Digital Content Creation and Management in Agricultural Libraries in India: Issues and Trends

Rabindra K. Mahapatra

Orissa University of Agriculture & Technology, Bhubaneswar–757 003
E-mail: rkm_02@yahoo.com; rkmahapatra60@gmail.com

ABSTRACT

Many Indian libraries have taken up the challenge of modernisation to develop the machine readable catalogues, and machine readable full-text databases to provide greater accessibility to full text documents of different nature in order to provide seamless information to their users. The paper examines the status of the digitisation of agricultural libraries in India and the role of the Indian Council of Agricultural Research in developing new digital initiatives in content creation and agricultural digital library management. It elaborates upon the tools and technologies required for agricultural digital libraries management.

Keywords: Agricultural digital libraries, digital content management, agricultural libraries, digitisation

1. INTRODUCTION

The emergence of information and communication technologies (ICTs) has made dynamic changes in the structure and functioning of the library and information centres in the present day information environment. Traditional library system has been transformed into e-learning and virtual learning system. In order to ensure utmost use of information resources for remote users there is a dire necessity of digitising those resources and making them available through the web.

With the advent of the world wide web, every organisation could begin developing its own information services and new collaborations could be facilitated to share and disseminate resources. Users are presently more conversant with the new technologies and demanding electronic-based services. While providing information services, libraries have strived to convert the manual method into electronic mode of services. Having been empowered with the advantage of the new technologies, libraries have got the opportunity to digitise those services to be used by different user groups along with the facility of archival features.

The most striking feature of such a digitisation procedure is to create digital contents because without creating contents in digital forms, libraries will not be able to provide services in electronic formats. There is no doubt that some advance libraries have started to provide contents in digital formats and taking steps as to how the contents are converted into digital formats and made available on the network, CD-ROM and other services where hypertext format is of utmost use[1].

Agricultural libraries now face a situation in which the sharing of resources of other libraries and access to information in digital formats has become the primary requirement for the users. Dissemination of information in agricultural sector has been highly emphasised due to its direct impact on the farming community. The agricultural scientists are striving hard to develop new crops and transform the traditional cropping pattern into more agricultural produce and more profitable to the farmers. In such a situation the dissemination and use of right information for a wider audience in agricultural sector appears to be a significant approach.

It is for this reason that the national agricultural research system (NARS) has been invigorated and the emergence of agricultural research information system (AGRIS) has been given adequate importance. Furthermore, agricultural research library information system has been developed to strengthen the information dissemination pattern among the agricultural users. It is an acknowledged fact that one of the major thrust areas of library and information services is digitisation of collection and services.

Many Indian libraries have taken up the challenge of modernisation to develop the machine readable catalogues, and machine readable full-text databases to provide greater accessibility to full-text documents of different nature. Digitisation is the answer to such a situation. In order to digitise a library's collection, it is required to create contents in digital format. How far the agricultural libraries would get the benefit of such digitisation and content creation is the crux of the problem. The paper is designed to reflect the state of digital content creation and management of agricultural libraries in India.

2. DIGITISATION OF AGRICULTURAL LIBRARIES IN INDIA

With a view to cater to the library and information needs of the agricultural information users Indian Council of Agricultural Research (ICAR) has strengthened and improved the agricultural libraries in the country. All the agricultural universities in India having central libraries, regional libraries, and college libraries at other campuses are well developed. Under the ambit of ICAR research institutes, national research centres, project directorates, and national bureaus have libraries of their own catering to the information needs of their respective users. All the libraries under ICAR started computerisation during the AHRD Project. However, with the NATP support during 2001-05 all the central libraries have been completely automated. A large collection of thesis has been digitised. Further, a number of CD-ROM databases are subscribed by university and college libraries. Internet access has been provided by to the students and faculty members of agricultural academic and research institutes. The libraries in all agricultural universities have inter and intra networking communication links, powerful desktops, and servers. All those libraries are provided with CD-ROM databases searches by subscribing to *CAB Abstracts*, *AGRIS, AGRICOLA, VET-CD*, etc.

