Innovations in Agricultural Libraries and Information Management

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Abstract

The article expresses the basic ideas and objectives of the agricultural libraries in the modern perspectives and paradigm shift in agricultural information services and knowledge management. The digital interference in the library services shows glimpses of change in the library system to fulfill the thirst of the agricultural scholars in the present e-documentary information system. Innovation of agricultural library information services with KOHA LMS is very sophisticated and assists easy functionality of the library day-to-day works with security. KOHA is a free open source software that provides comprehensive functionalities expected from a modern integrated library management software. An RFID system had been developed and integrated with KOHA using middleware software. This paper highlights the innovative development of agricultural library services and integration procedure of the RFID system with KOHA and the challenges faced during the process.

Keywords: Agricultural Library, Innovative Ideas, Digital System, Paradigm Shift, Shodhganga.

Introduction

Innovation refers to something new, such as an invention, or the practice of developing and introducing new things. Innovation is often a new product, but it can also be a new way of doing something or even a new way of thinking to create a new primary component concerned with any field of knowledge.

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Every area of human life relies heavily on information. We live in a time where information is exploding at an unprecedented rate and when knowledge becomes absolute much too quickly.

The agricultural library has become one of the primary information sources for agricultural researchers and students. Information services such as cross-database retrieval, full-text recovery, document transmission, virtual orientation, and user training have become popular. These services have moved towards the idea of "access to any document, at any time, in any place". However, most agricultural library construction efforts are still directed to resource optimisation. The services provided are confined to providing information for users, which has to be changed. Enabling innovation in information access and management allows information to be supplied as a seamless, borderless service that users can utilise right away, whether nearby or far away.

Innovative technologies which impact library services

i. **Big data:-** Big data means a massive amount of information that can be managed and conserved for future use.

ii. **Artificial Intelligence:-** Artificial intelligence is the application of Software in the library to automate the functions of the libraries and go with modern digital services and e-services.

iii. **Blockchain technology:-** A blockchain is a distributed database shared among the nodes of a computer network. As a database, a blockchain stores information electronically in digital format. As new data comes in, it is entered into a new block. Once the block is filled with data, it is chained onto the previous block, chaining it together in chronological order. Different types of information can be stored on a blockchain, but the most common use has been as a ledger for transactions.

iv. **Internet of Things:-** The Internet of Things (IoT) is a network of physical objects-"things"-embedded with sensors, software, and other

technologies to connect and exchange data with other devices and systems over the Internet.

v. **Library bookmark apps: -** They are archiving tools to create a personal, organized, searchable reference library online public access catalog accessible for holding library documents.

vi. **User-focused interfaces and application: -** User interface (UI) design is the process, designers use to build interfaces in Software or computerized devices, focusing on looks or style. Designers aim to create interfaces that users find easy to use and pleasurable in search of graphical information.

vii. **Augmented reality:-** Augmented reality or AR is a technology that presents us with virtual objects and information in our field of vision. If we look at a street, for example, and point my smartphone towards that street, it may give me more information, such as the names of cafes, gyms, dentists, etc.

viii. **Digital interfaces for printed books:-** Digital interfaces for printed books detect the users' fingers and what it is touching and create an interactive touch screen where they can select the part they want to and transpose it into a digital form, where it can be processed.

Paradigm shifts

A paradigm shift is defined as a shift in the patterns and methods used to operate any system or process. "A significant change that occurs when a new and different way of thinking about or doing something replaces the traditional way." It refers to a dramatic shift in how something operates or is performed in worldview, concepts, and practises. A paradigm change in agricultural libraries can occur in various circumstances, ranging from scientific approaches to information provision and management of both print and non-print information, including e-books, e-journals, and e-databases, among other things.

