Implementation Strategies and Sustainability of Repositories in the Autonomous Institutions in West Bengal, Karnataka, Kerala, and Delhi: An Evaluative Study

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ABSTRACT

Background: To reduce costs, provide more information for a lower price, and preserve the documents for a more extended period for future generations, it is best to implement sustainable repositories in libraries. Libraries are always given a limited budget, but study materials are unlimited, and there are also many users. Since literature has always been crucial to everyone, including nations, individuals, and organizations, it must be protected.Gathering, preserving, and sharing an institution's intellectual output is the core goal of an institutional repository (IR). This data makes it easier to understand and discuss a particular institution. In Bharat, the open access movement has already started to take hold.

Scope: The current study focuses on how autonomous institutions in some regions, which consist of three diverse states and one Union territory in India, can maintain their repositories and implementation methods over the long term. For this study, a total of six independent institutions were chosen.

Method: Online questionnaires are currently the most used way of data collecting, and the study used them.

Findings: The library website is the most popular repository promotion method.

Suggestion: Institutions should enhance user satisfaction with repository features such as content accessibility, user interface, file formats, and submission processes.

Keywords: Institutional Repositories, Self-Archiving, Content Quality, Open Access, Autonomous Institutions, Software for IRs

1. Introduction to Remote Access and Methods

Institutional repositories (IR) are powerful ideas that have the power to change any organization. Everyone wants to create content and become a successful information service provider in this digital age. So that users can adapt the content to their demands, libraries and informational institutions must build their services. (Sharma, Saha, and Meichieo, 2008). The intellectual output of an institution is gathered and stored in a repository, which houses a sizable number of data-bases or files for distribution across a network. (Mali and Deshmukh, 2002). The exchange of best practices, better consistency, and stronger community growth that results from resource sharing improve teaching and learning. Faculty, researchers, and others can create their digital collections and access those made by others on a single platform provided by institutional repositories. (Fernandez, 2006). As access to open-source operating systems and software platforms increases, academic institutions increasingly create institutional repositories (IR).(Gibbons, 2004).

2. Background

The number of repositories and their content has grown exponentially over the years. As a result of this evolution and the emergence of shared repositories, universities have become knowledge spaces, platforms where users can access content on their own. However, these developments are not without challenges. As repository creators and holders invest, the costs of creating and running a repository increase. Another challenge is the sustainability of maintaining a repository for long periods. Many institutions worldwide have started to build their repositories and integrate them with their web access platforms. For instance, in Japan, most universities are already running IRs. Not many universities and research institutions have yet set up a repository despite producing research results worth disseminating. Global open archives and repositories also run with parallel and overlapping contents. (National Institute of Informatics. 2014)

2.1. Software for IRs
The standard software platforms used in institutional repositories include D-Space, E-Prints, Fedora, Greenstone, and others. These are open-source platforms that allow institutions to install and host the content. Besides, very few in-house platforms are generated in some major institutions. This work will study the most preferred software platforms.
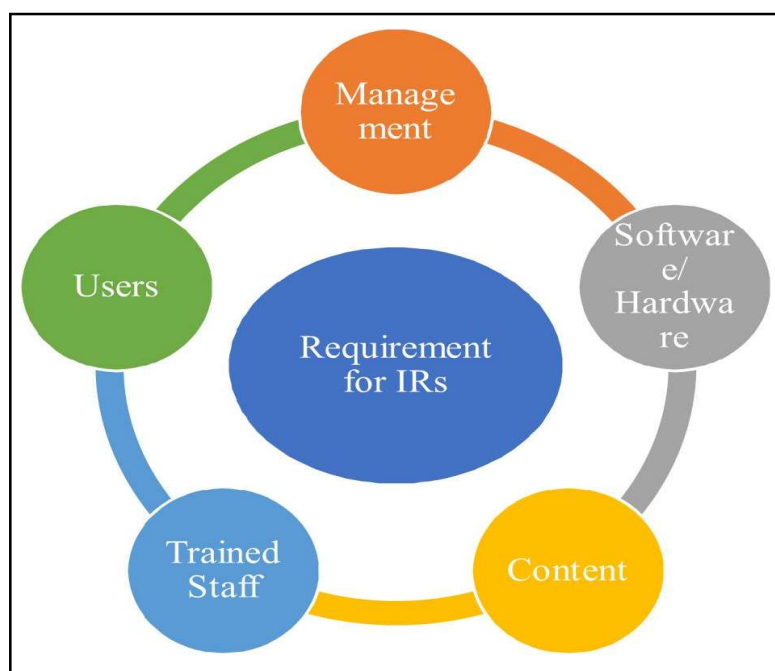