Some libraries are also subscribing to *EBSCO*, *PROQUEST,* and e-journals, etc. Moreover, it is encouraging to note that the collaboration between agricultural specialists and information specialists are increasing. Librarians are providing leadership that brings improvement in the research performance and effectiveness in all the agricultural libraries[2]. In order to revitalise the agricultural information environment in India, ICAR has taken major steps to develop an AGRIS. During eighth five year plan, ICAR has embarked upon a project called AGRIS to bring the power of information technology to the NARS. An AGRIS network was developed to exploit the potential of modern computing power in planning and management of agricultural research.

As a part of this project, agricultural research library information system was built up towards the modernisation and networking of libraries of ICAR institutes and state agricultural universities. The basic purpose of such a project is to strengthen the working condition of libraries and to develop creation of digital contents, databases, and compilation of information on regional agricultural development. Another significant mission of the project is to transform traditional libraries into digital libraries. Adequate initiatives were taken up to adopt ICTs to promote and facilitate the development of digitisation of information resources of libraries. Efforts have been made to strengthen the automation of library management activities and developing union catalogue compatible with *World Cat*. The creation and maintenance of digital repositories of university and research institutes have been started. Networking of libraries and development of consortium have been developed. The capacity building and re-structuring of library and information centres have been initiated.

2.1 e-Granth Project

Under the National Agricultural Innovation Project (NAIP), a scheme has been assigned for developing agricultural library network in India for digitisation, content creation, knowledge management, strengthening libraries of agricultural universities and institutes and formation of e-journal consortium of agricultural sciences. As a part of the digitisation and content creation effort decision was taken by ICAR to develop the digitised version of books and other collection in libraries of the NARS system. The consortium partners are Indian Agricultural Research Institute (IARI), ICAR Library, N.G. Ranga Agricultural University Library, Central Institute of Fisheries Education, G.B. Pant University of Agriculture & Technology Library and Chaudhury Charan Singh Haryana Agriculture University Library. The exact title of the project is 'e-Grantha-Strengthening of Digital Library & Information management' under NARS. While the duration of the project is 36 months, the cost sanctioned is Rs. 861.48 L. The objectives of the project are to: (a) create OPAC under Indian Agricultural Research Group catalogue of all the partner library resources with OCLC partnership; and (b) to digitise important institutional repositories/resources of leading NARS libraries including rare books and old journals and make them open access.

2.2 Consortium of e-Resources in Agriculture

The ICAR has developed the Consortium of e-Resources in Agriculture (CeRA) in 2008 with the following objectives:

- To develop the existing R&D information resource base of ICAR institutes/agricultural universities, etc.

- To create an e-access culture among scientists/ teachers in ICAR institutions/state agricultural universities.

- To develop a *Science Citation Index* (*SCI*) facility at IARI for evaluation of scientific publications, and

- To access the impact of e-resources usage on the level of research publications measured through *SCI.*

The consortium has collected more than 2700 journals primarily from Elsevier, Taylor & Francis, CSIRO, *Annual Reviews,* and Open J-Gate publishers for composition of the database. The consortium consists of 126 libraries of agricultural universities, ICAR research institutes, and centres in India. All the participating centres are given one IP and password to log on to CeRA database for access and use. The user may choose the simple or the 'advance' searching mode from the home page. Users can browse the journals by subject, title, publisher in alphabetical order. By registering his name, the user gets the alert of his interest after creating the profile. Arrangement has been made among the participating libraries to provide the hard copies of the article at their respective institute's cost to the users.

2.3 *KrishiPrabha*

The ICAR has taken a good step in creating the digital contents of the research works in agricultural subjects in India. It was decided that all the PhD theses submitted to agricultural universities and research institutes would be digitised and will be used in a networked environment. A project under NAIP was assigned to the Nehru Library of Chaudhury Charan Singh Agricultural University, Hissar, Haryana. The university library has taken the step to digitise the PhD theses available in all 45 agricultural universities and ICAR institutes in India.

During the first phase, the project covered digitisation of theses from 2002 to 2007. All the theses available in agricultural university libraries were scanned and data were sent to the Nehru Library for compilation and editing. Till date, 7500 theses have already been entered into the database for use. Each participating library is given an ID number and password for proper browsing and retrieval of theses. The metadata of the thesis is confined to the bibliographical details and an abstract. The different search options such as, author, title, supervisor, subject, institution can be used to search the document. Besides this, advance search like multiple key word, free text searches, etc., are available to make the database accessible. Users of *KrishiPrabha* can access the content through user ID and password or through the IP address provided. The project is a successful digital content creation activity of the agricultural research initiative in India.

