Role of Agricultural Libraries in Knowledge Management

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Organized by
Acharya N.G. Ranga Agricultural University, Hyderabad
e-Granth Project IARI, New Delhi
CeRA, IARI, New Delhi
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Foreword

Agriculture has always been the backbone of India's livelihood and continues to play a major role in the Indian economy after the green revolution of 1968. While the population of our country is heading towards 1.23 billion, our agricultural scientists are engaged in increasing the food grain production to address the food security challenge. The importance of agricultural production in the context of global competition has occupied a significant place in the national development plan.

One of the major constraints faced by the Indian agriculture is dissemination of knowledge generated in the research laboratories to the stake-holders, i.e. farmers and field workers. In other words, there is an 'information divide' between the farmers and agricultural scientists and extension agencies which needs to be 'bridged' for effective transfer of technology.

A vast amount of research-based knowledge of the existing and improved agricultural practices is being generated all over the world, but much of it does not reach the actual users. In order to realize the full potential in Indian agriculture, it is necessary to manage the sector like an Industrial enterprise, which is possible only through effective dissemination of knowledge through the use of information and communication technologies. It is only then it is possible to "reach the unreached" by bringing information right to the grassroots level.

Traditionally, libraries are engaged in collection, organization, preservation, and dissemination of knowledge in the form of books and journal articles to researchers, scientists, and policymakers. With the advent of the Internet the role of libraries has expanded from printed materials to that of providing access to a wide range of digital information. However, there is need to create awareness among the users of agricultural information on how to access the required information using the latest ICT tools and techniques.

In this direction, the Govt. of India had initiated several measures to strengthen the agricultural information access and delivery mechanism through various projects, agencies and networks. The National Agricultural Innovation Project (NAIP), e-Granth and Consortium of e-Resources in Agriculture (CeRA) are some of them.

Agricultural libraries and librarians have a greater role to play in managing the available agricultural knowledge to make India self-sufficient in food production. Information and communication technologies can play a vital role in the knowledge management process. According to Metcalfe, "the central purpose of knowledge management is to transform information and intellectual assets into enduring value".

I am extremely happy to know that the University Librarian, ANGRAU has embarked on a very important mission of educating the 'producers' & 'consumers' of agricultural information from all over the country through this national conference. The papers presented in this pre-conference volume reflect the interest and importance shown by our agricultural information professionals towards knowledge management particularly e-resources. I hope the deliberations of the conference evolve into a roadmap for future libraries. I wish the National Conference a grand success.

(V. NAGI REDDY)
Agriculture has been a part of human life since the beginning of the human race and the need for agricultural information is probably almost as old as agriculture itself. Agriculture today has to feed a growing population in a world of static or shrinking natural resources and increasing social and environmental constraints. Agricultural information professionals need to support agriculture by managing and improving access to a proliferating and increasingly complex array of information resources in a climate of shrinking resources and expanding challenges. Informatics for agricultural development requires coordinated inter-sectoral approach and application of appropriate information technology (IT) tools.

India has invested heavily in telecommunications infrastructure over the last decade, and now has internet connectivity down to District level throughout the country. It is not correct to assume that without access to the internet, communities do not have information systems of any substance. This can lead to an overly optimistic technologically deterministic approach to the conclusion that the problem will only be solved if the existing information networks are replaced with the modern systems.

New methods for creating and disseminating scholarly information provide extraordinary opportunities to transform research libraries into 21st century institutions for collective action. Libraries have a crucial role to play in bridging the technology gap between available information and information in the hands of farmers. Digital library technologies have immense importance in doing this. Libraries can also work with the various other information and communication networks to disseminate knowledge that can link to the wider farmer community.

To understand the future of agricultural information integration and access, one must understand present-day information networks in the proper context, i.e., how information networks evolved as a result of new digital technologies; how end users have influenced the design of information networks; and how the increased demand for technology transfer and evolving role of information systems in this knowledge transfer process have influenced the structure of regional national and international information networks. The prerequisites for a successful universal agricultural digital library include: a knowledge transfer problem that is clearly defined with a realistic agenda for action; a bottom-up approach to defining issues; a strong self-interest that drives productive collaboration; willingness to commit resources, e.g., human resources, funding, facilities; the availability of trained and qualified manpower.

The theme of the National Conference on Agricultural Libraries and User Community – 2012 is carefully preferred as “Role of Agricultural Libraries in Knowledge Management” because of its importance and relevance to the present day situation. Given the importance of the theme, there was tremendous response from many library professionals working in agriculture and other libraries from all over the country. After
rigorous editing and scrutiny by experts, the Editors had to reject some papers which did not fit into the theme and/or ‘not up-to-the-mark’, which is inevitable.

We earnestly hope that this National Conference will create an awareness and interest among LIS professionals about knowledge management in agriculture libraries and enable them to establish a unique place in the knowledge society. Our sincere thanks to Sri V. Nagi Reddy, Hon’ble Vice-Chancellor, Acharya N.G. Ranga Agricultural University, Hyderabad who has spared his precious time in writing the Foreword for this volume in a short notice.

Finally, the Editors are thankful to all those who have contributed, supported and encouraged directly or indirectly to make this national event a great success. We hope this volume would be useful to the students, researchers, practicing information professionals, agricultural library staff and the faculty in Library and Information Science.

- Editors
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Theme Papers
APPLICATION OF KNOWLEDGE MANAGEMENT IN LIBRARIES

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ABSTRACT
Knowledge management is basically a business concept aimed at enhancing and improving operations to gain profits and competitive advantage. However, the tools and techniques of knowledge management can also be applied to non-profit organizations such as libraries to improve their services to meet the changing user needs. The environment in which today’s libraries operate, has drastically transformed due to the arrival of e-resources and the Internet. As a result, the role of academic libraries is also changing to provide the competitive advantage for the parent organizations in the knowledge society. This paper aims at establishing the importance of knowledge in the knowledge economy, impact of information technologies on libraries, library’s role in knowledge management and improvements in library services and user satisfaction.

Keywords: Knowledge Management; Digital information services; Academic libraries

INTRODUCTION
The management of information has long been regarded as the domain of librarians and libraries. Librarians and information professionals are known to be experts in information searching, selecting, acquiring, organizing, preserving, repackaging, disseminating or delivery.

The basic functions of a library are to collect, process, organize, disseminate documents or information to its user community. In the digital era the academic library is a treasure-house of human knowledge, participant in knowledge innovation, and an important link in the knowledge innovation. However, knowledge management should never be viewed as a way to control the process of knowledge creation.

The growth of the Internet and digital technology has caused a dramatic change in the scholarly communication system. For academic libraries, which are responsible for preserving and providing access to the scholarly record, these changing scholarly communication practices are creating both new challenges and new opportunities.

Academic Libraries have traditionally focused on acquiring externally produced work to make available to their local communities. Within the information chain, libraries perform an intermediary function between publishers and end users.

Academic institutions exist to impart and create knowledge, and thus, they have a role to play in the knowledge management process. To achieve their institutional mission, that is, education, research and service to society, libraries need to be consciously and explicitly managing the processes associated with the creation and sharing of knowledge.
Knowledge management is an appropriate discipline for enabling a smooth integration of these new needs that have arisen from the present economic, social and technological context, into higher education. Academic libraries have always facilitated information exchange, so they are well placed to take on the knowledge management functions. It is clear in the era of a knowledge society and knowledge economy, university libraries have a major role to play.

WHAT CONSTITUTE KNOWLEDGE?

Because knowledge management is relatively a new concept it is viewed differently by different people from different backgrounds, and hence its definitions also vary. To determine what knowledge management is, it is helpful first to distinguish the differences between data, information and knowledge.

The traditional paradigm of information systems is based on seeking a consensual interpretation of information based on socially dictated norms. This has resulted in the confusion between ‘knowledge’ and ‘information’; however, both are distinct entities.

It is evident from literature that knowledge is an intrinsically ambiguous term, and therefore, defining it precisely is difficult. It is because different disciplines use the term to denote different things. Despite the difficulties in defining knowledge, it is well agreed that, “knowledge is the expertise, experience and capability of staff, integrated with processes and corporate memory”.

Thus, knowledge management is concerned with the exploitation and development of the knowledge assets of an organization with a view to furthering the organizations objectives. The knowledge to be managed includes both explicit (documented) knowledge, and tacit (subjective) knowledge. Knowledge management entails all of those processes associated with the identification, sharing and creation of knowledge. This requires systems for the creation and maintenance of knowledge repositories, and to cultivate and facilitate the sharing of knowledge.

THE NATIONAL KNOWLEDGE COMMISSION

Realizing the importance of information in the knowledge society, the Government of India has set up an advisory body in 2005 called “National Knowledge Commission (NKC)”, which has five focus areas namely - easy access to knowledge, emphasis on education at all levels, creation of knowledge, application of knowledge to all sectors, and better delivery of services in all sectors. The NKC has also recognized public libraries as an important element in the knowledge economy.

In order to facilitate sharing and access to information among higher education institutions the NKC has created a National Knowledge Network (NKN), a high speed data communication network, which interconnect Institutions of higher learning. It is a high capacity countrywide Infrastructure at education & research Institute level, to support education and research applications, and other application as envisaged by these institutions which require very high bandwidth.

The National Knowledge Network is expected to facilitate creation, acquisition and sharing of Knowledge resources among the large participating Institutions; collaborative research; country wide classrooms (CWCR) etc. and help the country to evolve as Knowledge Society in the years to come.
WHY KNOWLEDGE MANAGEMENT IN LIBRARIES?

As a result of rapid environmental changes, academic libraries need to rethink their organizational structures in an attempt to provide quality service to the university community. The emphasis is more on the needs of the library user than the needs of the library.

In the present era of information and communication technology, knowledge has become a key resource. Although the conventional function of libraries is to collect, process, disseminate, store and utilize information to provide service to their user communities; the environment in which libraries operate today has changed due to the developments in ICT, which necessitates new ways of information handling.

Knowledge management is a viable means in which academic libraries could improve their services in the knowledge economy. This can be achieved through creating an organizational culture of sharing knowledge and expertise within the library. The success of academic libraries depends on their ability to utilize information and knowledge of its staff to better serve the needs of the academic user community.

The changing role of academic librarians as knowledge managers emphasizes the need to constantly update or acquire new skills to remain relevant to the today’s library environment. Academic libraries may need to restructure their functions, expand their roles and responsibilities for effective delivery of library and information services to meet the ever changing user needs.

Universities as Knowledge Producers

Traditionally, universities are involved in knowledge production, storage, dissemination and authorization. Also, the acquisition of knowledge and learning forms the main focus of universities. It may be noted that the university is concerned with the conservation of knowledge and ideas; teaching, research, publication, extension and services and interpretation.

Oosterlink and Leuven (2002) pointed out that “in our era of knowledge society and a knowledge economy, it is clear that universities have a major role to play”. In other words, universities are faced with a challenge to better create and disseminate knowledge to society.

These demands require the development of partnerships between universities and curricula customized to meet students’ needs. It can be noted that universities are complicated environments, incorporating a variety of very different kinds of work.

The present the structure and functioning of the university system is also undergoing rapid transformation due to globalization, developments in ICT, online education and changing user needs. Consequently, the libraries have to maintain the same level of information delivery mechanisms in a changed environment. Due to these challenges, it is clear that academic libraries are turning to be “libraries without walls” and the information is mostly in digital format.