Types of innovative information access and management

Innovative information access methods are advantageous in the library platform. Even small libraries can also get advantages of using these things. The types of innovative information access and management are as follows:

1. Consortiums for e-Resources in Agriculture (CeRA)

The Consortium for e-Resources in Agriculture, popularly known as CeRA, facilitates online access based on the static IP address to about more than 3400 journals in agriculture. The allied sciences to all researchers comprising scientists, teachers, faculty, research fellows, and students in the National Agricultural Research System (NARES) through IP authentication. At present, there are 150 members (along with regional stations, KVKs, and colleges) in CeRA comprising ICAR Institutes, SAUs, NRCs, PDs, etc., in the NARES. About 3,400 journals are now accessible in CeRA [http://cera.iari.res.in & http://www.jgateplus.com], which is now the most sought-after online platform by scientists/teachers in the NARES for literature search through IP authentication. The impact of CeRA in research publications is revealed through Web of Science, which indicates a qualitative and quantitative increase in the number of published papers during post-CeRA (2008-12) than Pre-CeRA (2003-07). The Consortium includes publishers viz. Springer, Annual Reviews, CSIRO, Elsevier, Taylor & Francis, Oxford Journals, American Society of Agronomy, Informatics, Wiley, and over 800,000 articles from Indian Journals downloaded by researchers. 24 x 7 online accessibility of scientific articles is provided to researchers in NARS through IP authentication. Not accessible through CeRA, specific articles are made available through Document Delivery Request (DDR) System. So far, 46,190 printed articles have been delivered under DDR. The impact of CeRA on the level of research publications at Institutions in NARS was initiated in 2010.

2. Indian Digital Ensemble of Agricultural Libraries (IDEAL)

IDEAL is a ready platform for Agricultural Libraries of Indian National Agricultural Research & Education System (NARES), which enables them

to adopt an Integrated Library Management System for their day-to-day operations of all their library functionality. It is a software platform built on the 'Software as a Service (SaaS)' concept to provide a hassle-free, ready-to-use, international standards-based platform for sharing library holdings through AgriCat) union catalog. An integrated digital library delivered at the desk of researchers, faculty, and students of NARES can boost the quality of research output and save time. Libraries can reduce the cost incurred in procuring books & other library resources by sharing through this digital system. At present, 38 libraries of NARES as a part of an e-Granth project supported by the National Agriculture Innovation Project (NAIP) of the Indian Council of Agricultural Research (ICAR) have endeavored to establish an IDEAL platform that is easily extendible to more libraries covering the whole NARES. Vast resources spread all over NARES can be accessible with a few clicks. For library users all over NARES, an Online Public Access Catalog (OPAC) of their library provides an easy and enhanced experience of using the library online, sitting at their desk either in lab or home. Even while on the move, they can access their library using smartphones. An integrated catalog of the whole NARES (AgriCat) provides access to holdings of other libraries of NARES. A robust set of servers and failover servers operational at the data entry of Indian Agricultural Research Institute (IARI), Pusa, New Delhi, provide hosting facilities for customized KOHA open source software running independent instances for each library. Local mirror servers at individual libraries in sync with their KOHA instance at the central server ensure redundancy and high availability. However, those not running their local server may run offline KOHA modules on any desktop to ensure uninterrupted circulation services in the event of connectivity failure. All circulation data can be easily uploaded to a central server for maintaining a complete record as soon as connectivity is restored. IDEAL is a ready platform for Agricultural Libraries of Indian National Agricultural Research & Education System (NARES), enabling them to adopt an Integrated Library Management System for their day-to-day operations of all their library functionality.

- It is a software platform built on the 'Software as a Service' (SaaS) concept to provide a hassle-free, ready-to-use, international standards-based platform for sharing library holdings through a union catalog (AgriCat 2.0).
- For library users all over NARES, an Online Public Access Catalogue (OPAC) of their library provides an easy and enhanced experience of using the library online, sitting at their desk either in lab or home. Even while on the move, they can access their library using smartphones.
- An integrated catalog of the whole NARES (AgriCat) provides access to holdings of other libraries of NARES.
- Any library under NARES willing to be part of IDEAL needs to bring their catalog data to a standard format and learn how to use KOHA ILMS for library functioning. It is not necessary to run any server or KOHA software locally.