Figure 1. Institutional Repositories Framework

2.2. Framework of Institutional Repositories (IR)

Institutional repositories are designed to improve the research information infrastructure that facilitates easy access to information. As a policy measure, the community encourages the creation of institutional repositories in universities or public research institutions to facilitate the systematic collection and preservation of papers, observations and experimental data, as well as other educational and research results in digital form, and to promote open access to those resources. A well-designed framework below in Figure 1 outlines the requirements to do it successfully.

Instituting institutional repositories warrants a few requirements which should be realized. Identifying the collection for hosting once completed, the installation needs a platform for which relevant software and hardware configurations are determined. As the basic premise of the IR is advocating open access, the software required should also be in open form. Hardware requires proper networking and linking of enough clients. Content has two types. First are the publications of the host institutions only, and second are the open archives, which accept contributions from anywhere in the world. When it is open archives, the web platform should be available to anyone who accesses it worldwide. Personnel can manage the development and hosting of the resources. Users can be aware of the resources available and understand the volume and size of the repositories.

3. Research Issues

We intend to select a few institutional repositories and observe their pattern, use, nature and collection. It is a type of comprehensive study that aims to know the period of the introduction of the repositories by the respective institutions. Collections stored in them are the crucial issues that need to be addressed. While hosting digital content, how these sources are identified and the principles and policies involved are exciting focuses of this work. Usually, to run the IR, the host institution identifies the particular software platform and prepares the engine. The nature of the collection and the format are also important. Thus, in the current work, we track the period of hosting, collections hosted, the criteria used for selection, the software used for hosting the content, and the format of the hosted documents, which are the primary focus of this study.

4. Data Source

For this work, we identified six major institutions that were selected at random. These institutions lie at the advanced level of research, where the information resources are highly structured and equipped with good infrastructure. Table 1 lists these institutions studied.

S.N.	Name of the Institution	Place
1	Bose Institute (BI)	Kolkata
2	S.N. Bose National Centre for Basic Sciences (SNB)	Kolkata
3	Indian Institute of Astrophysics (IIA)	Bangalore
4	Raman Research Institute (RRI)	Bangalore
5	Sree Chitra Tirunal Institute for Medical Sciences and Technology (SCTIMST)	Thiruvananthapuram
6	Vigyan Prasar (VP)	New Delhi

Table 1. Sample institutions studied

5. Methods

A well-designed and carefully structured questionnaire was framed to solicit responses from the studied institutions. The selected six institutions are presented in Table 1. This selection is random, and we did not use any criteria for host institution selection. One of the restrictions in this study is

the use of merely six institutions. The developed questionnaire was forwarded to the selected institutions to solicit responses. The responses are codified in the data platform.

6. Data Analysis and Interpretation

We collected and analysed the required data through the built questionnaires. The results are posted in the tables below with a discussion on them.

Particular	Year
Bose Institute	2007
S.N. Bose National Centre for Basic Sciences	2010
Indian Institute of Astrophysics	2006
Raman Research Institute	2005
Sree Chitra Tirunal Institute for Medical Sciences and Technology	2010
Vigyan Prasar	1991

Table 2. Implementation year of the repositories

In 1991, Vigyan Prasar was the first institution to implement repositories in the autonomous institutions of the Department of Science and Technology. The second institution that implemented repositories was the Raman Research Institute in 2005. All the studied repositories were instituted 14 years ago and had enough data to document for this study.

Particulars	Extremely	Somewhat	Slightly
Protect intellectual work	6	0	0
Promote online study	6	0	0
The global visibility of institution collection	6	0	0
Opportunity to access certain material like manuscripts, etc.	6	0	0
Preservation of fragile collection	6	0	0
Provide more access to scholarly	6	0	0
Institution collections/E-resources accessible from a single platform	6	0	0
Any other	0	0	0

Table 3. Factors that Influenced to make repositories

The respondents are extremely influenced by all the factors like protecting intellectual work, preserving fragile collections, etc. There is a uniform response from all the studied repositories about the factors that influenced the installation of archives.