Knowledge management practices can be effectively applied to university libraries to enable them to provide services which meet the current user needs in a more realistic way rather than “spoon feeding” the students, faculty and scientists. The use of ICTs in universities makes it possible for courses, modules and training programmes that are
interactive and multimedia based to be delivered on any time any place basis. Under this the mandate of future libraries should be based on the following four guiding principles:

1. Identifying what knowledge is sought by the users
2. Analyzing how we can add value to this knowledge
3. Specifying actions to achieve the above
4. Reviewing the usage of the knowledge by the users

In order to achieve the above, we need to take into consideration the nature of information resources, technologies, linkages, sharing, delivery, user needs, and human factor (staff).

CHALLENGES FACED BY ACADEMIC LIBRARIES

The rapid growths of information and communication technologies have enabled libraries to collect less of print material and more of electronic material in multiple formats and media. These technologies have enabled academic libraries in providing services and resources to the university community on their desktop computers. It is a challenge that requires universities to restructure their services to meet the needs of the academic community.

Academic libraries have to provide information services for users acting in the changing academic environment. Academic librarians need to liaise with library users, faculties and schools to support the effective teaching, learning and research in universities.

The changes brought by electronic media necessitate transformation in the way librarians think about their jobs, the users of information and communication process of which they are part of. Academic librarians must strive to remain competent navigators of each medium on order to assist the library users. The challenge for academic librarians is to manage services, which offer users a carefully selected mix of multiple formats and media.

Changing user needs

Experts argue that knowledge workers will be the most important profession in this century. One of the major roles of academic librarians in the knowledge economy is that of knowledge managers. It is evident that academic librarians can no longer meet the information needs of the university community through the traditional supply-based means of collection development. They need to understand the information needs of users. In other words, academic librarians should extend their information management roles and enhance their knowledge management competencies.

Due to societal and technological developments, traditional teaching changes increasingly in creating learning environments. Students participate in flexible learning processes via more ‘indirect’ contacts with teachers and facilities, including scientific information.

The challenges require academic libraries to offer user-friendly ICT oriented facilities (like remote access to information and services), analyze the changing user needs and give support to users in new academic environments.
Organizational structures have to be established for acquiring information in digital form involving licensing and copyright. Thus, digital era has brought in changes in information formats, delivery models and technologies, which have given a new role to the academic librarian.

STRATEGIES FOR KNOWLEDGE MANAGEMENT IN LIBRARIES
Knowledge management process involves the creation, capturing, sharing and utilization of knowledge. Whether the key objective of academic libraries is to provide resources and information services to support the university community, the key resource that is required is knowledge. That is, the knowledge of the library’s operation, the knowledge of library users and their needs, knowledge of the library collection and knowledge of library facilities and technologies available.

These types of knowledge must be put together so that new knowledge is created which leads to the improvement and development of service to the users. However, this diverse knowledge is rather dispersed across all library sections and up the library hierarchy. The knowledge is not held by one individual only but by a number of individuals.

Academic librarians can become part of the knowledge creation process through participating in the teaching and research activities of the university. Knowledge creation in this context should involve all the management effort through which the academic library consciously strives to acquire competencies which are neither available internally nor externally.

Successful libraries are those that are user-centric and are able to respond to users’ needs. As users became more sophisticated, academic libraries need to develop innovative ways to respond - to add value to their services. It is important to create good library website to enable librarians to not only provide an in-depth customized reference service but also to become knowledgeable about handling different user enquiries.

For academic libraries to utilize their know-how, it is necessary that they become knowledge-based organizations. Academic libraries need to prepare themselves for using and sharing knowledge. The importance of knowledge sharing should be based on the capability of academic librarians to identify, integrate and acquire external knowledge.

New Role of the Librarian
The transformation from librarian to knowledge manager is clearly underway. However, this impending shift of incorporating knowledge management in the library activities requires a great deal of preparation. The challenge for the information professional lies in applying competencies used in ‘managing information’ to the broader picture of ‘managing knowledge’. A recent report issued by the Association of Research Libraries (ARL) concluded that “publishing services are rapidly becoming a norm for research libraries.”

The success of academic libraries depends on the capabilities and skills of its staff in fulfilling the needs of the university community more efficiently and effectively. To be successful in this environment, individuals need to acquire new combination of skills such as technical, organizational and interpersonal skills.
Academic librarian should focus more on user-centric services that meet the objectives of the university. There are many new initiatives that can be taken up by the academic librarians such as:

- Creating institutional repositories to support the archiving and distribution of a wide range of scholarly and teaching materials produced by faculty at their institutions
- Developing digital publishing services to support the design, management and distribution of online journals and monographs, and
- Engaging in education, outreach and advocacy activities addressing scholarly communication issues.

University libraries can add value to the knowledge creation process in a number of ways and some of them are given below:

1. By working closely with the academic staff (faculty) in the selection of library resources
2. By working closely with the publishers in negotiating access terms – price for content access, use and distribution
3. Providing facilities for on-demand printing of material for users within the library
4. Providing on-line & off-campus access to aggregated, value-added and subscribed resources in electronic and/or print form
5. Market intelligence for the publishers through a number of channels ranging from reviews to the ‘blogs’ to be produced from the new system and adding value for the users within their institutions.

The ALA’s Association of College and Research Libraries has listed the following “top ten” assumptions for libraries of the future:

1. Digitization and digital collections and preservation
2. Data storage and retrieval skill set for librarians will continue to evolve in response to changing needs and expectations.
3. Demands for faster and greater access to services
4. Debates about intellectual property more common
5. Growing demand for technology-related services; additional funding
6. Higher education will increasingly see the institution as a business
7. Students will increasingly see themselves as customers and consumers
8. Distance learning more common in HE alongside traditional model
9. Free public access to information stemming from publicly funded research will grow
10. Privacy will continue to be important in Librarianship

CONCLUSIONS
It can be clearly seen that the environment in which academic libraries operate today is changing. It is both faced with challenges and opportunities thrown open by the information and communication technologies particularly the Internet. The Academic libraries need to respond to these challenges in order to better serve the needs of the entire
academic community. One way of doing that is engaging in knowledge management activities, that is, creating, capturing, sharing and utilizing knowledge to achieve the library goals. Knowledge management is a viable means in which academic libraries could improve their services and become more responsive to the needs of users in the university.

It is important for academic libraries to encourage librarians to constantly update their skills and competencies in this changing environment. With a concerted effort, Knowledge Management will help to increase libraries’ operational efficiency and cater to the ever-increasing needs of their clientele.

While the world is poised for change in the new knowledge economy, libraries of all types are undergoing drastic changes too in the digital era. The new role of libraries in future might be as a learning and knowledge center for their users as well as the intellectual commons for their respective communities where people and ideas interact in both the real and virtual environments to expand learning and facilitate the creation of new knowledge.

REFERENCES
5. Hans-Christoph Hobohm “Knowledge management: libraries and librarians taking up the challenge”; IFLA Publications (Volume 108); K.G. Saur, 2004; 220 pages.
10. Upendra Prasad Mainali (2010): The Role of Knowledge Management in Libraries; *Infotib*, 3 (3).
INTRODUCTION
Over the recent decades, ever-increasing number of libraries has been in the process of abandoning the traditional card catalogue as a means of access to their collections, and is switching over to computer-based catalogue. This phenomenon characterised as transition from manual method to mechanical method resulted in the design and development of Online Catalogues, otherwise known as OPACs. When the OPACs are made available over the Web then they are termed as Web OPACs. With the creation of Web interface to online catalogues, the nature of catalogues and access to library and information resources has drastically changed in the recent years. Of course there are other features which contribute to designate them as Web OPACs. Many academic libraries are migrating to Web based catalogues from traditional text-based versions. These are one end-product of evolutionary advances in the ways libraries fulfill their mission of providing information on a wide range of access points to a heterogeneous group of users. Access to library collections in an era where users want to “get” rather than “find” offers particular challenges. After the emergence of Web 2.0 technologies and related developments the Web OPACs has also changed to Library OPAC 1.0 to Library OPAC 3.0.

DEVELOPMENT OF CATALOGUES FROM CARD TO WEB OPAC TO LIBRARY OPAC 3.0
Library 2.0 is the extension of Web 2.0 to library services, enhancing user services such as community participation and feedback and offering opportunities for online social networking. Some of these ideas are not new to libraries, but the technology is new, and it is enabling the reinvention of services in the library sphere. A few forward looking libraries started re-examining the function, design and usefulness of the online catalogue, rethinking search and discovery. Integrated library system (ILS) vendors also started to see the opportunities for extending Web 2.0 applications to the OPAC to transform the user experience and improve the catalogue’s usefulness and usability. OPAC 2.0 is the application of Web 2.0 technologies and ideas to online catalogues.
The following factors have contributed or influenced the development of library catalogues from card to Web OPAC to Library OPAC 3.0:

- Computers and communication technology.
- Multipurpose bibliographic records per item.
- Computer produced bibliographies.
- Consortia and networks
- Electronic publishing.
- Web 2.0 Technologies
- Content Management Systems (CMS)
- Integrated Library systems

These developments are referred to as next generation, third generation or 21st century catalogues.

REDEFINITION OF LIBRARY CATALOGS

- Traditional notions of the library catalog are being questioned
- It’s no longer enough to provide a catalog limited to print resources
- Digital resources cannot be an afterthought
- Forcing users to use different interfaces depending on type of content becoming less tenable
- Libraries working toward consolidated search environments that give equal footing to digital and print resources
PROBLEMS WITH THE LEGACY OPAC

The conventional library environment requires users to interact with many different interfaces, and search many different resources. They are overly complex and not always intuitive. Users have to go to different places to find different kinds of information on a given topic: Library OPAC for books, Article and E-journal locators for articles. There is a lot at stake for the future of libraries in adapting to generational transitions. Web 2.0 provides a metaphor and model for adapting library services to today’s Web-savvy users. Widespread dissatisfaction with most of the current OPACs. Many efforts toward next-generation catalogs and interfaces. Movement among libraries to break out of the current mold of library catalogs and offer new interfaces better suited to the expectations of library users. Decoupling of the front-end interface from the back-end library automation system.
WORKING TOWARD NEXT GENERATION LIBRARY INTERFACES

- Redefinition of the library catalog
- More comprehensive information discovery environments
- Better information delivery tools
- More powerful search capabilities
- More elegant presentation

GENERATIONS OF OPAC

According to Hildreth, OPACs can be categorized into three generations, on the basis of evolutionary changes, to incorporate novel features in data content, access points and user interface.

First Generation OPACs
- Referred as “Phrase indexed or Pre-coordinate OPACs”
- Derived from traditionally searched catalogues of library cooperatives and networks.
- Limited interface facilities for public.
- Features are similar to card or COM catalogues.
- Library oriented systems.
- Menu driven and simple to operate.
- Sophisticated combinations of search could not be made.
- OCLC is an example.

Second Generation OPACs
- Derived from commercial bibliographic information retrieval systems of 1970s like DIALOG and BRS etc.,
- Provides multi-access points.
- Referred as “keyword or Post-coordinate OPACs”.
- Facilitates sophisticated search combinations using Boolean logic.
- Needs training to understand the operators, search logic, etc.,
- Resembles an online bibliographic IR system

Third Generation OPACs
- Possess the combined features of first and second generation OPACs.
- Facilitates improved subject access.
- Facilitates ranking of retrieved output.
- Facilitates partial and coordination level matching.
- Provides access to other kinds of bibliographic information.

Hildreth (1989) has summed up the three generations of OPACs as follows: “There is some truth in the statement the first generation OPACs were mainly constrained by file
structures and second generation by functional consideration. To make a third generation OPAC it will be necessary to start with the user interaction component”.