2.4 Development of Institutional Repositories

The ICAR has a vast scope for research in agriculture in India where 97 institutes are working under its ambit. Apart from that 45 agricultural universities are also engaged in research work with the funding from ICAR.

Almost each agricultural university has one research department called Directorate of Research headed by one Dean of Research. There are some indigenous research projects undertaken by agricultural researchers. The outcomes of such research activities are presented in the form of research reports which are disseminated for furtherance of research.

Considering the bottleneck in the use of such reports in printed form, the digital formats are highly encouraged. The whole gamut of research activities in agricultural science is required to be captured in digital formats and made available to the researchers through a network system. Now most of the research institutes and universities have developed their institutional repositories in the form of file and databases primarily available in their respective web sites. Such institutional repositories are growing in nature due to its increasing use. Apart from such research reports, the institutes and universities have annual reports, patents, monographs, handbooks, seminar papers, and statistical reports which should be available to the researchers in soft copy form through the Internet. While some of the institutes and universities are taking steps to convert the printed copy to digital formats, still a large numbers of such materials are not available in soft copy forms. There is a greater need for developing the institutional repositories of the institutions and universities in agriculture in India so as to make the whole spectrum of research available in digital formats.

2.5 Digitisation of Agricultural Information

Digital technologies and online information resources have brought fundamental changes in how the research is done. The most important component of digital library, however, is its digital collection. The information content of a digital resource includes virtually any kind of electronic media (text, image, graphic, video, etc.) licensed database of journals, articles, and abstracts. Before developing a digitised system, it is pertinent on the part of the information specialist to determine the users group in agricultural sectors and their needs. Agricultural information users are agricultural scientists, faculty, researchers, students, extension workers, farmers, policy makers, administrators, and industrialists. Another important aspect is the users' competency of using digitised information. The information specialist has to fully ensure that those users coming under ambit must be aware of such digitised information use so as to help develop a successful digital library. Digitisation is the answer to high cost involvement in the duplication of resources in all the libraries. It facilitates live and interactive access to wide variety of content online. It is an ideal solution for budget constraints, staff crunch, and space limitation for growth. Valuable archives owned by libraries are required to digitise so as to allow online access to researchers, teachers and students to which they would not otherwise have easy access.

The most striking part for the information specialist is to identify the information resources to be converted into digital format. In such a step it is required to determine the usability of documents for digitisation. In agricultural libraries, information resources generated by the institutions are primarily of indigenous in nature. However, judicious decision is to be taken to list out the documents to be created into digital format. Information resources constitute such as, annual reports, newsletters, bulletins, lectures, seminar papers, research papers, review papers, profile of scientists, convocation addresses, patents, monographs, handbooks, extension materials, course curricula, training manuals, power point presentations, reports of important committees, project papers/reports, and statistical reports, etc. But PhD theses and master degree dissertations and research reports are the most dynamic form of information resources that need to be converted into digital formats. Adequate attention is required to see that what sorts of documents are to be converted into digital formats.

Creation of digital library is the order of the day. Leading institutions having good libraries are striving to create digital contents of their collection and services and managing those contents for wider use and long term preservation. Creating contents in digital form is a technical job that needs expertise. Irrespective of the subject category, every library can take up the job of digital content creation and management. The following paragraphs categorically depict the content creation and management process which is also applicable for agricultural libraries. Agricultural libraries in India who are interested to develop their library contents into digital formats may adopt similar methods of content creation and management.

2.6 Digital Content Creation

The librarians' role is to provide different types of information services from the library collection and those services are contents created in separate shape and size suitable for the needs of the user groups. Computer has the facility to create contents in digital formats and the communication technologies have given the scope to communicate over a network environment. The amount of information is emerging in an exponential manner where, it is difficult to trace the specific information for a specific group of users. However, creating contents in digital formats and their management has become the order of the day in this digital era. Although, content creation in libraries in not new, the content created in digital formats and disseminated in a network environment appears to be of recent development. The creation of digital contents will be an integral part of library's future. Digital contents directly support the teaching and research objectives of researchers and faculty in higher educational institutions. Digital contents created should meet the instruction and research needs of the students

and faculty. Hence, the need for content creation and management seems to be one of the latest functions of libraries which are providing the services in this digital era.

