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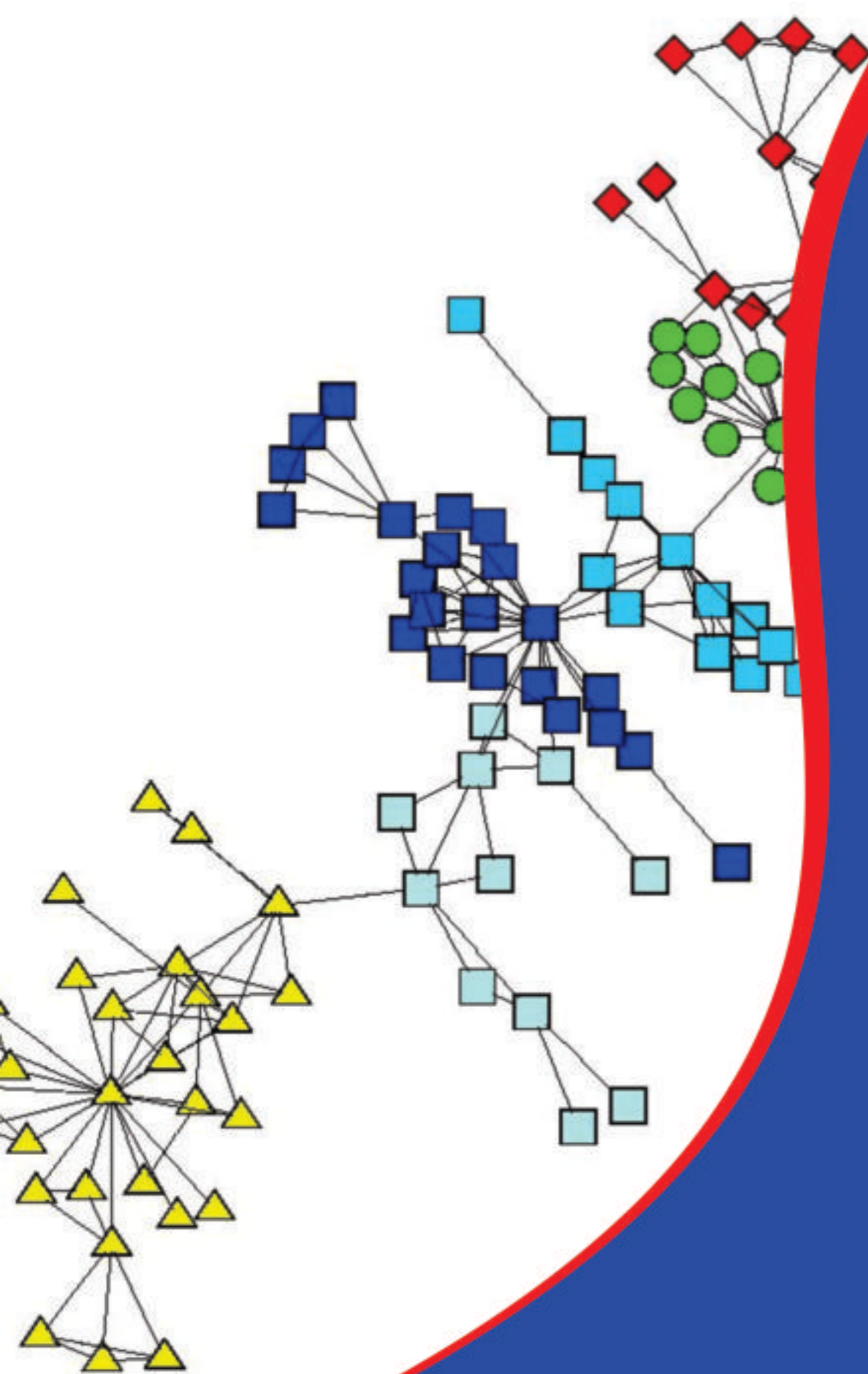
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NDLTD



ETDs in Agriculture: Status and Way Forward with Case Studies from India and Bangladesh