NEXT GENERATION OPACs

The newest generation of library catalogue systems are distinguished from earlier OPACs by their use of more sophisticated search technologies, including relevancy ranking and faceted search, as well as features aimed at greater user interaction and participation with the system, including tagging and reviews.

Librarians have been working to retool library catalogs in order to make them more useful for patrons to find, organize, and interact with information in a way that has infinite potential for user customization. These new types of catalogs are a shift from "isolated information silos" to "interlinked computing platforms. The OPAC of the future will not be our most important finding tool. The OPAC should function well alone but recognize its position in the larger scope of available information (the catalogue of the future will feed end user discovery tools as well as be a discovery tool in its own right) (Tennant, Nov. 10, 2006). Librarians have become besotted by a restless search for the latest bright baubles of information technology, who find the provision of a coloured screen web-based windows environment a substitute for thought and who blow in the wind—or is it the flatulence--of every new management fad.

Many libraries, with the goal of modernizing their web presence, are racing to deploy a “next generation catalogue.” Next generation catalogue applications typically offer a mix of these features: faceted navigation, keyword searching, relevancy-ranked search results, “did you mean?”-style search revisions, item recommendations, RSS feeds, and mechanisms to collect and display user feedback. These “OPAC 2.0” efforts to replace or upgrade legacy OPACs with more powerful alternatives will no doubt improve the overall catalogue experience for many library users. Unfortunately, the gains from these efforts are limited because a single catalogue application cannot be optimized for all library users and uses. OPAC 2.0 is the application of Web 2.0 technologies and ideas to online catalogues. Similarly Web 3.0 influenced to develop Library OPAC 3.0. These developments are referred to as next generation, third generation or 21st century catalogues.

FEATURES OF NEXT-GENERATION OPACs

The comparative research involved listing all of the criteria that a next-generation library catalogue should possess in the minds of various library staff. This wish list contained characteristics such as the following:

- “Did you mean?” suggestions for spelling errors
- The ability to refine results by characteristics such as date and format
- The presence of a tag cloud as an alternate search/limit interface
- Whether or not recommendations would be available for related materials (i.e., if you liked this, you might also like …)
- Advanced search capabilities (including Boolean logic and phrase searching)
- Whether item status and call number information would be directly available in the results list
- The ability to mark records for export and printing
The inclusion of federated searching for library databases
Easy access to other sites and services, such as ILL, My Account, state-wide union catalogue, etc.
The ability for users to rate, tag, or review materials
Seamless integration with the main ILS so users would not need to navigate away from the next-generation product into the main ILS
Use of record uploading for technology staff and/or catalogers
Ease of customization (colors, layout)
ADA compliance  (Source: Susan Marcin and Peter Morris (2008)

Additional features are

Relevance ranking
Clean interface – a simple unclutered search facility like Google
Spell checker - a prompt, as Google’s ‘Did you mean’ does, to make sure your search terms are correct
Faceting – I know there will be some faceting in our upgrade but Michael suggests the ability to filter by age, level of ability, category etc
Full text searching
Book reviews – links to professional reviews and the facility for readers to add their own reviews
Similar searches – like Amazon the ability to find related titles easily
User defined tags – so that readers can create their own tags which reflect personal search terms or popular terms
Share facility – the ability to send links to library resources to colleagues or fellow learners
RSS feeds – so that learners can set up their own notifications for new material in their chosen subject areas
Citation creator – something which already exists in some of our e-journal and e-book databases

WEB OPACs

Web Catalogues are emerging in the late nineties and they are termed as an improvement over second generation of OPACs. The role of the library catalogue receded from being the principal online tool for information retrieval to one seen as almost marginal in its inability to lead to full text sources and its marriage to non-GUI based technology.

The features of Web OPAC are as follows:

Web interfaced OPAC is a new generation of OPAC.
It is an online, interactive catalogue.
It is an Internet client - server hypertext distributed information retrieval system, which originated from the CERN High-Energy Physics Laboratories in Geneva, Switzerland. It was introduced publicly in 1991.
- It can present the library catalogues in a hypertext format.
- Has Graphical User Interface (GUI), which is typically thought of as a combination of windows with pull-down or drop-down menus, icons and a pointing device such as mouse or trackball to manipulate information.
- It is advancement over the equivalent catalogues available in local networks or via Telnet access.
- It offers the libraries the opportunities to have access to various resources of other libraries on the Web.
- It allows users to interact with documents stored on computers all over the world.
- Makes easier to access catalogue data in the form of bibliographic records.
- Sometimes has the ability to search the OPACs of other libraries.
- Sometimes command-line searching is often replaced by pull down menus.
- Powerful tool that links all the electronic resources for easy access
- Has the usual features of OPAC like, storing bibliographic and full text databases, providing with direct access to a library’s bibliographic database through the use of terminal; provision of instructional help; display of search results in readily understandable form; remote access from the library’s location; information about community events; provision of links to circulation files, reference help etc; provides search through a variety of access points such as author, title, keyword, subject, periodical title, series, class number, ISSN or ISBN, etc;
- Facilitates the operations such as downloading records and sending results and messages electronically reinforces the usefulness of the catalogue.
- It becomes another search engine.
- Referred as ‘Web Cats’ and as well a type of ‘Information Gateways’.
- Some include information on the screens such as login id, user name or pass word in boxes and users can see when they access the catalogue
- According to Hildreth, it has the potential to overcome all the major limitations of earlier forms of the library catalogue.

**ADVANTAGES OF WEB OPAC**

There are many advantages of a Web OPAC. It can support protocols such as TELNET, HTTP, FTP, and Gopher. It can also support files and document formats like Portable Document Format (PDF), Hypertext Mark-up Language (HTML) and Standard Generalized Mark-up Language (SGML). Further, the library resources like user guides and help guides can be hypertexts-linked to and from a Web OPAC.

- Access to electronic resources such as bibliographic records, full text electronic journals articles, images, links to local and remote indexes and databases
- Expanded access beyond locally held resources via the OPAC as gateway
- Seamless links from resource to resource
- Support of multiple electronic field and document formats
Has the ability to link directly to Internet resources from within the catalogue record

A graphical user interface display that can accommodate more textual explanations of searching instructions and descriptions of resources

Support protocols such as telnet, HTTP, FTP and Gopher

Supports files and document formats like PDF, HTML, and SGML

In addition to the above, Web OPACs offer the following benefits:

- Information located in the online catalogues of other libraries across the world is readily available to the cataloguer through remote access.
- Helpful to assign call numbers and subject headings
- Helpful to find full cataloguing copy from other libraries
- Enriches their local catalogues with notes present in the records of other libraries.
- Helps to find a copy of foreign language item that cannot be read by the library staff.
- Helps to resolve difficult problems when important parts of an item are missing or are in disarray
- Has the ability to link directly to Internet resources from within the catalogue record.
- Enables to integrate electronic journals into a library's collection of print titles and provide direct hypertext linked to journal homepages from within the catalogue record.

PITFALLS OF WEB OPACs

Although they are valuable as the modern information retrieval systems, yet they do have some pitfalls. Cherry (1998), who studied the bibliographic displays in OPACs and Web-based OPACs, has identified the following pitfalls:

- Some Web-based OPACs, even though the link is available on the Web page or the TELNET address is given, are restricted to a particular user community and requires the use of appropriate login names and passwords.
- Some did not provide links through authors or subjects.
- Displays failed to provide access to online help.
- Some do not display the database being searched, the search strategy /query and the call number.
- Some do not list the options available to the users, both the top and bottom of the page.

EXAMPLES OF Web OPAC
Welcome to the OLIS web OPAC

The web OPAC is the web interface which enables searching of OLIS, Oxford University's online union library catalogue. See the OLIS homepage for more information about OLIS.

Note that the Automated Stack Request (ASR) facility is not available within the web OPAC. See the OLIS homepage for ASR documentation and access methods.

Start
(Connect to OLIS)

Announcements concerning OLIS
OLIS Server unavailable 20th June 9:45 - approx 3pm

You can now use a sneak preview of the new version of the OLIS web OPAC and try out its enhancements and additional functionality. Try the new version or read further information about it. We welcome your feedback.

Help on using the web OPAC   About the OLIS catalogue
Library OPAC 1.0

- Feature rich, but complex
- Advanced Boolean Search
- Textual displays
- Results in alphabetical or catalog key order
- Slow, cumbersome
- Focused on the physical inventory

Library OPAC 2.0

- Satisfying to the Web-savvy user
- Faceted browsing – drill-down model of search
- Graphical displays – cover art images
- Enriched content – TOC, summaries
- User tagging, folksonomies, ratings, reviews
- Federated search as a separate service
- Improved searching experiences
- Ability to show more clearly the search results and how to use it
- Clearer expression of catalogue functionality by bringing refining options

Examples of Library OPAC 2.0
Library OPAC 3.0

- Comprehensive search environment:
- Digital on equal footing with print
- Federated search as an integrated service: access to full-text of subscribed content
- Beyond MARC metadata: Dublin Core XML, Onix, etc: full-text searching
- Searching “inside the book”
- Integrated resource sharing architecture
- A more social OPAC with built-in tools for collaboration
- Fully integrated with other community and campus resources
- ILS fully integrated with other information and business systems
- One-click fulfillment

The new interfaces are user-centered and provide visually-appealing supplemental presentations to the traditional OPAC. Web 2.0 has raised new expectations from the library users: after reading a book, they wish to rate it, provide some comments or review about it and tag it for themselves or for others. They also expect to discover other interesting books thanks to the contribution of other people. Those functions, summarized under OPAC 2.0, are now provided by several Integrated Library Systems (ILS), at least partially. But, due to the slow development of some products, other paths were also explored: Content Management Systems (CMS) or specific software. CMS does provide the required functionalities like tagging and commenting. Some pioneers thus decided to develop a new Web OPAC based on CMS. Another approach was to build an OPAC that is independent from any ILS and which offers the required functionalities.

WorldCat.org ([http://www.oclc.org/worldcat.org/](http://www.oclc.org/worldcat.org/))

WorldCat.org, an online cataloging system launched as an improvement of the Online Public Access Cataloging (OPAC) system. WorldCat.org was created in 1971 by the OCLC (Online Computer Library Center), a global cooperative of libraries. The site is maintained by OCLC member libraries. The database contains more than 90 million records pointing to 1.4 billion items. It is said that the emergence of Web search engines, together with OPAC's non-user-friendliness, led to the development of WorldCat.org, which was, above all, available for use on the open Web. WorldCat.org's features include relevancy ranking, the ability to refine search results with facets and clustering of work to improve display. It is a platform for broad, Web-scale discovery and delivery of library resources:

- Unique system that exposes the holdings of WorldCat libraries on major search engines and across the Web
- Simple Web interface that guides users to local libraries that hold a particular item
- A growing array of site partnerships and APIs, widgets, mobile and social apps that put WorldCat data everywhere
- Popular social networking features that let users personalize and contribute to library-based knowledge
- A received benefit when your institution or group contributes its holdings to the WorldCat global catalogue
- Users can search a database of over 90 million entries pointing to 1.4 billion items located all over the world
- Searches can be performed by subject, author or title
- Results can be filtered by year, audience, content, format or language
- Users can locate the nearest library that has the item
- Results include electronic content which can be downloaded or viewed online
- Users can search books, CDs, DVDs and articles

OPACs in the Indian Context

The development of OPACs/Web OPACs are characterised as follows:

- Infancy stage
➤ Sporadic attempts / efforts towards library automation
➤ Snail speed
➤ Networks do not influence much
➤ Little efforts towards database development
➤ Limited resources, man power; money and infrastructure facilities

BARRIERS IN THE DESIGN AND DEVELOPMENT OF OPACs
The following are the barriers that come in the way of design and development of OPACs in India:
➤ Lack of interest on the part of professionals
➤ Lack of motivation by the top management
➤ Lack of incentives to the professionals with skills
➤ Lack of resources
➤ Lack of standardisation in the record structure

CONCLUSION
The online catalogue is not only an instrument of change in today's libraries, it is also ever changeable. Automated library systems in general and specially online catalogues will continue to be produced and enhanced from a variety of sources; in-house development, library consortia and commercial firms. This will result in a diversity of online catalogues from time to time. The careful design and use of technology and an understanding of the functions and purposes of a catalogue can allow us to combine the best of the past and the present experiences into a future catalogue. This would serve as a gateway not only to records in a library but also to the ever-expanding universe of information. The decision to go in for the designing and developing Web OPAC may of course confront with some problems but certainly would envisage the ways to overcome them.