The contents refer to the knowledge of anything and almost everything contained as information and is available both in its conventional as well as non-conventional form. Before creating contents, the information specialist has to design the strategy of developing the contents in digital formats. One should emphasise the factors such as type of contents, method of creation cost involved, needs of the users and sustainability of content creation for a longer time. In these circumstances what type of contents are to be created is a matter to decide. How the nature of content will attract the users groups is to be decided. A long term budget will be needed for the creation and effective management of such contents. The contents created must serve the users community so that they must derive satisfaction out of such activity.

2.6.1 Stages of Content Creation

While designing a content creation programme in an organisation by its library, it is essential to look into the stages of creation. At the first stage, it is required to collect different types of information on different aspects of the digital contents. The recording of documents is necessary to keep track of them. After identifying the information to be digitised, prototypes are to be developed to determine the suitability of the content creation system. The best step is to create the proper contents. The contents, needed to be created, are to be converted into digital information forming a file or database. The contents already created need to be navigated through the web pages with necessary links to make the contents to be accessed and distributed over a network system.

2.6.2 Types of Contents

The content creation authority needs to know what types of contents are to be created. Before determining the types of contents here, it is necessary to ascertain the process of content creation which is basically divided into two types: (1) dynamic content and (2) static content. Dynamic contents are those multimedia components that are primarily treated as moveable in nature. Such contents are audio, video, both audio-visual video conferencing, songs, movie clips, etc. But the static contents are presented in the form of texts, pictures, graphs. However, the type of digital contents for creation can be categorised as graphics, texts, multimedia, databases, and file from websites.

2.6.3 Infrastructure

For content creation, one needs certain physical and resource infrastructure. These resources are equipments, software, human resources, and financial resources.

Equipment: Computer systems with good storage capacity, a scanner, and a network environment with server are basically needed for content creation. The hardware equipments such as flatbed scanner, auto document feeder book scanner, micro film/fiche scanner, server and work stations are essential to convert the print document into digital formats.

Software: Software for scanning, optical character recognition (OCR), word processing, spell-checking, image management. Video and audio capture is required to manage the conversion process. Software tools— Photoshop 6.0, Omni Page Pro 11.0, Acrobat 6.0 and Frontpage 2000 are useful programs for content creation.

Human Resources: Trained and skilled manpower are needed to develop a content creation and management system.

Financial Resources: Adequate and regular funding is required to manage the content creation and management activities for salaries, equipment, software, running cost of the organisation, etc.

2.7 Metadata Harvesting

Metadata is a set of information which remains in same hierarchical relationship with another set of information. It is something data about data. Metadata improves the performance of information retrieval. A metadata record can include representation of the content context, structure, quality, performance condition and other characteristics of an information bearing objects. Metadata is a method of making information available about resources in libraries. The concept is of utmost use when content creation and subsequent treatment of the digital item. The metadata to be harvested may be in any agreed format. The primary role of the metadata harvesting is to facilitate resource discovery when resources are stored in a number of distributed, independent repositories by exporting metadata about items in these repositories[3].

2.8 Quality of Content

While digitising documents, one should establish the right quality of the contents as well as for the archival documents. These should be stored in a widely used ISO formats such as TIFF and such other emerging formats. The archival quality of the digital format does not totally replace the original documents, as the contents created in archival format are treated as original. Special devices and techniques are used to convert digital contents for documents of cultural heritage and historical records. Special skill and care is required to develop the highest quality of digital contents for preservation of rare documents.

2.9 Management of Digital Contents

The management aspect of digital contents is the most important task for the content creator since it involves the effective and future use of the contents in an organisation. Content management is a set of tasks and processes for managing contents explicitly targeted for publication throughout its life span from creation to archival use[4].

Content management system is a tool that is designed to facilitate the access to all types of digital assets available in libraries. The primary objective of using such a tool is to manage the available digital assets from their creation to archiving. It is basically a web-based management system that facilitates the users to create, modify, edit the digital contents. As the large number of contents are required to be created, and designed for presenting qualitative information to the users, a system is essentially required.