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Abstract

The ICT led agricultural development has opened up an opportunity for accelerating knowledge dissemination. The Electronic Theses and Dissertations (ETDs) in Agriculture are the valuable research documents that are generated from the various experiments by the research scholars and scientists of the National Agricultural Research System (NARS) of the respective countries. As it is rightly said by the first Prime Minister of India, Pandit Jawaharlal Nehru that, 'anything can wait, but not agriculture', the knowledge generated from the agricultural research should be openly available for the prosperous agricultural growth and public good. Owing to the importance of ETDs, there is a need to create more awareness among the researchers and the research managers in making ETDs publicly available. Therefore, we prepared this paper by undertaking a study on ETDs in Agriculture in India and Bangladesh. It was found that due to growing global awareness and interests about free and open accessibility and knowledge sharing (Open Access) among the researchers and research managers, till date about 100 research repositories have been established in India and 10 in Bangladesh respectively. However, when compared to the amount of research taking place in agriculture, very few online ETDs have been established in India and Bangladesh. The only popular ETDs in agriculture in India is KrishiPrabha (now part of KrishiKosh) and in Bangladesh, Digital Archive on Agricultural Theses and Journal (DAATJ). These repositories are now primarily being made available online for the academicians and research community. This paper discusses and presents the status of the ETDs in Agriculture in the NARS of India and Bangladesh and tries to suggest a way forward for making them openly available for the public to use, re-use and build upon. The paper also presents the results of a survey undertaken regarding ETDs awareness and usage among the NARS of India and Bangladesh.

Keywords: ETDs, Agriculture, NARS, KrishiKosh, KrishiPrabha, Digital Archive on Agricultural Theses and Journal (DAATJ), India, Bangladesh



Introduction

Agriculture, the world's oldest profession is the key factor for our civilization, development and enhancement on the planet earth. Though there is a tremendous improvement in the technologies related to farming (agriculture), it is now facing challenges from various factors, be it biotic or abiotic. And the studies of agriculture, its history, the current and future practices at the university, institute and the farm level needs a multi-discipline approach. When we look at the two countries, India and Bangladesh, India ranks second worldwide in farm output. In India, the agriculture and allied sectors contributed 13.7% of the GDP (Gross Domestic Product) in 2013 with the involvement of about 50% of the total workforce. And in Bangladesh, agriculture has contributed to its economy of about 13.09% (data released on Bangladesh Economic Review, 2014) of the country's GDP employing around 45% of the total labour force (Wikipedia, 2015). Seeing the growing need and the importance, the agricultural knowledge should be made publicly available. Long ago, the first Prime Minister of India, Pandit Jawaharlal Nehru had rightly said 'anything can wait, but not agriculture', the knowledge generated from the agricultural fields should be openly available for the sake of prosperous agriculture growth and public good.

We are now seeing that there is a vast growth of information, data and knowledge across all the disciplines and is now being abundantly available due to high technological advancements. The phenomenal development of Information Communication Technologies (ICTs) and Web 2.0 applications has paved way for the preservation of born digital information, especially, the academic and research outputs and made us to think of new scientific collaborations and experimenting with multidisciplinary approaches. It is now said that the growth of data has been far beyond the capacity of current preservation models and strategies and would have a profound effect on the scientific infrastructure (Hey and Trefethern, 2003).

As Lahiri-Dutt (2013) rightly placed the argument that by 'locking away awarded PhD theses instead of publishing them for public and academic knowledge only encourages mediocrity and enhances poor academic practices' and further the author says that 'it also propagates unhealthy hierarchy among universities and hinders the advancement of knowledge.' The Electronic Theses and Dissertations (ETDs) in Agriculture are the valuable research documents that are generated from the various experiments by the research scholars and scientists of the National Agricultural Research System (NARS) of any country. However, when compared to the vast amount of research taking place in agriculture and allied sciences, very few online ETDs have been established in India and Bangladesh the only popular ETDs in agriculture in India is KrishiPrabha (<http://14.139.232.167:8080/HAU/thesis.html>) and (<http://krishikosh.egranth.ac.in/handle/1/466>) which is now part of KrishiKosh (<http://krishikosh.egranth.ac.in/>) and in Bangladesh, Digital Archive on Agricultural Theses



and Journal (DAATJ). These repositories are now primarily being made available online for the academicians and research community. Owing to the importance of ETDs, there is need to create more awareness among the researchers and the research managers in making ETDs publicly available. In this backdrop, this paper discusses and presents the status of the ETDs in Agriculture in the NARS of India and Bangladesh and tries to suggest a way forward for making them openly available for the public to use, re-use and build upon. The paper also presents and discusses the results of a survey undertaken regarding ETDs awareness and usage among the NARS of India and Bangladesh.