Librarians must continue to play the role of change agent for the online catalogue. But this will require that they make efforts to learn about the potential of online retrieval, catalogue access issues that cannot be couched in the familiar terms of card catalogue use and user-system interface problems and promises. The emergence of Web-based OPACs has created new vitality for the libraries in the LIS environment and cataloguers are experiencing a renaissance, as the online catalogue becomes both an atlas and a vehicle to INTERNET resources. These will serve as a major tool for browsing ever increasing scientific and technical information.

The Library and Information Science professionals and system developers are carrying out more research in order to enhance the retrieval capabilities of online catalogue. Such an endeavour would certainly pave the new way of thinking about the very concept of Web OPACs in the days to come. In the light of changing dimensions of library services with the application of new Information Communications Technology, the design and development of online catalogues, is to be strengthened to provide effective access to the resources of the libraries.

REFERENCES


INTEGRATING OF KNOWLEDGE MANAGEMENT AND TOTAL QUALITY MANAGEMENT IN LIBRARY AND INFORMATION CENTERS

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ABSTRACT

Knowledge management (KM) is the name given to the set of systematic and disciplined actions that an organisation can take to obtain the greatest value from the knowledge available to it. Knowledge management has received increasing attention from 1990. For a few years, it was the next big thing after business process reengineering and total quality management. This paper describes and compares concepts of KM and TQM. At the end, it concludes that KM and TQM are complementary and to be successful, it is necessary to take an integrated approach to management.

INTRODUCTION

TQM is process-oriented, customer-centric and requires a cultural change (Kolarik, 1999). Precisely the same attributes can be assigned to KM. For more than two decades TQM has been the guiding principle for various organizations, both private and public, to produce high quality products (tangible and intangible) and attain high customer (internal and external) satisfaction (Crosby, 1979; Deming, 1986; Ishikawa, 1985; Juran, 1988; Taguchi, 1986). In the early 1980s the focus of TQM was to continuously improve processes by reducing variation and improving the mean of a quality characteristic (e.g., performance). Initially, manufacturing quality was the main aim. However, during 1990s, with the advent of global markets and digital economy, TQM priorities also shifted. TQM now focused mostly on services (rather than tangible/physical goods) and was utilized as a competitive weapon for product/service differentiation in the newly borderless markets where, for the most part, fierce competition made price and quality a non-differentiating factor. It is worth mentioning that during this e-Commerce era, the true spirit of TQM and its main slogan i.e., Customer is King/Queen was practiced. This was mainly due to fierce global competition among the firms as well as availability of various kinds of product related information to the customers.

DEFINITIONS OF KNOWLEDGE MANAGEMENT

Because knowledge management is still a relatively new concept and viewed differently by different writers from different focuses, its definitions vary. In her article, “What is knowledge management?” Jennifer Rowley offers her definition below:
“Knowledge management is concerned with the exploitation and development of the knowledge assets of an organization with a view to furthering the organization’s objectives. The knowledge to be managed includes both explicit, documented knowledge, and tacit, subjective knowledge. Management entails all of those processes associated with the identification, sharing and creation of knowledge. This requires systems for the creation and maintenance of knowledge repositories, and to cultivate and facilitate the sharing of knowledge and organizational learning. Organizations that succeed in knowledge management are likely to view knowledge as an asset and to develop organizational norms and values, which support the creation and sharing of knowledge.”

Rowley’s definition was based on the four different types of perspectives on knowledge management identified by Thomas H. Davenport et al in their study of a number of knowledge management projects. From the analysis of the projects’ objectives, Davenport et al were able to categorize them into four broad types of perspectives:

1. **To create knowledge repositories**, which store both knowledge and information, often in documentary form. These repositories can fall into three categories:
   - Those which include external knowledge, such as competitive intelligence.
   - Those that include structured internal knowledge, such as research reports and product oriented marketing materials, such as techniques and methods.
   - Those that embrace informal, internal or tacit knowledge, such as discussion databases that store “know how”.

2. **To improve knowledge access and transfer**. Here the emphasis is on connectivity, access and transfer.
   - Technologies such as video conferencing systems, document scanning and sharing tools and telecommunications networks are central.

3. **To enhance the knowledge environment** so that the environment is conducive to more effective knowledge creation, transfer and use. This involves tackling organizational norms and values as they relate to knowledge.
   - Increase awareness on sharing knowledge embedded in client relationship and engagements.
   - Provide awards for contributions to the organization’s structured knowledge base.
   - Implement decision audit programs in order to assess whether and how employees were applying knowledge in key decisions.
   - Recognize that successful knowledge management is dependent upon structures and cultures.

4. **To manage knowledge as an asset** and to recognize the value of knowledge to an organization.

**CHARACTERISTICS OF KM**

The challenge of Knowledge Management is to determine what information within an organization qualifies as "valuable." All information is not knowledge, and all knowledge is not valuable. The key is to find the worthwhile knowledge within a vast sea of information.

- Knowledge Management is about people.
Knowledge Management is orderly and goal-directed.
Knowledge Management is ever-changing.
Knowledge Management is value-added.
Knowledge Management is visionary.
Knowledge Management is complementary.

DEFINITIONS OF TQM

TQM is "a system of continuous improvement employing participative management and centered on the needs of customers". Key components of TQM are employee involvement and training, problem solving teams, statistical methods, long-term goals and thinking, and recognition that the system, not people, produces inefficiencies. Libraries can benefit from TQM in three ways: breaking down interdepartmental barriers; redefining the beneficiaries of library services as internal customers (staff) and external customers (patrons); and reaching a state of continuous improvement (Jurow & Barnard, 1993).

Capazio and Morehouse defines TQM as follows: “TQM refers to a management process and set of disciplines that are coordinated to ensure that the organization consistently meets and exceeds customer requirements. TQM engage all divisions, departments and levels of the organization. Top management organizes all of its strategy and operations around customer needs and develops a culture with high employee participation. TQM companies are focused on the systematic management of data of all processes and practices to eliminate and pursue continuous improvement.

Brockman defined “TQM is management philosophy, embracing all activities through which the need of customer, the community and the objectives of the organizations are satisfied in the most effective and potential of all employees in continuing drive for improvement.”

Total Quality Management (TQM), Management practices are designed to improve the performance of organizational processes in business and industry. Based on concepts developed by statistician and management theorist W. Edwards Deming, TQM includes techniques for achieving efficiency, solving problems, imposing standardization and statistical control, and regulating design, housekeeping, and other aspects of business or production processes.

Definitions and descriptions of TQM are often vague. It is therefore useful to provide a brief profile of TQM concepts by reviewing the vital principles:

- Customers include internal and external customers.
- Meeting and exceeding customer needs is a clearly stated aim.
- Leadership of TQM stems from the top management and enlists individual and team commitment throughout.
- The highest levels of integrity, honesty and trust and openness are essential ingredients of TQM.
- Mutual respect, mutual trust and mutual benefit of all stakeholders are important factors within the development of any Total Quality organisation.
- Total Quality offers each individual the opportunity to participate, contribute and develop a sense of ownership.
- TQM involves continuous and measurable improvement at all levels of an organisation.
- TQM requires consistent and precise performance to high standards in all areas of the organisation.

QUALITY AND TQM

The success of quality management is based on several quality models. Much of perspective and popular literature on TQM subscribes that TQM is “universal” in its application ability. This appears on many levels the institutional, national and certification schemes. (e.g. European Quality Award, the Malcolm Aldridge National Quality award, QS 9000, IS 9000). The proposed TQM model can serve as a prototype for implementing quality improvement programs in manufacturing and service-sector settings.

TQM and KM

TQM is an organizational culture dedicated to training, continuous improvement, and customer satisfaction. Empirical studies which have examined the relationship between TQM and organizational performance have investigated the impact of each dimension of TQM on performance separately. These studies have indicated that only a handful of the soft aspects of TQM (i.e., ‘human factors’ like commitment, team work and so on) contribute to organizational performance. Our contention is that soft TQM actually plays a number of roles. One is to create an environment where seamless dimension and implementation of hard TQM can take place, and the other is to directly aspect organizations’ performance in the same way that traditional human resource management (HRM) practices can impact on an organization. Previous attempts to identify the relationships between elements of TQM are suggested. The first approach conceptualizes TQM as a limited set of technical tools (such as statistical process control and Pareto analysis) while the second approach views TQM as part of broader changes to human resource (HR) practices. Through examining computer, automotive, health care and banking industries in four countries, they found that the use of hard TQM tools tends to be more profound in companies that adopt strategies to increase stakeholder commitment and incorporate

THE INTEGRATION OF TQM AND KNOWLEDGE MANAGEMENT

Based on the comparison above we can distinguish four fields of commonality in TQM and KM: similar aims; areas receiving particular attention; the position of the organisation in regards to management; as well as issues concerning the financial benefit of implementing these systems. The author proposes the following model for the integration of knowledge management into TQM, which could be used in TQM training and when implementing total quality and knowledge management in an organisation (Fig. 2).
Fig. 2 Model for the integration of TQM and knowledge management

(IC – intellectual capital; IT – information technology)

The model contains the main principles of TQM, which, raising several issues in themselves, can be resolved by KM. However, the least discussed field remains intellectual capital (IC), which is why it is incorporated into the model as a fundamental value within an organisation. Human resources and IT are natural extensions of IC, so this is also reflected in the model. The effectiveness of a business reflected in its implementation of TQM principles, so this field is not shown separately in the model.

Intellectual capital is a common point of contact through which corresponding KM strategies could be applied to each TQM principle – depending on the essence and content, resolutions from the IT and/or human resources fields may also be applied. When analysing the potential benefits and advantages of KM measures in total quality management it is important to note that it may be especially difficult to attain these goals if the actions undertaken by the leadership are not aligned in support of KM. Also important is the creation of strategies that would encourage the creation, storage and dispersal of knowledge in an organisation. The sharing of knowledge should become one of the essential values within an organisation, while business managers should regard employee training and passing knowledge on to others as one of the most important priorities of an organisation.

FINDINGS

TQM is shown to be an effective enabler of knowledge generation. TQM provides policies and tools (such as general involvement of all employees, teamwork, feedback mechanisms, and widespread communication) that are inherently useful as enablers of knowledge creation and dissemination.

