CVASU Annual Scientific Conference	05	Power point, Proceedings, images
2.	Fisheries	00	Thesis
3.	Food Science and Technology	05	Thesis, report
4.	Photo Gallery and Newspaper Cutting	05	image
5.	Syllabus and Curriculums	01	Syllabus
6.	Veterinary Medicine	45	Clinical & Production Report, thesis
	Total	**61**	

Source: CVASU Institutional Repository (on 30 August 2018)

Dhaka University (DU) Library

The central library of the University of Dhaka has been using DSpace for managing the "Dhaka University repository. "The goal of this repository is to increase the visibility, use and impact of the university's research publications by offering them to use through the university's own digital archive. The archive consists of full text materials produced in the university, such as theses, internship reports, journal

articles, conference proceedings and research materials produced by the Departments/Institutes/Research centres of the University (DU Repository, 2018)."

There are a total of 17 communities and 85 sub-communities in DUCL repository having more than eight hundred scholarly publications and resources from different departments and institutes of DU. The archive consists of MPhil thesis (171), PhD thesis (313), Research work/article (174), MS thesis (49), Thesis (93) and others (22). Table 6 shows the community-based publication in DU central library repository.

Table 6: Community-based Publication in DU Institutional Repository

	Community	Record	Type
1.	<u>DU Institutional Repository Policy</u>	01	Policy
2.	Dhaka University Library	16	Manuscript
3.	Faculty of Arts	209	MPhil & PhD thesis, Internship report, research work/article, thesis
4.	Faculty of Biological Science	277	MPhil & PhD thesis, research work/article, thesis
5.	Faculty of Business Studies	40	MPhil & PhD Thesis
6.	Faculty of Earth & Environmental Science	10	MPhil & PhD Thesis
7.	Faculty of Education	00	-
8.	Faculty of Engineering and Technology	08	MPhil & PhD Thesis
9.	Faculty of Fine Art	01	PhD Thesis
10.	Faculty of Law	06	PhD Thesis
11.	Faculty Medicine	05	MPhil Thesis
12.	Faculty of Pharmacy	15	MPhil & PhD Thesis
13.	Faculty of PGD MS and Research	03	PhD Thesis
1	Faculty of Science	25	MPhil & PhD thesis, research work/article

4.			
1 5.	Faculty of Social Sciences	109	MPhil & PhD thesis, research work/article, thesis
1 6.	Institutes	97	MPhil & PhD thesis, MS Thesis, research work/article, thesis
1 7.	Research Centres	0	-
	Total	**822**	

Source: DU Institutional Repository (on 30 August 2018)

Rajshahi University (RU) Central Library

The repository of RU is yet to be launched officially, although it is being run on a trial basis for some time. About three thousand records are ready to be uploaded in the repository awaiting permission of the RU authority. There are a total of 13 communities where only 06 communities have 08 publications in the university central library repository (RU Repository, 2018). Table 7 shows the total publications under different communities.

SL	Community	Record	Type
	Table 7: Community-based Publication in RU Institutional Repository		
1.	Faculty of Agriculture	01	-
2.	Faculty of Arts	02	-
3.	Faculty of Business Studies	00	-
4.	Faculty of Engineering	01	-
5.	Faculty of Law	00	-
6.	Faculty of Life and Earth Science	02	-
7.	Faculty of Science	00	-
8.	Faculty of Social Science	00	-
9.	Institute of Bangladesh Studies	01	-
10.	Institute of Biological Sciences	00	-
11.	Institute of Business Administration	00	-
12.	Institute of Education and Research	00	-
13.	Rajshahi University Central Library	01	-

Total	8

Source: RU Institutional Repository link (on August 2018)

Sher-e-Bangla Agricultural University (SAU) Library

SAU has developed a Digital Institutional Repository (DIR), aided by the Higher Education Enhancement Program (HEQEP) project. Earlier the library developed a repository with the help of DSpace for preserving the thesis, dissertations (Masters and PhD level) and scholarly articles published in the Journals of SAU, which could not be continued due to hardware failure. For this reason, the link of that repository (archive.saulibrary.edu.bd) is disabled at this moment. The authority maintains another customized software (made by Joomla CMS). There are a total of 4,653 collections available under five communities in SAU institutional repository (SAU Repository, 2018) . Table 8 shows the number of records in the repository along with the places of origin:

Table 8: Community-based Publication in SAU Institutional Repository

SL	Community	Record	Type
1.	Bangabandhu Sheikh Mujibur Rahman Agricultural University	887	MS & PhD thesis
2.	Bangladesh Agricultural University	2835	MS & PhD thesis
3.	Patuakhali Science and Technology University	48	MS & PhD thesis
4.	Sher-e-Bangla Agricultural University	864	MS & PhD thesis
5.	Sylhet Agricultural University	19	MS & PhD thesis
	Total	**4653**	

Source: SAU Institutional Repository (on 30 August 2018)

Khulna University of Engineering and Technology (KUET) Library

"Khulna University of Engineering & Technology (KUET) is one of the leading public universities of Bangladesh giving special emphasis in the Engineering and Technology and Technological Education and research (Chowdhury, 2016).". The KUET Library IR has 3 communities with 18 sub-communities having more than 700 scholarly publications from different departments of KUET (KUET Institutional Repository, 2018). Table 9 shows the community-based publication in KUET Library repository.

Source: KUET Institutional Repository (on 30 August 2018)

Comparative analysis

The researcher analyzed the retrieved data and re-arranged the same in ascending order of provided records to find out the highest number of available records of the repositories. Figure 1 shows that the highest number of records (4,750) is preserved by BUET Library, secondly (4653) SAU Library, thirdly (1435) BAU Library, then (822) DU Central Library, (340) KUET Library, (61) CVASU Library and the lowest number of records (8) is maintained by RU central library.