Objectives of study

The objectives of the study are as follows:

1. To study the growth and development of ETDs in Agriculture and allied sciences.
2. To understand the consensus of scientists and academicians with respect to embargo periods and digital preservation of ETDs

Literature Review

In the synthesis and preparation of this paper, the various source literature review was carried out and we present the same here. Jenkins, Breakstone and Hixson (2005) documented the real-time experiences of developing an Institutional Repository at the University of Oregon and opined that daily interactions with students, faculty, researchers and the general public, reference librarians can bring the knowledge of search strategies and user behaviour that are essential for the integration of IRs into the spectrum of information resources. The skills of reference librarians uniquely position them for a dual role in the IR community: as facilitators in getting the content into the repository and content out to users. Based on work practice study of faculty members and researchers at the University of Rochester (Bell, Foster and Gibbons, 2005) understood the attitudes of faculty members' hold regarding IR and the role of librarians in developing collections. They recommended a few strategies for IR design, recruitment of content, and outreach by librarians. Subirats *et al.* (2008) addressed the accessibility, availability and interoperability issues of exchanging agricultural research output by means of AGRIS application profile and found due to lack of adequate information exchange possibilities between researchers in food and agricultural sciences represents a significant weakness, limiting the research system to properly help address the issues of agricultural development.

Lypincott and Lynch (2010) surveyed about ETDs in the graduate education programme and addressed key issues related to the development and use of ETDs. They have also documented about the concerns by faculty and students about public access to ETDs limiting future publication opportunities, lack of consensus about embargo periods, technical support, concerns about digital preservation and, general disinterest in change.



They suggested libraries can play a broader role in graduate education by arranging for the IR services, which will enhance students 'dissertation experiences'. Sheeja (2012) emphasized on the need for knowledge management for national development and highlighted the significance of an integrated platform for preserving, searching and retrieving Indian theses while describing the features and functionalities of Indian ETD repositories. After reviewing the literature, it was understood that Institutional Repositories that are managed by individual institutions are also preserving ETDs along with other digital objects as per the requirement to store new entities as diverse as linked data and web archives. Thus, making the categorization of IRs becomes difficult (Babu *et al.*, 2012). Gayan (2014) studied about the development and status of the ETDs in India and found that there is importance of ETDs in technology-driven era and especially in a developing country like India. The study also revealed that most of the Indian ETD repositories have adopted open source software DSpace for building up the repositories. Cayabyab (2015) reviewed literature on ETDs and compared developed and developing countries. She found that while the ETDs mushroomed swiftly in developed countries, in developing countries the initiatives are isolated and still at the infancy stage. Intellectual property rights are major problem of concern for the integration and collaboration of ETD projects that were designed and developed individually.

Research Methodology

The study is based on content analysis that is used for both qualitative and quantitative approaches. The list of Agricultural universities/ institutes in India and Bangladesh with ETDs were collected from the Registry of Open Archives Repositories (ROAR), OpenDOAR (The Directory of Open Access Repositories), Wikipedia and the respective universities/ institutes/ organizations' websites. The details of the data were gathered and observations were noted and then analyzed to understand about the growth and development of ETDs in Agriculture in India and Bangladesh. An online questionnaire was also sent via Qualtrics Online Survey to the researchers, faculty members, librarians and others in the NARS of India and Bangladesh.

Data Collection

The survey was conducted in the month of June and July 2015. To create the research sample, the list of all agricultural universities in India and Bangladesh was created; their library websites were accessed to identify ETDs. The list of libraries that are having ETDs was taken from ROAR. As a result a subset of the whole research population was made up to 64 universities in India as mentioned in Table 1 and up to 5 universities in Bangladesh as mentioned in Table 2. Further, to understand the consensus of the scientists, faculty members, research scholars and librarians in the agricultural domain of India and Bangladesh, an online questionnaire with twenty questions has been circulated



using Qualtrics Online Survey software. The responses were collected, documented and then analyzed.