CONCLUSION
A contemporary library and information center must not only effectively manage the quality of its product and practices but also master and implement quality measurement knowledge management. KM is an interdisciplinary concept covering the greater part of library and information center’s activities. The main field of KM is the use and development of library and information center’s knowledge resources in order to meet its goals. Explicit documented knowledge needs to be managed as much as tacit subjective knowledge. Library managers need to establish and determine all the processes related to the identification, creation, storage and dispersal of knowledge. For this to occur library and information center must implement a system that would train employees how to create, store, maintain, safeguard and share knowledge. Although the concepts of TQM and KM are markedly different there are four fields of commonality: goals; areas receiving particular attention; the position they hold in the library in terms of its general management; and issues regarding the financial benefits of implementing these systems. The author has devised a model that integrates knowledge management into TQM, which could be used in TQM training and while implementing TQM and knowledge management in library.

REFERENCES

E- AGRICULTURE: HARNESING ICT

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ABSTRACT

Over the last two decades, India has emerged as the most preferred destination for outsourcing of ICT services. The vibrant ICT industry is contributing immensely by providing information about latest technology and international business practices. Various sectors of the Indian economy such as industry, finance, insurance, communications and transport have adopted information technology in a big way. However, agricultural sector of the economy is lagging behind in utilizing ICT services. Some efforts have been made in this regard but they are by no means adequate. The rapid strides that the country has registered in the ICT field will remain incomplete unless ICT is fully utilised to ensure more efficient and productive Indian agriculture. Practically there is no area in agriculture in which ICT has no role to play. The immense scale and diversity of Indian agriculture provides the ultimate challenge to the potential of information technology.

In spite of huge government machinery, Indian farmers still suffer from the absence of right information at the required time. The farmers require timely information on weather conditions, sowing time, availability of inputs including credit, expert advice on maintaining his crop in healthy condition, information on markets and on all other areas of interest to him and his family. In spite of the best efforts and expenditure, the conventional apparatus has not been able to deliver the goods satisfactorily. Herein lies the role of ICT which can efficiently address the concerns of farmers stationed at even remote locations. Low literacy levels, cost of computers, poor communication infrastructure make it impossible for individual farmers, particularly small farmers, to directly adopt ICT. This calls for institutional efforts to provide ICT-based services to farmers.

INTRODUCTION

Agriculture has undergone a number of changes in the 20th century, including new farm machinery, intensive fertilizers and agro-chemical management, plant breeding, high-yielding varieties of seeds and genetics manipulations. The growing demand for foodgrains, vegetables, fruit, milk, poultry and newer challenges to agriculture, ICT, biotechnology and environment technology are viewed as the drivers of globalization in the scenario of liberalization, privatization and a tighter Intellectual Property Rights regime. Moreover, the global environment arising out of WTO, poses challenges requiring Indian
agriculture to be competitive, sustainable, viable and equitable. In addition, until harvest, agriculture is a state subject, while afterwards it becomes a commodity of global trade. Hence, it is all the more important that agriculture be given its due recognition.

India is vast and has a variety of landforms, climate, geology, physiography and vegetation. It has great regional diversity, which accounts for its uneven 'economic and agricultural' development. India is becoming an information society with emphasis on IT. The fusion of various technologies aided by IT will bring in the desired inputs for sustainable agricultural and rural development. Hence, these technologies will have many potential applications spanning the use of agriculture in all walks of life- from the farmer to the cooperative and professional bodies, from farm machinery vendors, fertilizer and chemical companies, insurance and commodities to agronomists, consultants and farm advisors.

Since farming is also a business, the farmer as a businessman takes several decisions to maximize returns. It can be used to meet most of his information and commercial needs. Technology dissemination is crucial for getting across the benefits of any technology to farmers. But traditional methods are not cost effective. So a central repository for storing information in local languages is required.

“EVERY THING ELSE CAN WAIT BUT NOT AGRICULTURE” – JAWAHARLAL NEHRU

Unfortunately, this profound truth is yet to be converted into concrete policies and action on an adequate scale. Progress in agriculture should be measured by the growth rate in the net income of farm families if the human dimension in to be added to agricultural polices. Farming is both a way of life and the principle means of livelihood for 65 per cent of India’s population of 110 crore. The average farm size is becoming smaller each year and the cost risk- return structure of farming is becoming adverse, with the result that farmer are getting increasingly indebted. A recent NSSO survey revealed that nearly 40 percent of farmers would like to quit farming, if they have the option to do so. There is no option except to produce more food and other commodities under conditions of diminishing per capita arable land and irrigation water resources. Hence, we must Harness the best in frontier technologies and integrate with traditional wisdom and there by launch an eco technology movement.

Information and communication technologies has been an engine of growth in various sectors. Certainly it can effectively be used to enhance the livelihood of farmers. There changes can radically lead the country in to a new era. Inspite of huge government machinery, indian farmers still suffer from the absence of right information at the required time. The farmers require timely information at required time on weather condition, sowing time, availability of inputs including credit, expert advice on maintaining his crop in healthy condition, information on marketing and on all other areas
of interest to him and his family. Inspite of the best efforts and expenditure, the conventional apparatus has not been able to deliver the goods satisfactorily. Herein lies the role of e-resources that can efficiently address the concerns of farmers stationed at even remote locations.

Capturing the range of opportunities that ICTs enable is an enormous challenge as the targeted solutions would differ across geographies and communities depending upon the felt needs of the state holders involved: The technology that is chosen also hinges on the existing infrastructure in the area as well as host of other factors such as literacy, learning attitudes, environment, importance of the felt need and the commercial sustainability of the initiative.

Over the last two decades, India has emerged as the most preferred destination for outsourcing of ICT services. The vibrant ICT industry in contributing immensely by providing information about latest technology and international business practices. Various sectors of the Indian economy such as industry, finance, insurance, communications and transport have adopted information technology in a big way. However, agriculture sector of the economy is lagging behind in utilizing e-services. Some efforts have been made in this regard but they are by no means adequate. The rapid strides that the country has registered is the ICT field will remain incomplete unless ICT is fully utilized to ensure more efficient and productive Indian Agriculture.

**E-AGRICULTURE: ICT IN AGRI VALUE CHAIN:**

E-Agriculture signifies the integration of technology in Agriculture to have access to knowledge and information between various stake holders in agri supply chain. ICT is important in the sense that information transfer breaks the rural unbar divide and leads to a knowledge equilibrium affecting quality of life such as Technology, Markets, Education, Health and life styles of people. E-Agriculture is a promising area encompassing the agri value chain through the application of internet and related technologies. It involves the conceptualisation, design, development, evaluation and application of innovative solutions to existing or emerging information and communication technologies (ICTs).

Changes in the economic landscape and rapid urbanisation have led to an increased share of food plate getting diverted to horticultural products and a discernible shift towards a better packaged quality food. This has led to a Paradigm shift in Agriculture from being supply driven to demand driven and a predominantly cereal based to a markedly horticulture based cropping system. The role of government has also become more of facilitation and enablement of private enterprises engaged in agricultural and rural development. These have necessitated not only faster marketing systems for the stake holders in the Agri-value chain.
The Agri-value chain comprises of many players such as input companies, farmers, traders, processors, wholesalers, retailers and consumers. Most agricultural products (in either processed on fresh from) have a complex and an extended value chain involving exporters (in which various other players such as quality certification agencies, exporters themselves, carrying and forwarding agents, handling agents, etc.) play important roles. There is a need for information to be communicated in a seamless and timely manner and wherever required to enable feedback to come back to the source without significant distortions in the communication process. The use of ICTs helps to a large extent in achieving these objectives.

In the era of globalization, the entire world has become a single market. On one hand the producer has a liberty to choose the market for his product and on the other hand the consumer has a bigger basket of alternatives. E-commerce is a recently developed trading system where trading is operated through internet. It has profound implication for the agricultural sector and can add considerable value in every stage of agribusiness supply chain and ultimately be beneficial to the buyer as well as the seller. That means farmers will be able to sell their produce at a higher price and on the other hand end-users will be getting a reasonable choice basket within which they can choose. In a nutshell, it is basically an integration of information, communication and logistical technology along the whole chain stating from producer to the end user.

In recent days e-commerce in agribusiness is evolving rapidly due to the following reasons.

- Producers as well as consumers are adopting internet as a tool of business at an increasing rate and as a result the size of the market is also growing at a much higher speed. It is evident from the data that now-a-days most of the large scale producers are very keen to migrate to the online business procedure.
- Prime cause is the volume of benefit accrued due to this migration.

From the online information farmers can increase their profit margin by watching for lower costs. On one hand they are able to get the detail about the input price available in
the market and on the other hand they will have the information about the market price of their produce in different markets. According to experts, ICTs can play a vital role in achieving the first millennium development goal i.e, eradicate hunger and poverty) by generating more income opportunities for small scale farmers, thereby developing the agriculture sector as a whole. ICTs can help to get a better access to prices, markets and information regarding production. To make it a success, ICTs have to be main streamed in the agricultural sector. In this process, apart from the information regarding prices, farmers can get various content services. The other information which ICT will facilitate are banking, Micro credit and Micro finance related news and various other information like offers from other farming companies for fertilizers, farm budgets, seeds, herbicides, fungicides etc.

E-AGRICULTURE: FEW APPLICATIONS

E-Agriculture is an emerging concept that has been widely accepted by the stakeholders in agriculture. It recognizes the use of Information and Communications Technology (ICT) in agricultural development, services and entrepreneurship. Farmers, through interactive demand-based agricultural information systems, can have access to prices, will be able to set up direct relation with potential buyers and maintain data base like land records, agricultural statistics etc, related with the farming community. ICT has a crucial role in narrowing down the rural urban divide which, inturn, is expected to reach a knowledge equilibrium.

Knowledge is the most vital tool to a farmer for succeeding in agriculture business. According to a recent World bank study the base minimum set of information which a farmer should have are – “What crop to grow, what would be the suitable time to grow, what would be the most efficient method (Technology) of production, the ways to increase productivity, how to preserve the produce, what would be the ideal time for selling, what would be the right price. In addition to that the knowledge about business and marketing skill is another requirement.

The concept of Agriculture Knowledge Systems (AKS) can be solution to this problem. An AKS comprises “the organizations, sources of knowledge, methods of communications and behavior surrounding an agricultural process” Farmers generally operate on the basis of their localized information the source of which is mainly field level experience as well as information which is a part of the global information system. Knowledge intermediaries play a vital role at this stage. The task of this section is to translate the information regarding critical technical terms to a common man’s language. Ideally this intermediary role has to be played by the government extension agencies. But civil society organizations could also extend their cooperation in this front.
E-Agriculture-Few applications:

1. Ensure the systematic dissemination of information using ICTs on agriculture, animal husbandry, fisheries, forestry and food, in order to provide ready access to comprehensive, up-to-date and detailed knowledge and information, particularly in rural areas.

2. Public-Private Partnerships should seek to maximize the use of ICTs as an instrument to improve production (Quality and Quantity).

3. Various other applications are – Animal Registration, Milk Recording, Milk analysis, Fertility Analysis Herd Register, Grass Measurement, Tracking of inputs, Folk register, Accounting Applications, Enterprise Analysis etc.

4. There are above many examples of advisory and research bodies that offer web based services, such as interactive online discussion forums that permit users to post topics for responses by other farmers and advisors; interactive programmes to assist in managing the farm business; web based decision support tools (Dairy herd monitors, profit monitors) soil analysis results online, fertilizer recommendations online etc.

ICT FOR INDIAN FARMERS

Indian Agriculture contributes 22% of our GDP, and approximately 60% of Indians drive their livelihood from the agricultural sector. Today’s farmers not only want two -square meal bread for their families from their hard sweat, but also surplus food production, which can be sold in the market to get sufficient money to fulfill their other daily needs. Also, private sector initiatives like contract farming have commercialized the Indian agricultural sector. It has also seen many new concepts and theories substituting the traditional methods. Introduction of information technology is one of them, which enables the dissemination of requisite information at the right time. This revolution in information technology has made access to the information easy and cost effective.