Each institution has its priority in hosting the type of resources. The resource types hosted are given in the table below. No studied institution has hosted the conference papers. It is somewhat intriguing to note, contrary to the global institutional practice. Otherwise, SNB has accommodated

many resources in its repository. RRI has highly restricted content hosting when compared with other studied institutions.

Table 5 shows the collection of repositories in autonomous institutions. The table indicates that all six institutions have journals, but most do not have conference proceedings. S.N. Bose National Centre for Basic Sciences (SNB), has more collection variety compared to the other five institutions

Particulars	BI	SNB	IIA	RRI	SCTIMST	VP
Archival collection	✗	✓	✓	✗	✓	✗
Audio and video materials	✗	✓	✓	✗	✓	✓
Books	✗	✓	✓	✗	✗	✓
Conference proceedings	✗	✗	✗	✗	✗	✗
Theses and dissertations	✗	✓	✓	✓	✓	✗
Journals	✓	✓	✓	✓	✓	✓
Institutional publications	✗	✓	✓	✗	✓	✓
Newspaper	✓	✓	✗	✗	✓	✓
Photographs	✗	✓	✓	✗	✓	✓
Reports	✓	✓	✓	✓	✓	✗
Any other	✗	✓	✓	✓	✗	✓

Table 4. Types of Collections in Repositories

Particulars	Strongly Agree	Undecided	Strongly Disagree
The collection should be rare or in fragile condition	6	0	0
Work should be intellectual	6	0	0
The collection should follow copyright laws	6	0	0
Work should be in the prescribed format	6	0	0
Any other	0	0	0

Table 5. Criteria for selection of documents

The respondents strongly agree that collection should be in rare and fragile condition, work should be intellectual, the collection should follow copyright laws, work should be in a prescribed format, etc.

6.1. Software
Creating local in-house software involves cost, time, and manpower. The high cost of software development and maintenance of locally-hosted software forced many institutions to adopt open-source platforms.

Many organizations use the existing open-source platform to host the resources. While selecting the ideal one, one must study them using 12 parameters. These are developed by the UNESCO Digital Library (UNESCO), including Infrastructure, Front-end Design, Content Organization and control, Content Discovery, Publication Tools, Reporting, Multimedia, Social Features and Notifications, Interoperability, Authentication, Accessibility and Preservation. These parameters are individually studied and compared by the UNESCO digital library. They are given below with a comparative statement.

The Infrastructure component discusses the essential attributes of each repository.

Infrastructure	Digital Commons	DSpace	Eprints	Fedora	Islandora
Hosted Solution	Yes	Yes	Yes	Yes	Yes
Locally Installed Software Solution	-	Yes	Yes	Yes	Yes
Customer support / community support	CustomerSupport/ Email, phone, resource, and Community Support	Community Support	Community Support	Community Support	Community Support
Flexible Repository Structure	Yes	Limited	Limited	Limited	Limited
Simple and Qualified DublinCore Metadata	Yes	Yes	Simple Dublin Core only	Yes	Yes
Customizable Metadata	Yes	Yes	Yes	Yes	Yes
Open Source Proprietary	Proprietary	Open Source	Open Source	Open Source	Open Source
Automatic System Upgrades	Yes	-	-	-	-
Current Stable Platform Version	7.6	3.2	3.3.11	3.6.2	6.x-13.1.x and 7.x-1.1
Administrator Configurations	Yes	Yes	Yes	Yes	Yes
Supports Standard User Roles	Yes	Yes	Yes	Yes	Yes

Table 6. Basic Attributes of the Infrastructure of the Repositories

Out of the various available platforms, D-Space has significant features, and hence, most of the studied institutions, five out of six, have preferred to deploy for hosting. Only one institution adopted the Eprints for hosting the repository. D-Space is found to be used more than other platforms in a major study of Kenyan libraries (Kiplang 2021)

6.2. Metadata
Name changes, affiliations, and other issues impact document extraction. Strategic metadata practices, like clarifying personal names and ORCID identifiers, help prioritize and execute metadata maintenance. While this approach didn't solve all metadata issues, it did provide valuable insights. (Margaret Mering 2019).

The efficiency and effectiveness of any information retrieval service require coherency and

consistency in its metadata. Aggregator services potentially face two distinct but related categories of variation in harvested metadata: structure and content. (Dunsire)

Most digital library platforms support Dublin Core, Metadata Object Description Schema (MODS), MarcXML and Metadata Encoding and Transmission Standard (METS). (UCF)

Most institutions are using the Dublin core metadata standard.