3. OPAC and Web OPAC

OPAC means Online Public Access Catalog. It is a database of a library or group of libraries. Any library user can access such a database to know the study materials (books, CDs, DVDs, cassettes, videotapes, articles, etc.) available in the library or libraries concerned. The concept of Web OPACs is relatively new. It acts as a portal to the resources owned by the individual library and the holdings of other collaborating libraries that do not have a local collection but have access to resources at the regional, national, and worldwide levels. It allows users to interact with documents stored on computers worldwide and makes catalogue data, such as bibliographic entries, more accessible. Library users can also use Web-OPAC from anywhere. Such innovative service saves users time searching their required study materials stored in various libraries. Now agricultural libraries in India are ensembled with the KOHA Library management software; every library of the agricultural institution and universities has a central library OPAC based on KOHA and online public access. For instance, http://

chfcau.ideal.egranth.ac.in a library of the college of horticulture and forestry library OPAC. OPAC for the public with direct access to a library's bibliographic details through the use of a terminal.

4. Krishikosh Repository

"Institutional repository is a set of services that a university offers to the members of its community for the management and dissemination of digital material created by the institution and its community members. It is most essentially an organizational commitment to the stewardship of these digital materials, including long-term preservation where appropriate, as well as organization and access or distribution." (Clifford Lynch, 2003).

Krishkosh is an institutional repository developed under the E-Granth subproject of the National Agriculture Innovation Project funded by ICAR and governed by IARI, New Delhi, NAIP (National Agriculture Innovation Project). Digitization and creation of open access Institutional Repository using Krishikosh.

Krishikosh is a digital repository of accumulated knowledge in agriculture and allied sciences, with a collection of old and valuable books, old journals, thesis, research articles, popular articles, monographs, catalogs, conference proceedings, success stories, case studies, annual reports, newsletters, pamphlets, brochures, bulletins, and other grey types of literature scattered across the country in various ICAR Research Institutions and State Agricultural Universities (SAUs). Under the ICAR's Open Access policy, Krishikosh provides a ready software platform to implement all aspects of the open access policy, similar to 'Cloud Service' for individual institution's self-managed repository with central integration. E-Granth two products, (i) Krishikosh and (ii) IDEAL, are used by all SAUs/DUs/CUs & ICAR Institutes.

After completing the NAIP era, ICAR has institutionalized the E-Granth scheme under the Division of Agricultural Education to ensure continued services by intrusting this responsibility to AKMU, ICAR-IARI, New Delhi.

Under the ICAR's Open Access policy, it is mandatory to upload all Institutional publications viz., research articles, popular articles, monographs, catalogs, conference proceedings, success stories, case studies, annual reports, newsletters, pamphlets, brochures, bulletins, a summary of the completed projects, speeches, and other grey works of literature available with the various SAUs in the Krishikosh. Besides this, M.Sc., Ph.D. thesis/dissertations (entire contents) and completed research projects will be submitted in the Krishikosh repository. After completion of the work, the metadata (e.g., title, abstract, authors, publisher, etc.) will be freely accessible from the time of deposition of the content and can be freely used through Open Access.

For easy access to this repository, new initiatives have been taken up for efficient development and dissemination of Krishikosh to the end-users of NARES. These initiatives include the efforts to add a new library, development of tutorial video, development of the database for NARES library, uses of social media, upgrade the Dspace version from 4. x to 6. x, development of the mobile application for Krishikosh and others. In the last ten months, 50 more Institutes / SAUs have been added to the Krishikosh repository; 83 SAUs, CAUs / ICAR institutes are registered in Krishikosh. Currently, this repository has more than 83,000 articles, including nearly 35,000 theses.