2.9.1 Content Management Operations

To make the content management system effective, certain operational steps are required. At the design stage, a right decision is taken as to how to organise the contents for easy access and presentation. To devise a right shape to the contents at authoring stage, the additional materials like graphic and multimedia attachments need to be added. The revision of the process is required to improve the contents. Authority must provide the sanction to be included into the system. Contents in different formats are to be converted into specific formats readable in web-based formats. The contents ready to be disseminated is required to be stored in a right kind of database for easy and fast retrieval.

2.10 Content Management Organisations

To make the digital library system viable, some organisations have cropped up to take the responsibilities of content creation and management. The libraries may use the services of Sirsi Corporation, Innovative Interfaces Inc, Bibiliotech Review, Library Technology Guides, Innovative Internet Application in Libraries, Auto Graphics Inc., Sagerbrush Corporation and OCLC Web Express Service Centre, etc. These are some of the leading organisations working for digital content creation and management for the libraries and information centres.

3. CASE STUDIES

Web-based Information Services for Agricultural Research for Development (WISARD) is a platform for providing access to projects, experts, organisations, and other outputs including documents, articles, and web

pages. WISARD itself consists of an easy to use interface giving both access and ability to input and update information. Currently, WISARD contains more than 15,000 resources that are also available through web. It is also used as a platform for creating customised portals by other organisations such as FARA, the CGIAR Project Portfolio archive, the InterSard Good Practices database, and the FAO Global IPPM archive. The FAO CARIS projects database is currently integrated with the WISARD platform which now contains over 55,000 records[5]. Developers of WISARD products, based in the Netherlands, are actively engaged with GFAR, FAO, DFID, CTA, and CGIAR in 'coherence' initiatives. The new web 2.0 tools and approaches also are being developed for FARA and a global horticulture portal including an open source discussion application and open source virtual learning environment. The organisation is engaged in content creation and management in agricultural subjects for a wider dissemination of web-based information to the researchers worldwide[6].

The University of Illinois has developed large scale digital content creation. The digital collection of the library includes large caches of unique materials worthy of digitisation. Almost all the contents are created in the public domain. Faculty, researchers, and library staff have developed expertise in working with XML, OAI, and database technologies for digital libraries. The project such as teaching with digital content, emblem books, slavic digital resources, and the archives database/EAD projects have made some headway in providing digital library services to their users. Work has been undertaken to identify and capture born digital materials for their collections[7]. The basic level of hardware and software support for digital library development appears sufficient and provides a good basis for investigating aggregated services, via, OAI, metasearch tools, or digital object management systems. The distributed, entrepreneurial mode of grant, upon which the library relies, has been successful in other areas (OAI, Mellon Recon Project) and should be applied to DL opportunities. An institutional repository is on the horizon.

The IGCAR has developed the content creation and management activity of its library documents. The e-collection of its library includes e-journals, fast breeder reactor proceedings, standards, CD resources, and other technical documents. There is a heavy demand of scientists and engineers of their institute digitisation of in-house documents which should be available on the network, so that they can access them any time from their desktops. As a part of the digitisation activity of their resources, they have created the digital contents of research reports, newsletters, annual reports, PhD theses (abstract), and internal report of their organisation. For content creation, they have selected the list of documents for digitisation, decided by an expert committee. The approved documents are digitised by appropriate hardware and software. Such converted documents are then edited by software tools and again converted to PDF. The entire PDF document is made searchable by running OCR software, published on to web and made available to internet for wide use by all[8].

4. CONCLUSIONS

The modern library systems and services have developed the mechanism of content creation and management in digital formats, which would be available in the networked environment. Agricultural libraries are no exception to it. Under the ambit of ICAR, initiatives have already been taken to digitise the agricultural book collection through e-Grantha, conversion of PhD theses of agricultural universities and research institutes into digital format through the project *KrishiPrabha*. A consortium of e-resources in agricultural (CeRA) has already been working successfully. Efforts are on to develop institutional repositories of agricultural institutions. Open access publishing has already entered into the agricultural publishing industries in India. All those initiatives became possible in converting the print resources into digital. It is because digital content creation has become the necessity of this modern day information dissemination process. Libraries have to develop the necessary infrastructure for content creation and management, develop metadata harvesting and adopt content managements operations. Thereafter, it would be possible for them to disseminate the information in a web-based networked environment for a wider use.

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