At present, the ratio of farmers to the extension-workers is 1000;1, which is really very less. Although the appointed village local workers (VLWs) disseminate the information, they hardly accept any accountability. These two issues have created the urgency to help and guide the poor farmers properly. The cost factor in face to face information dissemination at the right time, and the difficulties in reaching the target audiences, has also created the urgency to introduce ICT. Although accounting for just about 20percent of the country’s GDP, the role of agriculture in the Indian economy cannot be undermined. Unfortunately, even as the economy has leapfrogged at over 8-9percent in recent years on the back of strong growth in services and manufacturing sector, the agricultural sector has been growing at snail pace; while the GDP notched a growth rate of 9.3 percent in the fourth quarter of 2005-06, the agricultural sector including forestry and fishing, grew at just 5.5 percent during the same period. While the potential of Indian agriculture is yet to be unleashed, lots of constraints shackles this
sector. Among them are factors like fragmented farms, weak infrastructure, numerous intermediaries.

INFORMATION DISSEMINATION PATTERN

In spite of huge government machinery, Indian farmers still suffer from the absence of right information at the required time. The farmers require timely information on weather conditions, sowing time, availability of inputs including credit, expert advice on maintaining his crop in healthy condition, information on markets and on all other areas of interest to him and his family. In spite of the best efforts and expenditure, the conventional apparatus has not been able to deliver the goods satisfactorily. Herein lies the role of ICT which can efficiently address the concerns of farmers stationed at even remote locations. Low literacy levels, cost of computers, poor communication infrastructure make it impossible for individual farmers, particularly small farmers, to directly adopt ICT. This calls for institutional efforts to provide ICT-based services to farmers.

Over the last two decades, India has emerged as the most preferred destination for outsourcing of ICT services. The vibrant ICT industry is contributing immensely by providing information about latest technology and international business practices. Various sectors of the Indian economy such as industry, finance, insurance, communications and transport have adopted information technology in a big way. However, agricultural sector of the economy is lagging behind in utilizing ICT services. Some efforts have been made in this regard but they are by no means adequate. The rapid strides that the country has registered in the ICT field will remain incomplete unless ICT is fully utilised to ensure more efficient and productive Indian agriculture. Practically there is no area in agriculture in which ICT has no role to play. The immense scale and
diversity of Indian agriculture provides the ultimate challenge to the potential of information technology.

The adoption of ICT services in agriculture depends on the main functionaries involved in Indian agriculture. These functionaries can make a big contribution to the growth of agriculture with the assistance of ICT. For this purpose, the following functionaries can be considered: (a) farmers, (b) industries providing inputs to agriculture, (c) industries dealing with agricultural output, (d) central and state governments and (e) NGOs working for the benefit of farmers and agricultural universities and research centres. In order to keep pace with the state-of-the-art technologies, NIC has been conducting various training programmes on ICT application on a regular basis from time to time for the user organisations of agriculture sector. Agricultural Informatics Division of NIC has taken up various initiatives in bringing ICT led development which includes Web enabled applications, GIS based applications, Multimedia applications, Database applications and e-Governance and training etc. in the Ministry of Agriculture.

**KNOWLEDGE MANAGEMENT HARNESSING ICT**

The differences between information and knowledge are being spelt out in many books and papers in recent times. Many authors have described the progressive processes from data to information to knowledge to wisdom in terms of purposes and contexts. Data refers to raw materials such as facts and figures that could be collected by an information system. Information refers to analyzed data often presented in a form that is specifically designed for a given decision-making task, and transmitted to/received by decision makers. Knowledge refers to subsequent absorption, assimilation, understanding and appreciation of that information (Chapman and Slaymaker, 2002). Pomeroll and Brezillon (2001) quoting Newell and Simon (1972) argue that knowledge is information incorporated in an agent's reasoning and made ready either for active use within a decision process or for action. It is the output of a learning process. Thus the roles of knowledge are to: (1) to transform data into information, (2) derive new information from existing ones, and (3) acquire new knowledge pieces. Wisdom is considered as meta-knowledge, knowledge mobilized to acquire new knowledge and update it. From a philosophical angle wisdom refers to the evaluation of knowledge vis-a-vis the norms, values and morality (Pomeroll and Brezillon, 2001).

Knowledge management focuses on definition of the context and validation of the information. It also increases the connections among people (who have knowledge) that would likely not occur without the help of a knowledge management system (Terra and Angeloni, 2002). They have identified the process of searching answers for the following questions as an important dimension of knowledge management:

- Who created the information?
- What is the background of the creators of information?
- Where and when was it created?
How long will the information be relevant, valid and accurate?
Who validated the information?
Who else might be interested or has similar knowledge?
Where was it applied or proved to be useful?
What other sources of information are closely related?
How to test and validate some of the concepts?

AGRICULTURAL EXTENSION AND ICT

In the context of rural community, the presence of traditional knowledge is another important dimension of knowledge management. The social construction of traditional knowledge and the blending of the new knowledge with traditional knowledge are the components of knowledge management. Thus knowledge management necessitates a participatory management in which the rural community plays a crucial role of absorption, validation, critical evaluation, assimilation, understanding and appreciation of information. A paradigm shift in the concept and practices of extension will occur only when the community develops its own frame/ork for knowledge management.

In many projects connected with agricultural extension and Open and Distance Learning (ODL), modern information and communication technology in the form of telecentres is being given utmost importance. A rural tele-centre evolves into a knowledge centre only when modern ICT facilitates transfer of information into knowledge. A knowledge centre is important for strengthening the self-directed learning which is an important learning process in the human society. A tele-centre providing market price is an information centre. A tele-centre, which enables the rural community to understand the differential mechanisms through which prices are influenced and determined, is a knowledge centre.

Most of the rural ICT projects focus on providing information. In agriculture and rural development, the importance of uneven distribution of knowledge in explaining variations in Total Factor Productivity (TFP) is being increasingly recognized (Chapman and Slaymaker, 2002). Mere information in the form of flow of messages may not be able to address the problem. Knowledge as the creative result of a flow of messages anchored on the commitment and beliefs of the actors involved in the process and resulting in human action is needed. Environment in which knowledge is built; capacity building and empowerment processes, social mobilization and organization are the important factors which to be taken into consideration while transforming a tele-centre into a knowledge centre. Freire (1973) argued in the case of the pedagogy of oppressed, the need for dialogues and discourses among learners to understand the world instead of mere understanding of words. Similarly in the process of knowledge management, dialogues and discourses of among the rural community are essential. Modern ICT, if properly defined can help to broaden the canvass for dialogues and discourses among the rural community.
ICT INITIATIVES FOR INDIAN AGRICULTURE AND RURAL DEVELOPMENT

National E-governance Plan (2003-07)

The national e-governance plan (2003-07) reflects the strategic intent of the central government in the right perspective. Many projects are earmarked under this plan, and it is trying to address the digital divide. From a political perspective, after watching the performance of some IT-sawy states in the recent elections, the system has woken up to the need to focus more on rural development. The political systems are keener to use IT to disseminate information faster to farmers, disburse loans, improve education and the health systems in villages etc. There is a clear-cut incentive to do it as 60 percent of the vote-bank still lives in rural India.

E-governance has to be supported by the will and resources of those who are in governance, be it at the central or state level. The central government has analysed and appreciated the concept by creating a separate E-governance department headed by a secretary to trigger e-governance in India. The World Bank, ADB and UN have been approached, and in response they are generously funding e-governance projects. In future, education, agriculture, state wide area networks (SWANs) and Community Information Centre projects will be rolled out backed by a strong public private participation model (PPP) to achieve long-term sustainability. Projects with PPP models in these segments can revolutionise the governance experience.

Cyber Dhabas

To take ICT to the door steps of the farmers, it is proposed that a large number of access points called cyber dhabas are setup. These cyber dhabas should be provided with a PC and a modem with telephone connection to connect to the databases. The farmers can take the assistance of the operator of cyber dhabas for a nominal charge. The major bottleneck in spreading e-culture to rural areas is related to connectivity i.e. ensuring that the access points can get connected to the databases which are in selected locations. Since dialup lines are very slow, other viable options are required to be explored. Unfortunately, the alternatives are expensive and may not be feasible. One silver lining is that several private operators are connecting important cities with fibre optic which provides a very reliable and fast access. Since these will pass through rural areas, it is possible to explore the possibility of tapping this potential by laying the last mile connectivity. Once this is done, substantial segment of rural India can access the IT-based services.

E-Choupal

E-Choupal, ITC's unique web-based initiative, offers farmers the information, products and services they need to enhance productivity, improve farm-gate price realisation, and cut transaction costs. Farmers can access the latest local and global information on weather, scientific farming practices, as well as market prices at the village itself through
this web portal-all in Hindi. E-Choupal also facilitates the supply of high quality farm inputs as well as the purchase of commodities at the farm.

Given the literacy and infrastructure constraints at the village level, this model is designed to provide physical service support through a choupal sanchalak, himself a lead farmer, who acts as the interface between the system and the farmers. The contents of this site in their entirety are made available only to the registered sanchalaks.

Impact of the E-choupal:
The e-choupal changed the way the farmers conducted their business: earlier they were totally dependent on middlemen. Visiting the e-choupal provided them instant, first hand information on mandi prices across the state. In addition, they had both options open: They could sell their produce either at the mandi to the ITC. Selling to the ITC meant lower waiting times for them than at the mandi, and a higher realization as well, as the company’s modern processing centre assured that there was no spillage at the time of unloading and that the produce was weighed precisely.

Other services that the farmers could access through the e-choupal were: a) procurement of quality farm inputs b) information on weather forecasts, and c) information on good farming practices. The cumulative effect of all the benefits accessed through the e-choupal has been a rise in income of the farmers, their awareness of markets, and increase in farm productivity.

Launched in June 2000, in Misrod village of Madhya Pradesh, the e-choupal services now reach out to more then 3.5 million farmers growing a range of crops in over 36,000 villages across 9 states through nearly 6,000 kiosks.

**IFFCO-ISRO GIS Project**

Recently, IFFCO has initiated ICT-based services for farmers and cooperative societies. It has taken up a project in association with Indian Space Research Organisation (ISRO) to utilise satellite based remote sensing data and Geographical Information Systems (GIS). Developed countries have been utilising precision farming with the help of ICT tools for a long time. While this will take a long time for our country due to small holdings, it is to be noted that GIS has an invaluable role to play even in the existing conditions. Remote sensing and GIS information can provide warnings on evolving crop stresses, crop vigour etc.

The IFFCO-ISRO GIS project extends support for efficient and timely availability of IFFCO’s fertiliser to farmers though better logistics and efficient operations. Based on the experience gained from this project, more intensive services based on GIS are envisaged for the entire country. In addition to the GIS-based services, effort is being made to create databases that contain information of interest to the farmers. These include recommendation on package of practices for major cereals, pulses, horticulture, floriculture and animal husbandry etc. Information on various inputs such as seeds, fertilisers, credit is provided. An important service envisaged is to provide access to the
nearest expert in case of stress or any other problem witnessed in the crops. Facilities are sought to be provided to encourage and share farm experiences by forging various crop forums. Many of the agricultural extension services are also proposed to be made online using multimedia facilities.

In order to encourage farmers to obtain best possible price, information regarding prices of various crops prevailing in approachable markets (mandies) is also being provided. Other areas of interest to farmers such as distance education, location specific news etc. are also planned.