Table 9: Community-based Publication in KUET Institutional Repository

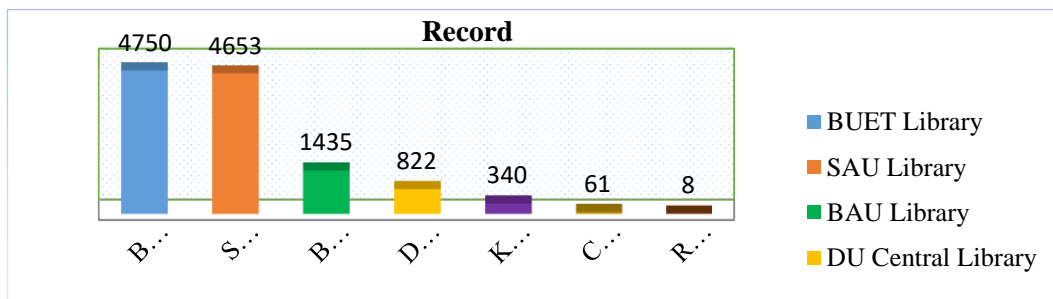| SL	Community	Record	Type
1.	Faculty of Civil Engineering	220	Thesis
2.	Faculty of Electrical and Electronic Engineering	85	Thesis
3.	Faculty of Mechanical Engineering	35	Report, thesis
	Total	340	

Fig 1: Ranking of public University Library Repositories with highest number of records

Figure 2 shows that the highest number of records types is MS Thesis (90%), which is followed by PhD thesis (3%), MPhil thesis (2%), Thesis & Report (4%), Research article/work, Policy & Manuscript, Syllabus, calendar, prospectus, curriculum, Power point, proceedings, image, Clinical & productive report (1%) etc.
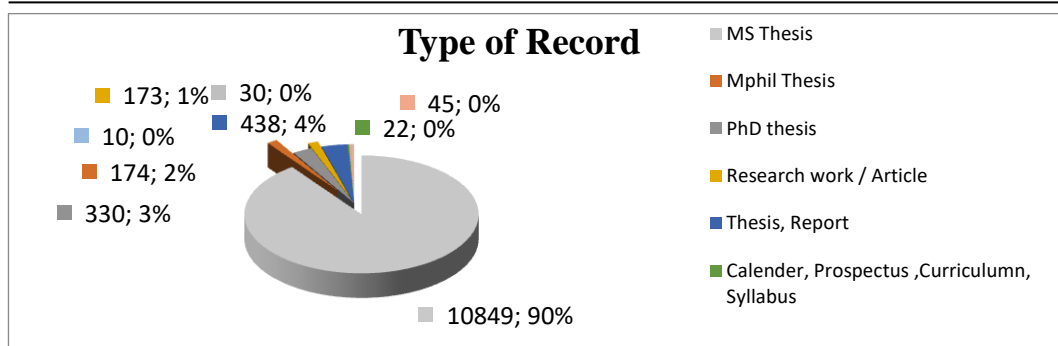
Type of Record

173; 1%   30; 0%   45; 0%

438; 4%   22; 0%

10; 0%

174; 2%

330; 3%

10849; 90%

- MS Thesis
- Mphil Thesis
- PhD thesis
- Research work / Article
- Thesis, Report
- Calender, Prospectus ,Curriculumn, Syllabus

Fig 2: Types of record with percentage of surveyed university repository

Findings of the study

The purpose of the study was to explore the present scenario of IR, identify faculty or subject wise IR, examine useful repository in public university libraries of Bangladesh. The major findings of this study are given below:

- Only 13% public universities use IR. The majority (83%) do not maintain any repository software, either customized or open source.
- Of those using IR, the highest number use DSpace for managing the IR.
- Some IRs are not publicly accessible.
- Due to the problem of power supply and server, the repository site is not always accessible.
- In case of universities not maintaining an IR as yet, the main reasons seem to be lack of awareness of the university authority regarding the importance of IR and their unwillingness to share their intellectual outputs.
- The number of publication/records preserved by surveyed universities is comparatively very few.
- To maintain the repository software properly there is not enough IR experts in some public universities.

Recommendations

Considering the findings and observations, this study suggested the following recommendations for the enhancement of IRs in university libraries of Bangladesh.

- UGC can establish a separate wing for supervising the preservation activities of digital scholarly publications in the universities of Bangladesh.

- Repositories should be maintained properly by higher educational institutions.

- Repository should be made publicly accessible to encourage the Open Access movement.

- The authorities should ensure uninterrupted power supply so that repository site is always reachable.

- University authorities should be aware of preserving their institutional publications and intellectual outputs through IR software.

- Since most of the university libraries are using DSpace as repository, the remaining university libraries of the country, who are interested to use IR, can select DSpace for maintaining their institutional repositories.

- The number of publication/records of surveyed public university librarians should be increased.

- The open access to the intellectual outputs of the institution needs to be ensured through IR software.

- Libraries should appoint adequate number of expert IT professionals for the maintenance of their repositories.

Conclusion

This study emphasized the overall digital preservation activities of some selected public university libraries of Bangladesh. The public university libraries need to provide digitization facilities giving free access in digital preservation to the students, faculty members, researchers and other users to envisage Government of Bangladesh's vision to build Digital Bangladesh by 2021. To fulfill this vision, the Government, UGC and respective university authorities need to take necessary steps for digital preservation of their intellectual outputs.

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