Results and Discussion

National Agricultural Research System in India: The National Agricultural Research System (NARS) of India comprises of four deemed universities, 15 Directorates, 60 Institutes, 6 Bureaux, 15 National Research Centres, 64 Agricultural Universities, 630 Krishi Vigyan Kendras (KVKs). In addition to these institutions, there are faculties and departments in other traditional and central universities. With all these institutions, India has the world's largest NARS. The agricultural universities in India are established under the land grant pattern of the USA and are publicly funded.

National Agricultural Research System in Bangladesh: In Bangladesh, under the provision of BARC Act 2012, the NARS has been formed with Bangladesh Agricultural Research Council (BARC) as the apex body and 12 agricultural research organizations as the constituent units. It was mentioned that though the agricultural universities were not included in the NARS setup, but there are integrated and linked with NARS in research collaborations.

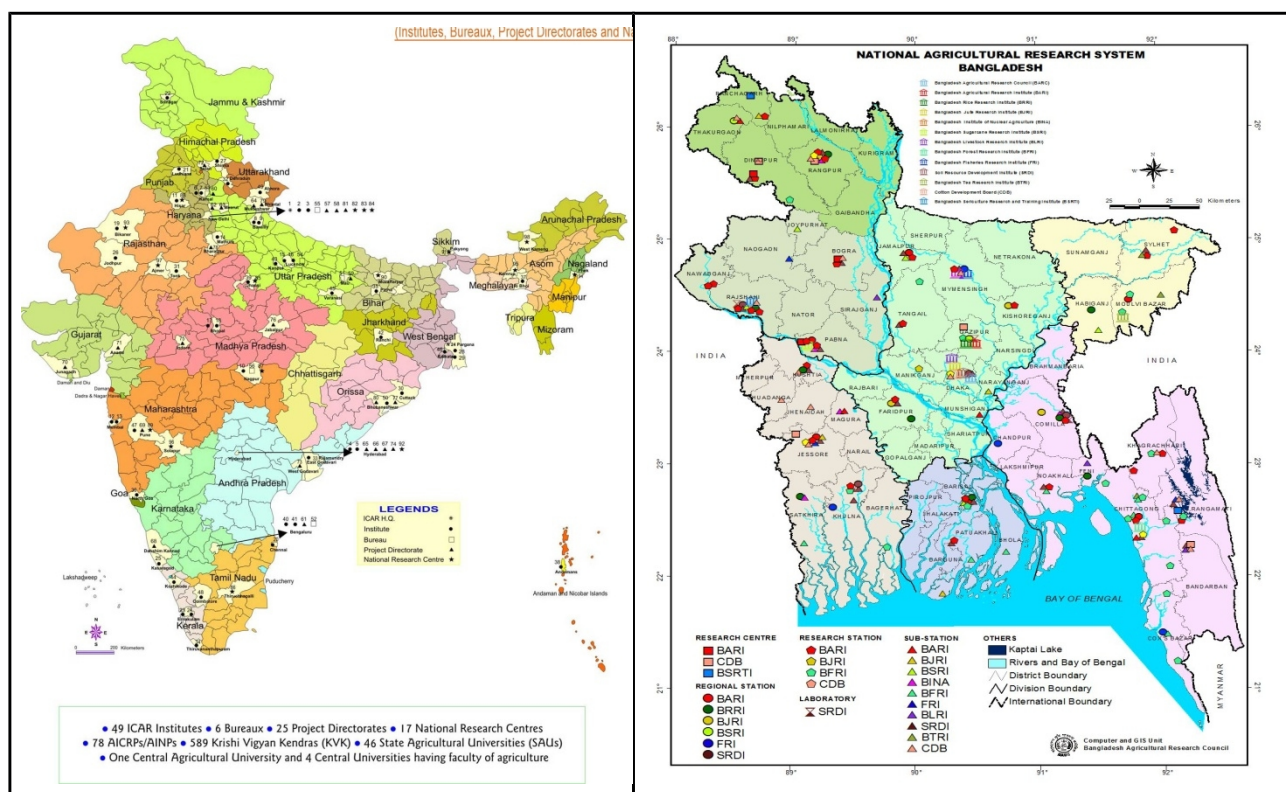


Fig. 1. NARS system of India and Bangladesh

ETDs in Agriculture India

The KrishiPrabha is the largest collection of the ETDs in Agriculture repository in India. In addition to this, the University System in India has the Shodhganga (<http://shodhganga.inflibnet.ac.in/>). Gutam (2012) had summarized about agricultural repositories in India and gave the historical development of the same. The KrishiPrabha, thesis collection is built by Apache Tomcat. While the initial KrishiPrabha created by Nehru Library, with financial support from Indian Council of Agricultural Research, New Delhi under its National Agricultural Innovation Project and housed on the Ch. Charan Singh Haryana Agricultural University website is having a full-text thesis of the NARS of India (36 State/ Deemed Agricultural Universities) submitted during the period from January 1, 2000 to December 31, 2006, the latest collections housed in the KrishiKosh has the collections of previous KrishiPrabha and the thesis submitted till date. The KrishiKosh, Institutional Repository of Indian National Agricultural Research System is built by DSpace and Apache Tomcat.



Fig. 2. Screenshots of ETDs in Agriculture, KrishiPrabha

Table 1. ETDs in Agriculture, India

| Name of the Agricultural University/ University having Faculties/ Departments of Agriculture | KrishiPrabha (ETDs) | Shodganga (ETDs) |
|--|---------------------|------------------|
| Acharya NG Ranga Agricultural University | 2537 | |
| Aligarh Muslim University | | 10 |
| Anand Agricultural University | 99 | |
| Annamalai University | | 1 |
| Assam Agricultural University | 74 | |
| Bidhan Chandra Krishi Vishwavidyalaya | 192 | |
| Birsa Agricultural University | 33 | |