Features of Krishikosh

- Krishikosh is a digital repository platform capable of Decentralized Management of Content but Centralized Hosting and maintenance for the convenience of multiple users.
- Each institution has its repository with complete control without botheration of maintaining hardware/software, which is centrally managed at ICAR-IARI, New Delhi.
- Krishikosh Institutional repository of NARES provides open access to institutional knowledge. Krishikosh has been developed by customizing open-source Software DSpace.

- At present, Krishikosh has more than 20 million digitized pages in 83,000 digital items (volumes) like old books, old Journals, reports, proceedings, reprints, research highlights, training manuals, historical records.
- It includes more than 35,000 Ph.D. and M.Sc. theses submitted by various ICAR Institutes / SAUs, CAUs, and full-Text searchable facilities.
- Krishikosh provides a ready software platform, similar to 'Cloud Service' for individual institution's self-managed repository with central integration of all individual repositories.
- It is full text searchable open access repository. Semantic search enabled through the integration of Agrotags.
- Comprehensive search and browse options are available.
- Easy to register for additional facilities
- Making provision for continuous improvement through Users' feedback.
- Subscribed users can get collection updates.
- Institutional users can administer their repository and upload, remove, set embargos on their institutional content.

5. Libraries with RFID Systems

Radio - Frequency Identification (RFID) is a wireless system that uses electromagnetic fields. This system automatically identifies and tracks the chip attached to the books and materials of the library. It is one of the self-service schemes where a library user can take his required books. The identity of books, name of the user, and date of issuing the book are automatically recorded in the e -register of the library. The library using an RFID system does not allow the users to take any book or material unless a proper procedure of recording the issued books and about its use is not followed, which ultimately avoids the risk of theft. To avail of the facilities

of such a library, the users are required to be a member. The nominal charges for using the library materials will be deducted automatically from the user's bank balance. It also helps in the proper arrangement of all materials of the library. Such a system also needs less human resources and helps reduce the monotonous work of the librarian. For integrating the RFID system with KOHA, a new table has been created in the MySQL database of KOHA. This table stores UID of each RFID tag and the corresponding accession number of the library holding. These two fields should have properties NOT NULL and UNIQUE, respectively.

The Library users intending to issue holdings will be required to place the desired holdings on the RFID reader affixed on the self-check-in/out kiosk. The user will then be required to click on the check-out button on the kiosk console. This will send the ISO Inventory command (0x01) to the reader from the kiosk PC over a serial link. The reader collects all the UIDs in its vicinity and sends them to the PC on getting the inventory command. Using UIDs received by the PC, the library identifiers corresponding to each of the UIDs are fetched from the tags. If each fetched identifier conforms to our library, accession numbers corresponding to each of the UIDs are fetched from the KOHA database. A further query to the 'ITEMS' table of KOHA is made to know the statuses, reserved and on-loan, of every holding intended to be checked out. If the two statuses permit check out of a holding, 'ISSUES' is updated with borrowers ID and accession number in the KOHA database table. The EAS field of the tag is reset by issuing manufacturer-specific ISO command 0xA3. The check-out process completes with the user logging out of the system. Subsequently, if the user walks out with the checked-out holding(s) through the security gate, the gate will allow smooth passage without raising any alarm. Check-in of library holdings is similar to check-out, except that the reader sets the EAS field of the tag, and the database table 'issues' of KOHA is also updated.

Other Initiatives

Shodhganga: A Reservoir of Indian Theses:

Theses and dissertations are the rich and unique source of information, often the only source of research work that does not find its way into various publication channels. Theses and dissertations remain an untapped and under-utilized asset, leading to unnecessary duplication and repetition that, in effect, is the antitheses of research and wastage of enormous resources, both human and financial.