**AGRICULTURAL MARKETING INFORMATION NETWORK (AGMARKNET)**

Agricultural Marketing information network is a joint venture of the Directorate of Marketing and Inspection (DMI) and the National Informatics centre (NIC). DMI and NIC are the sponsoring agencies of AGMARKNET. It has increased the efficiency in marketing activities by establishing a nation wide information network, which provides details about market functionaries, sold and unsold stocks as well as the sources of supply and destination. These timely information data are helpful to producers, tractors and consumers.

Market information is needed by farmers in planning production and marketing, and equally needed by other market participants in arriving at optimal trading decisions. The existence and dissemination of complete and accurate marketing information is the key to achieve both operational and pricing efficiency in the marketing system. Advancement in Information and Communication Technology (ICT) has made the world a smaller place and a larger market at one go. To fully utilize the new emerging trade opportunities for the benefit of farming community, there is a felt need to establish an ICT-based Agricultural Marketing Information Network in the country. Towards this end, Ministry of Agriculture, Government of India launched the ICT-based Central sector scheme of Agricultural Marketing Information Network (AGMARKNET) in March 2000 to link important agricultural produce markets spread all over the country and the State Agriculture Marketing Boards and Directorates. The project is being executed with the technical support of National Informatics Centre (NIC).

In order to facilitate wider market access to farm produce and better price discovery through value addition, the scheme is additionally disseminating information on market requirements in terms of quality, packing, standards, sanitary and phyto-sanitary conditions etc.

Objectives of the scheme are as under:

1. To establish a nation-wide information network for speedy collection and dissemination of market information and data for its efficient and timely utilization.
2. To facilitate collection and dissemination of information related to better price realization by the farmers. This would cover:
• Market-related information such as market fee, market charges, costs, method of sale, payment, weighment, handling, market functionaries, development programmes, market laws, dispute settlement mechanism, composition of market committees, income and expenditure etc.
• Price-related information such as minimum, maximum and modal prices of varieties and qualities transacted, total arrivals and dispatches with destination, marketing costs and margins etc.
• Infrastructure-related information comprising facilities and services available to the farmers with regard to storage and warehousing, cold storage, direct marketing, contract farming, buy-back arrangements, grading, re-handling and repacking etc.
• Promotion-related information covering accepted standards and grades, labelling, sanitary and phyto-sanitary requirements, pledge finance, marketing credit and new opportunities available in respect of better marketing.

3. To sensitize and orient farmers to respond to new challenges in agricultural marketing by using ICT as a vehicle of extension.

4. To improve efficiency in agricultural marketing through regular training and extension for reaching region-specific farmers in their own language.

5. To provide assistance for marketing research to generate marketing information for its dissemination to farmers and other marketing functionaries at grass-root level to create an ambience of good marketing practices in the country. The Scheme will continue during the Eleventh Five Year Plan (2007-12) by enhancing its scope to cover 500 additional markets including remaining principal regulated markets, if any, farmer/consumer markets, private markets, panchayat markets, urban markets and special commodity markets.

Following activities are also proposed to be undertaken while implementing the Scheme during the Eleventh Plan to fully achieve various objectives of the Scheme:

1. Information regarding export documentation, export infrastructure, transportation facilities, exporters, marketing experts, agri-business corporate, quality standards, grading/packhouse infrastructure, plant quarantine facilities, package of best marketing practices, seasonality of commodities will be provided on the portal.

2. Information on contract farming, direct marketing opportunities, value addition facilities etc. to be enriched and tie-ups between farmers/growers and sponsors/buyers will be facilitated through the portal by evolving a specific software system through outsourcing of work to an expert agency. It would be developed as an interactive query based system to educate the farmers on issues raised by them and would serve as a national clearing house for buyback and contract farming arrangements.
3. Information on warehouses along with addresses, accreditation facilities and their distance, pledge financing facilities etc. will also be provided on the portal.
4. Area specific success stories will be loaded at the portal so that farmers get knowledge and can plan for trading of their produce.
5. GIS-based Atlas will be expedited for the content enrichment and system will be put in place for regular data updating.
6. A data validation software will be developed to identify the wrong reporting and for removal of undesirable data from the central data base.
7. Electronic display boards will be provided at every networked market for displaying minimum and maximum price of important commodities, arrivals, temperature etc. These efforts would be dovetailed, as far as possible, with the action being taken by the Forward Market Commission under the Scheme of the Department of Consumer Affairs.
8. Translation of contents of portal into regional languages is necessary and this work will be undertaken through the concerned State Marketing Boards/Directorates.
9. Strategic alliances will be developed with corporate, telecom players and private users for strengthening market intelligence services.

Promotion of nationally and internationally acceptable standards of grading and standardization, packaging and labelling, storage and warehousing and sanitary and phyto-sanitary requirements and quality certification in farm sector will enable trade and processing sector to undertake large scale agricultural marketing operations in domestic as well as international markets.

**Networking of AGMARKNET**

![Networking of AGMARKNET Diagram]

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AGMARKNET has been connected to 670 agricultural produce markets and 40 state Agricultural Marketing boards and Directorates. Each AGMARK portal of whole sale market provides daily information to AGMARK portals of its respective states, and then each state AGMARK portal seeds the information to the AGMARKNET portal.

APEDA (Agricultural and Processed food producers Export Development Authority), NAFED (National Agricultural Cooperative Marketing Federation of India Ltd.), Food corporation of India, central warehousing, SFAC (Small Farmers Agri-business Consortium) are the main users of the AGMARKNET portal. The food processing units, traders and different village Kiosks, mainly use these portals, to help the farmers in taking the right decisions.

LOCAL AREA NETWORK (LAN) AT MINISTRY OF AGRICULTURE

A high speed Local Area Network has been established in the Ministry of Agriculture spread over various buildings viz. Krishi Bhawan (~500 nodes), Shastri Bhawan (~200 nodes), Krishi Anusandhan Bhawan (~100 nodes) etc. In addition, Agricultural Informatics Division has extended its full support (round the clock operation) to the Ministry of Agriculture at the time of super Cyclone in Orissa and Gujarat Earthquake. Video Conferencing facilities were used extensively from the Krishi Bhawan studio to Orissa and Gujarat on continuous basis.

The Central sector scheme "DACNET" has been approved by the Department of Agriculture and Co-operation to be implemented by NIC. The project will commence in this financial year. The project proposal envisages establishment of NICNET based INTRANET linking directorates, attached offices, subordinate offices, autonomous bodies and public sector undertakings and field units of the Department of Agriculture and Cooperation, Ministry of Agriculture. This project includes networking of field offices of DAC, connectivity, procurement of H/W, S/W tools, Application Software Development and training of officials.

Plant Protection Informatics and Communication Network (PPIN) envisages to link the Directorate of Plant Protection Quarantine and Storage (DPPQS), Faridabad, National Plant Protection Training Institute, Hyderabad, CIMPS, LCC, Central Pesticides Testing Laboratories, and State Pesticides Testing Laboratories and to disseminate information related to plant protection and pesticides. As a part of project, the computerization of the CIB/RC of DPPQS has been taken up by NIC.

To cater to the needs of the Department, NIC has developed various information systems viz. FPO and licensing monitoring, Plan scheme monitoring, industrial approvals, processed food products, FPO on-line status, industrial entrepreneur's memoranda query information, country profile and international cooperation etc.
Agricultural Extension Information System Network: VISTARNET

Research, education, extension, and training are considered as four pillars of sustainable agriculture. Generation and transfer of technology have become very crucial worldwide. As a step towards making technology reach the small holders (resource-poor-farmers), efforts are being made to establish "VISTARNET-NICNET based Agricultural Extension Information System Network, in India, linking extension functionaries at Central, State, and District level. The required funds for implementing VISTARNET will be provided through the National Agricultural Technology Project (NATP). As a part of VISTARNET, Informatics Development for the Directorate of Extension has been taken up by NIC.

Indian Agriculture On-line: NIC has submitted an IT-Plan for the agriculture sector with the objective of establishing NICNET based Agricultural Informatics and Communication Network (AGRISNET) to facilitate higher and sustainable agriculture productivity and also putting Indian Agriculture on-line in the Country.

Animal Production and Health Information Network (APHNET): APHNET envisages building up of reliable databases and network based information systems for all activities of the animal husbandry and dairying sector at district, state and national level, using NICNET facilities. In view of importance of making technology reach the small holders through IT, the plan also suggests to establish APHNET nodes at about 42,000 veterinary polyclinics, hospitals, and dispensaries and veterinary aid centres for strengthening animal disease surveillance and advisory system in the country. As a part of APHNET, National Project on Rinderpest Eradication (NPRE) which aims at capturing animal disease related information from various State Animal Husbandry Departments has been entrusted to NIC.

Agricultural Research Information System Network (ARISNET): The ARISNET, a close user group of institutions in National Agricultural Research System of India (NARS) on NICNET, links ICAR Institutions and their Regional Research Stations, Central Agricultural University, State Agricultural Universities and their colleges, Krishi Vigyan Kendras, Zonal Research Centres and Project implementing centres with the ICAR Headquarters. ARISNET has become an integral part of agricultural research, extension and education process.

Infrastructural Facilities and Services Provided by NIC to the Ministry of Agriculture

These are the following:
1. INTRANET/INTERNET.
2. Telecommuting Programme.
3. Video Conferencing.
4. Information Kiosk.
5. In-house Training facilities.
6. Web site design and development.
7. Web enabled applications.
9. Intranet applications.
10. Agriculture Portal.
11. NICNET based Public Information and Facilitation Centre.

MARKET INFORMATION SYSTEM FOR HORTICULTURE
This project has been taken up by NIC on a turnkey basis. As part of the project, NICNET based internet/intranet facilities have been established at National Horticulture Board (NHB), Gurgaon. Computing facilities have been created at 33 market centres of the Board located all over the country. NIC has developed and implemented the necessary software for evolving a comprehensive database of the prices and arrivals of fruits and vegetables being received by NHB headquarters from 33 market centres on a daily basis. This information is being used by the Ministry of Agriculture, its related agencies and markets through National Bulletin on fruits and vegetables.

Integrated Fertilizer Management Information System (FERMIS)
The Department of Fertilizers (DOF) in collaboration with National Informatics Centre (NIC) has introduced computer-based methods for decision support with the major objective to evolve an evaluation system which ensures a uniform system of Planning and control mechanism with signalling system to highlight deviations from desired performance indicators by Plants/organisations for all the public sector fertilizer enterprises. Thus, an Integrated Fertilizer Management Information System (IFMIS) of worth Rs. 1.99 crore has been executed through NIC and various IT based systems developed covering Planning, Movement, Import, Handling-Payment, Project Monitoring, Performance Monitoring and Evaluation aspects to strengthen Fertilizer Informatics for decision support. Information exchange for decision support has been promoted through Fertilizer Informatics Network (FERTNET) extended to Department of Fertilizers and various Fertilizer Companies viz. IFFCO, NFL, MFL, GNFC, FCI and HFCL.

Computerisation of Agricultural Census and Input Survey
Recognizing the predominance of the agriculture sector in the Indian economy, Department of Agriculture and Cooperation collects and maintains agricultural statistics
such as number, area, tenancy, land utilisation, cropping pattern and irrigation particulars of different classes of operational holdings regularly and make it timely accessible to the planners and policy makers for decision making. This project was entrusted to NIC and it made significant headway in almost all the States/UTs except Bihar, where Census is yet to be conducted. The salient features are the following:

1. Creation of large database of about 8000 Million Bytes at National Level and 1 GB at state level.
2. Processing and tabulation of Agricultural Census and Input Survey database at District/State/National level.
3. Development and implementation of information retrieval system at micro and macro level for decision making at various levels.
4. Selective information will be put on INTERNET/INTRANET for easy access of information to public to ensure transparency in the Government functioning.
5. Training programmes on software implementation for officers of States/UTs and Central Government.