| Bundelkhand University | | 4 |
| Central Institute of Fisheries Education | 71 | |
| Chaudhary Charan Singh Haryana Agricultural University | 713 | |
| Chaudhary Charan Singh University | | 229 |
| CSA University of Agriculture and Technology | 186 | |
| CSK Himachal Pradesh Krishi Vishwavidyalaya | 122 | 62 |
| Dr Balasaheb Sawant Konkan Krishi Vidyapeeth | 48 | |
| Dr Panjabrao Deshmukh Krishi Vidyapeeth | 89 | |
| Dr YS Parmar University of Horticulture and Forestry | 253 | |
| GB Pant University of Agriculture And Technology | 509 | |
| Guru Angad Dev Veterinary and Animal Sciences University | | 5 |
| Guru Nanak Dev University | | 2 |
| Indian Agricultural Research Institute | 643 | |
| Indian Veterinary Research Institute | 240 | |
| Indira Gandhi Krishi Vishwavidyalaya | 38 | |
| Jawaharlal Nehru Krishi Vishwavidyalaya | 16 | |
| Karnataka Veterinary, Animal and Fisheries Sciences University | | 102 |
| Kerala Agricultural University | 161 | |
| Maharana Pratap University of Agriculture and Technology | 100 | |



| | | |
|--|-----|----|
| Maharashtra Animal and Fishery Sciences University | 33 | 7 |
| Mahatma Phule Krishi Vidyapeeth | 168 | |
| Marathwada Agricultural University | 82 | |
| Narendra Deva University of Agriculture & Technology | 118 | |
| National Dairy Research Institute | 156 | |
| Navsari Agricultural University | 5 | |
| Orissa University of Agriculture and Technology | 24 | |
| Punjab Agricultural University | 320 | |
| Rajasthan Agricultural University | 54 | |
| Rajendra Agricultural University | 80 | |
| Sam Higginbottom Institute of Agriculture, Technology and Sciences | | 58 |
| Sardarkrushinagar-Dantiwada Agricultural University | 28 | |
| Tamil Nadu Agricultural University | 238 | |
| Tamil Nadu Veterinary and Animal Sciences University | 116 | |
| University of Agricultural Sciences, Bengaluru | 216 | 14 |
| University of Agricultural Sciences, Dharwad | 86 | |
| V. B. S. Purvanchal University | | 4 |
| Visva Bharti University | | 6 |
| West Bengal University of Animal and Fishery Sciences | 48 | |

ETDs in Bangladesh

With the financial support from Higher Education Quality Enhancement Project (HEQEP) of University Grants Commission of Bangladesh (UGCB), Digital Archive on Agricultural Theses and Journal (DAATJ) was established in the year 2012. In this project, the agricultural theses and journals published from agricultural universities, namely, Bangladesh Agricultural University (BAU), Mymensingh; Sher-e-Bangla Agricultural University (SAU), Dhaka and Bangabandhu Sheikh Mujibur Rahman Agricultural University (BSMRAU), Gazipur and others were being archived and made publicly available through a common web portal DAATJ (<http://www.saulibrary.edu.bd/daatj/public/>) built on Joomla, a Content Management System software.