The UGC Notification (Minimum standards & procedure for award of M.Phil. / Ph.D. Degree, Regulation, 2009 Amendment made on 2016) dated May 5, 2016, mandates submission of the electronic version of theses and dissertations by the researchers in universities intending to facilitate open access to Indian theses and dissertations to the academic community worldwide. Online availability of electronic theses through centrally-maintained digital repositories ensures easy access and archiving of Indian doctoral theses and will also help raise the standard and quality of research. This would overcome the severe duplication of research and poor quality resulting from the "poor visibility" and the "unseen" factor in research output. As per the regulation, the responsibility of hosting, maintaining, and making the digital repository of Indian Electronic Theses and Dissertation (called "Shodhganga"), accessible to all institutions and universities, is assigned to the INFLIBNET Enter. "Shodhganga" is the name coined to denote the digital repository of Indian Electronic Theses and Dissertations set-up by the INFLIBNET Enter. The word "Shodh" originates from Sanskrit and stands for research and discovery. The "Ganga" is the holiest, largest, and longest of all rivers in the Indian subcontinent. The Ganga symbolizes India's age-long culture and civilization, everchanging, ever-flowing, ever-loved, and revered by its people, and has held India's heart captive and drawn uncounted millions to her banks since the dawn of history. Shodhganga is the reservoir of Indian intellectual output stored in a repository hosted and maintained by the INFLIBNET Enter.

e-ShodhSindhu

Based on the recommendation of an Expert Committee, the Ministry of HRD (now renamed as Ministry of Education) has formed e-ShodhSindhu, merging three consortia initiatives, namely UGC-INFONET Digital Library Consortium, NLIST, and INDEST-AICTE Consortium. The e-ShodhSindhu provides current as well as archival access to more than 10,000 core and peer-reviewed journals and several bibliographic, citation, and factual databases in different disciplines and many publishers and aggregators to its member institutions, including centrally-funded technical institutions, universities, and colleges that are covered under 12(b) and 2(f) Sections of the UGC Act.

ShodhGangotri

ShodhGangotri is a new initiative that compliments "ShodhGanga." ShodhGangotri hosts a synopsis of research topics submitted to the universities in India by research scholars for registering themselves for the Ph.D. Program. On the one hand, the repository would reveal the trends and directions of research being conducted in Indian universities; on the other hand, it would avoid duplication of research. ShodhGangotri is an open access repository of Indian research in progress, which is a new initiative that complements ShodhGanga - the reservoir of Indian theses. ShodhGangotri hosts an electronic version of approved synopses and research proposals submitted to the universities in India by research scholars for registering themselves for the Ph.D. program, revealing the trends and directions of ongoing research in India, and helps to avoid duplication of research. A study on the current status of ShodhGangotri in different aspects, namely universities, issue date, discipline, and state. University-wise analysis shows that Shri Jagdishprasad Jhabarmal Tibrewala University submits 48% of the full synopses, 8.9% by Swami Ramanand Teerth Marathwada University, 8.7% by Dayalbagh Educational Institute, and 5.7% by Mahatma Gandhi University, and they occupy 1 to 4 positions, respectively. It concludes with a suggestion that all universities and research

institutions should make it mandatory to submit approved synopses and research proposals at the time of their Ph.D. registration to make it experience the pulse of ongoing Indian research.

Conclusion

The Indian National Agricultural Research & Education System (NARES) is a vast agricultural and related knowledge repository. It consists of rare and valuable books, reports, theses, surveys, statistical data, maps, bulletins, newsletters, journal back volumes, and other documents housed in the libraries of various Agricultural Research Institutes and State Agricultural Universities across the country. The Digital Repository entitled 'KrishiKosh' was built under the 'e-Granth' project of the National Agricultural Innovation Project (NAIP) ICAR to provide online access to this unique resource to scholars and scientists worldwide. The 'e-Granth' is a collaborative initiative that aims to strengthen libraries by implementing data standards, standardised Integrated Library Management Software, and easy cataloguing for a smooth day-to-day operation and improved user experience. Individual library OPACs, a Union catalogue for exchanging materials, a Digital Repository with Electronic Theses and Dissertations (ETDs), and increased capacity building are all built into the system. Its goal is to serve as a portal to Indian agricultural knowledge via the Internet and share research information with the rest of the world through cutting-edge information and communication technologies.

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