Metadata Standards	Frequency
Dublin core	06
METS (Metadata Encoding and Transmission Standard)	0
MARC21	0
Total	06

Table 7. Type of Metadata Standards Used

6.3. Format Preference
The hosting format depends on the source documents' available format. Hence, it is not mandated by the host institution. However, the current hosted format is studied, and the results are posted in the table below. The preference is multiple document types.

Particulars	Most Preferred	Preferred	Neutral
PDF	06	0	0
Word	3	3	0
TIFF	0	6	0
GIF	3	1	2
JPEG	2	1	3
WAV	0	1	5
MP3	4	2	0
AVI	2	4	0
Any other	0	0	0

Table 8. Types of formats preferred in repositories

Table 9 shows that Institutions have the most preferred PDF format while very few respondents are most preferred and preferred other types of formats.

Keeping the resources alive and functional in retrieval is a prime task of the repositories' organization. It includes both content and software updates. When updates are available, the policy of the repositories should follow the update activity. The table below indicatesthe updating carried out by the organization.

Table 10 indicates that all six participating institutions constantly update their software and keepthe depositions policy current.

Particulars	Always	Sometime	Never
Access to content or Deposition policy	06	0	0
Software update	6	0	0
Models of hardware equipment	3	3	0
Any other	0	0	0

Table 9. Updating of repository

6.4. User services from the Repository Organization

Table 10 lists the services rendered by the participating institutions. Only two institutions, the IIA and RRI, were found to provide extended services to the users.

Particulars	Alert system	Authentication and Rights	Memberships /login	Submission	Indexing	Search/Browse/ Display facility	Feedback
BI	✗	✗	✗	✗	✗	✓	✗
SNB	✗	✗	✗	✗	✗	✓	✗
IIA	✓	✗	✓	✓	✗	✓	✗
RRI	✓	✓	✓	✗	✗	✓	✓
SCTIMST	✗	✗	✗	✗	✗	✓	✗
VP	✗	✗	✗	✗	✗	✓	✗

Table 10. Services offer to library users

The table shows the services offered to library users. The searching, browsing, and displaying facilities are being offered by all the studied institutions, followed by metadata standards and interface memberships/login alert systems, feedback facilities, etc. The rest of the services are offered moderately or very few.

7. Major Findings

Our study found that the institutions widely use the D-Space platform, whereas the Dublin Core Metadata is used as a data standard. DC metadata is more suitable for documents hosted in institutional libraries. As the papers are available in digital format, the appropriate format is PDF, where the readers feel free to use ebooks. The features of the studied repositories include disaster management by installing fire and smoke alarms, backup power supplies, temperature controls, data storage, frequent staff training, and assuring and maintaining the usefulness, validity, and integrity of digital assets. Many repositories do not frequently upgrade their respective repository software, hardware equipment models, or withdrawal policies, although a handful do. These repositories do not have any specific web access system and use the existing library pages to access them. The library website is the most popular method of promoting the repository, followed by meetings, seminars, symposiums, workshops, and orientation programs. (Kalbande, 2012). & (Mark, & Shearer, 2006).

8. Required Improvements

The study visualizes a few essential suggestions to Institutions for upgradingtheir services.

• *When copyright violations occur, institutions must take strict action by the relevant copyright laws and any subsequent revisions.*

• *Institutions should encourage users to use the repositories fully.*

• *Institutions should improve user satisfaction with repository aspects such as available content, user interface, file formats, submission procedures, etc.*

9. Conclusion

The best example of offering the best study materials to customers for a low cost is using digital repositories in libraries. Long-term storage of the documents is also beneficial. (Anuradha, 2005). The sustainability of the repositories and implementation methodologies are the main topics of the current study. Most responders have completely implemented repositories, it may be said. Many respondents utilize D-space to manage repositories and are happy with the institutions' digital infrastructure. Most users know the repositories, although they only use them infrequently. Despite this, users have expressed pleasure with the features and calibre of the repositories. The study's findings suggest that to increase the collection of intuitions and ensure proper resource use; users should deposit more intellectual work than just theses and dissertations, articles, conference proceedings, archival collections, reports, etc. The ideal platform for providing users with knowledge in the best way possible is libraries.(Singh, & Mahawar, 2021). (Sawant, 2012).&(Roy,2021).

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