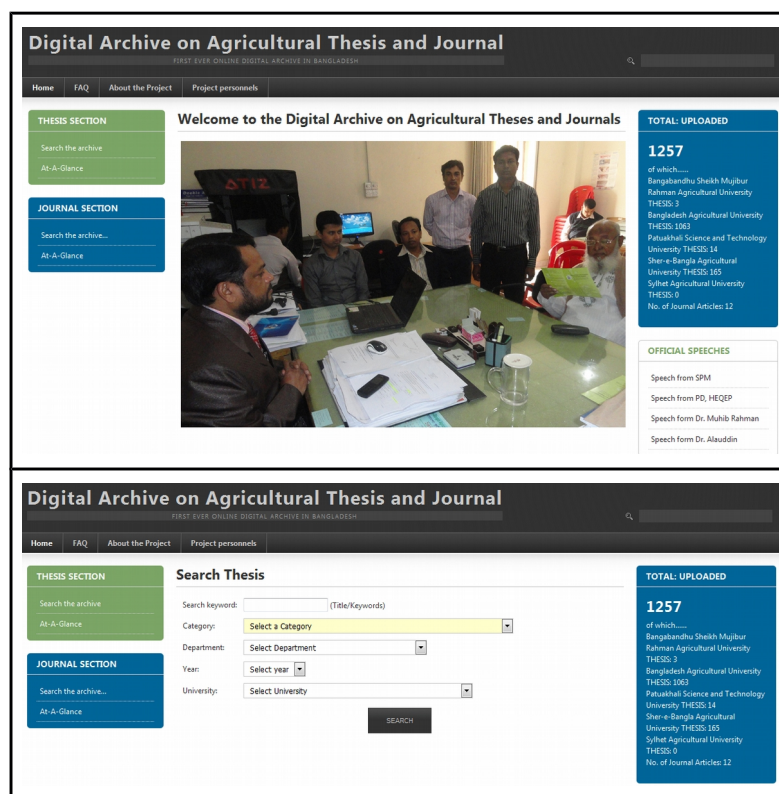


Fig. 3. Screenshot of ETDs in Agriculture, DAATJ

Table 2. ETDs in Agriculture, Bangladesh

| Universities | URL | Platform | No. of Records |
|--|---|--------------|----------------|
| Bangladesh Agricultural University | http://180.211.163.203:8080/xmlui/ | DSpace | 1293 |
| | http://dspace.bau.edu.bd | | |
| | http://www.saulibrary.edu.bd/daatj/public/index.php/thesis/subcategory/Bangladesh%20Agricultural%20University | Joomla (CMS) | 1063 |
| Bangabandhu Sheikh Mujibur Rahman Agricultural University | http://www.saulibrary.edu.bd/daatj/public/index.php/thesis/subcategory/Bangabandhu%20Sheikh%20Mujibur%20Rahman%20Agricultural%20University | Joomla (CMS) | 3 |
| Patuakhali Science and Technology University, Faculty of Agriculture | http://www.saulibrary.edu.bd/daatj/public/index.php/thesis/subcategory/Patuakhali%20Science%20and%20Technology%20University | Joomla (CMS) | 14 |
| Sher-e-Bangla Agricultural University | http://www.saulibrary.edu.bd/daatj/public/index.php/thesis/subcategory/Sher-e-Bangla%20Agricultural%20University | Joomla (CMS) | 165 |

| | | | |
|---|---|--------------|---|
| Rajshahi University, Faculty of Agriculture | http://library.ru.ac.bd:8080/ | DSpace | 1 |
| Sylhet Agricultural University | http://www.saulibrary.edu.bd/daatj/public/index.php/thesis/subcategory/Sylhet%20Agricultural%20University | Joomla (CMS) | |

Survey Report

For the survey, we have got a good response and it was 81% from India and 19% from Bangladesh. However, only 45% of the respondents have visited ETDs during the last three months. The other demographics show that 68% were scientists and 16% librarians. Thirty five per cent of the respondents informed that their institution does have a ETDs repository; 24% of them have mentioned that the ETDs are not open under Open Access. However, 41% of the respondents answered 'Yes' to the question on development of the Open Access policy. When asked for the preferred format of the thesis, majority (75%) of them had voted for 'pdf' format and 50% of them informed that ETDs are submitted to Librarians.

When asked to comment on the ETDs, a respondent had mentioned that the public funded research should be in repositories that are freely available for the general public. Some had opined that the issues of copyrights or IPR should not come in the way of making the research findings free for public where as some others had given the opinion that the copyright should be with the author. The survey revealed that at least 40% of them are for making immediate available of ETDs upon submission, 23% are for six months' embargo period but 37% are for 'After securing IP Rights'!

Purposes of ETDs in Agriculture and allied subjects

The purposes of building and maintaining ETDS are many. Centralization of information related to ETDs when deposited to national repositories will help in bibliographic control of these and dissertations. It will also enable quality control in public funded research and diminishes malpractices like plagiarism. It will also help in proper utilization of research infrastructure available in universities and institutions (K. [Gupta and Gupta, 2014](#)). Accessibility and visibility of research outputs will enhance the opportunities of international collaborations and provides more chances of funding for research and development in multidisciplinary subjects.



Limitations of Study

Some data were gathered from websites which is a single segment. It was not possible to reach to so many stakeholders as the survey was conducted online and mail was sent to more than 2000 respondents to respond. Many sent emails bounced back for reasons unknown. As a result, the researchers were unable to study on a large sample of various respondents with different designations.

Recommendations

Along with the guidelines to build and maintain ETDs, a number of training programmes are to be organized for implementation of ETDs as Open Access Repositories. Training programmes are also to be conducted at national, regional and sector levels for the awareness and use of ETDs. As current digital repositories for educational resources and Open Access archives provide scholars for materials, according to given, or to retrieve the full content of those material from the repository (Sanchez-Alonso, 2009), ETDs enhances potential availability of the resources that can also be used innovatively in imparting interactive e-learning programmes. Data curation is another challenge and opportunity to the specialist librarians and researchers in the field of agriculture. Data curation is closely related to digital preservation as both activities are aimed at long term storage, access, and usage of digital content (Horik, R. 2007).

It is important to understand the needs of small farmers and officers in Agriculture and allied sciences should be handy with the case studies and research solution for the problems that are endemic to respective regions and zones. This can happen with a proper planning of flow of the information and knowledge through the ETD repositories. Solutions for certain problems that are encountered by farmers can be studied and they can be separately preserved as case studies will help the officers in Agriculture and Extension in solving the issues. Indigenous knowledge can be preserved in repositories at national ETD repositories that can be accessed at various regional levels. This would help in documenting the Traditional Knowledge that can be preserved for posterity and can be used and reused forever.

Conclusion

With the emerging technology, it is observed that ETD phenomenon is a sustainable model for promoting digital and open scholarship. Copyrights, embargo periods, licensing the content are few important issues that are to be addressed. A lot of advocacy is to be provided to the stakeholders with the importance and impact of ETDs in innovations without reinvention of the wheel. While the documents in Shodhganga are, by and large, made available openly to public, the Krishikosh documents are made available only



through 'Request Button'. The ICAR Open Access Policy (<http://icar.org.in/en/node/6609>) states that M.Sc. and Ph.D. dissertations/ theses (full contents) and summary of completed research projects are to be deposited in the institutes' open access repository after completion of the work. The metadata (title, abstract, authors, publisher, etc.) be freely accessible from the time of deposition of the content and their free, unrestricted use through Open Access can be made after an embargo period not more than 12 months, it was noticed that the full text of all ETDs are not accessible from the repositories of KrishiKosh and KrishiPrabha whereas the full text ETDs are available in Shodhganga repository. It is hoped that soon all the contents of agricultural repositories in the world would be made open access.

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