PRECISION AGRICULTURE

Precision Agriculture (PA) is also known as precision farming, prescription farming, site specific agriculture, spatially visible crop production or soil specific crop Management, PA is “An Integrated Information-and Production – based farming system that is designed to increase long-term, site specific and whole farm production efficiency, productivity and profitability while minimizing unintended impacts on wildlife and the environment. It involves using the information technology in crop production process.

Speaking in terms of variability two types of variability exists: spatial and temporal. Spatial variability occurs across the field and temporal variability and temporal variability occurs across time period. With the objective to optimize production and quality subject to minimum environmental impact and income risk to farmers, it is necessary to consider the variability and accordingly go for suitable management intervention. PF, therefore also called as Site Specific Crop Management (SSCM) is defined as a form of PA whereby decisions or resource application and agronomics practices are improved to better match Soil and Crop requirements as they vary in field.

In order to reap maximum benefits by applying the technology of precision farming, the exact knowledge about the field area as to what and how the inputs used shall enable the field to realise its full potential should be obtained. A decision support system should be provided to farmers so that they can understand the technology – product mix with regard to variations in the field and get all the information necessary and finally process the requisites. Thus, precision farming methodology is a chain of process involving data collection of site – specific crop and soils, its analysis and decision – making and finally
using information technology for application of fertilizers, pesticides, etc, and other site-specific operations.

**Village Knowledge Centers (VKCs)**

VKCs of Ms Swaminathan research foundation were launched in 1998 in Pondicherry. The main aim behind the establishment of VKCs was to provide sustainable food security in rural areas of Pondicherry. To fulfill this aim, its provides technical information related to agricultural inputs. It helps in procuring purity seeds, in providing information about the daily marked price from the Government as well as private bodies, and advices farmers on rotation of crops as well as about the use of fertilizers and pesticides. VKCs receive information by voice mail, and disseminate it through any public address systems. It has also identified 13 districts in Pondicherry, where there is huge potential for agriculture business, and where the and the agricultural graduates provide the initial query. If the queries handled by the agricultural graduates are not satisfactory or the farmers want more information, the call is forwarded to level II and level III executives.

**The Farmers Call Centres/Kisan call centres**

Call centers are increasingly becoming more sophisticated with multiple delivery channels available to the callers. With its capacity to deliver information services, call centres sometimes deliver the necessary extension services to the farmers. The centre aims to make the available information directly to the farmers on equal opportunity basis as per their need from the experts themselves. Likewise, structured and regular feed backing will be available to provide inputs for trend analysis, effectiveness of existing polices and procedures for the future. Kisan Call Centers (KCCs) were launched on January 21, 2004 by the Department of Agricultural Cooperation. The main technologies involved in Kisan Call Centres are:

- Desktop Computer Systems with Internet Connectivity
- High bandwidth telephone line
- Telephones with headphones and teleconferencing facility.

The main aim is to deliver the extension services to the farming community in the local languages. The farmer can dial the help line, a toll free number and the agricultural graduates provide the initial enquiry, if the queries handled by the agricultural graduates are not satisfactory or the farmers want more information, the call is forwarded to level ii and level iii executives.
Operational Mechanism of KCC

Thus, KCCs are the important information gateway for farmers. The cost to the farmer is almost zero, and they get the response in their local languages. If needed, the agricultural scientists also visit the field to resolve any further queries.

EID Parry’s India Agriline

Another significant effort in using ICTs to enhance the livelihood security of farmers is that of EID parry’s India agriline. Through its sugar and fertilizer business, the company has high stakes in agribusiness and is closely linked to farmers. It has about 1,00,000 sugarcane growers from more than 1,000 villages in southern India who supply it sugarcane, and it sells nearly one million tones of fertilizers to there million farmers annually.

The Company harnessed information and communication technologies to set up a hub for accessing and disseminating information set up at the village level for the farmers, with an internet portal dedicated to capturing all crop-related information in real time.
with interactive capabilities. This information hub could also serve as a platform for bringing producers and services in and out of the village. In other words while for the farmers, the information hub, would enable them to access various market-related information, farm extension services, and thereby conduct their trade, it would also serve as an efficient and effective distribution channel for products and services of companies which would want to tap rural markets. The company launched the www.indiaagrine.com portal in 2001 setting up internet Kiosks in 16 villages around its sugar factory in Nellikuppam, Tamil Nadu in partnership with a number of organizations including TNAU. The tele communications infrastructure deployed in the internet kiosks, named “Parry corners’ are franchise based business models to expand the reach of its project in a cost effective way. Using the portal, farmers experience the power of accessing information first hand on market prices, weather forecasts, and farming practices within the periphery of their village. Parry corners have become a one-stop shop at the village level for a whole host of services that include farm extension services, procurement of farm inputs sale of commodities, and EID Parry’s social initiatives.

Decision Support Systems for Farmers

The Indian farmers are cautious and usually tend to avoid taking risks. The provisions of the WTO stipulating reductions in export subsidies on farm products will make Indian experts more competitive. The data on cost of cultivation, efficient agricultural practices and the availability of inputs will help to assess the strengths of indigenous products vis-a-vis imports. The availability of information of the adverse effects of the WTO regulations on any specific agricultural product will help farmers take corrective measures, in the emerging scenario, competitive advantage should be fully exploited to improve export potential. Opportunities for specialization may lead to better export potential. Similarly, forecasts on threats in terms of information related to cheaper imports and the macro-economic conditions of other countries are also required.

It is possible to lift geographical barriers by helping farmers come together online and facilitating the disposal of their produce at attractive prices. Online bidding can be introduced for various agricultural commodities. But this will require complicated IT systems, which should be supported by proper infrastructure and post-harvest technologies, storage, etc.

It is necessary to bring Indian farmers together for value additions to their agricultural output and to get them better returns from their produce. The opportunities for setting up such units, procedures related to exports, the quality norms to be adopted, packaging, and the like, must also be made available.

It is necessary to promote monitoring cells in all major institutions related to agriculture and allied activities to maintain data, provide periodic analytical reports and raise advance alerts.
Remote Sensing in Agriculture

The basic principle involved in remote sensing is that different objects reflect different amounts of energy in different wavelength ranges, based on different properties. A sensor is used to record such reflected energies from the surface of different objects. This recorded energy is then transmitted to the users, processed to form an image and then analysed to gather information about the target. In the context of frequent droughts and given the fact that weather forecasts are often wide off the mark, the use of remote sensing becomes imperative. The success of farm operations, from sowing to harvesting, depends upon correct forecasts. Moreover, it is also helpful in gathering vital information on pests, water and other natural resources depletion, etc, which can help planners and researchers effectively and strategically counter these. Also, it is possible to study continuously all kinds of renewable and non-renewable resources, such as water resources, forest cover, land use/land cover patterns, coastal resources, geology, Geomorphology, etc. Satellite remote sensing has great potential and is an efficient technology for the inventory and monitoring of natural resources.

However, remote sensing is not without constraints, these are:
- Non-availability of uniform spectral data.
- Data gaps due to cloud cover.
- High cost, time consuming.
- Low correlation yield for certain crops, like groundnut.

Expert Systems

Expert systems are currently considered the most commercially successful product of artificial intelligence research. The problems confronting farmers are complex. These include yield losses, soil erosion, diminishing market prices because of international competition, increasing chemical pesticide costs and pest resistance, and economic barriers hindering the adoption of farming strategies. Hence, farmers need to become expert managers of all aspects of their farming operations.

Expert systems are used to aid:
- Single-point decisions, such as the design of an irrigation system, selection of the most suitable crop variety etc.
- Sequence of tactical decisions throughout a production cycle, plant protection and nutrition decisions, etc.
- As a stand-alone advisory system for a specific case.
- As a delivery system for extension information etc.
Some agricultural expert systems in India and abroad are

- Rice-crop doctors to diagnose pests and diseases for the rice crop and to suggest preventive and curative measures.
- Farm advisory systems to support agri-business management.
- Computer assisted agriculture, a system developed for farmers, agricultural officers and researchers with a facility to interact in the local language.
- Expert systems for cotton crop management for cotton growers.
- CALEX, a system developed by the University of California for pest control.
- A variety of systems for forecasting the needs of farming, cost-benefit analysis, water quality monitoring and crop rotation planning systems.

Constraints and Remedies for Effective Dissemination

Some major constraints, which are delaying the spread of the e-revolution in agriculture in rural India, are:

- Haphazard development, namely the duplication of efforts due to limited subjects. This can be overcome through a coordinating agency with advisory powers such as user interface, standards for setting up kiosks, etc.
- Non-availability of user-friendly technologies. This can be overcome by providing touch screen monitors and intuitive graphics-based presentations.
- Difficulty in providing advice in local languages through computers.
- The government's map restriction policies, which hinder the optimal utilization of data generated through remote sensing.
- Uncertain and poor quality power supply in rural India, which can be overcome by providing solar power packs for an uninterrupted power supply (UPS).
- Despite the fact that there are many facilities available, connectivity in rural areas requires improvement.

The face of Indian agriculture can be transformed by a well-conceived deployment of IT. The key players involved in this process such as industry, government and educational institutions and research centres are required to make contributions in this endeavour. This initiative to develop necessary IT based agricultural services need to be developed immediately.

In the light of globalization it is necessary for the industry related to agriculture to review their present IT infrastructure with respect to marketing function and undertake measures to strengthen the same. No single institution or organization can succeed in the task of e-powering farmers and rural India. At the same time, scattered and half-hearted attempts cannot be successfully in meeting the objective. Industries with major stake in villages, should come together to provide the initial impetus.
The success of any IT based service to rural India hinges on evolving a proper revenue model for the dissemination points. The information kiosks can draw revenue from the industry by providing and disseminating required services. Once these dissemination points prove to be economically viable, the IT revolution in rural India will require no crusaders. However, it must be kept in mind that the challenges and rewards in this field are reciprocal and the greatest challenge is to keep pace with the ever changing and evolving technologies.

**Future of Extensions**

In view of the emerging competition in the fertilizer industry because of the increase in fertilizer consumption and crop productivity, the thrust areas of fertilizer promotion must be properly defined and tackled in order to get the desired results and improve the socio-economic conditions of farmers. Information is an important resource in agriculture. Farmers need information to improve their farming and extensions to provide them relevant and timely information. The main function of the extension is the transfer of information. These services can overcome obstacles in technology transfer and pave the way for agricultural development. Applications of communication technology in the transfer of agricultural information have two implications:

- The results provide the basis for adjusting strategies.
- Successful cases can become a model for replication.

Fertilizer marketing without promotion and extension is merely a selling activity. In a competitive market, service to the consumer/customer is most important. The availability of fertilizers has improved and farmers today have the option to select from various brands available in the market. Hence, extension education has become a dynamic concept in the fertilizer industry. Therefore, the current strategy of extension education is to keep farmers not only within the fold of balanced fertilizer use, but also to care for the maintenance of soil productivity. Extension services can guide farmers so that they have a proper mix of traditional and innovative farming practices—farmers no longer need to follow the legacy of their ancestors.

Structural and functional changes in agricultural extension are important to meet the needs and challenges of the new millennium. The globalization and liberalization era has made people re-think the role of public extension in developing countries. Extension workers/farmers can acquire knowledge as and when they have time and want to do so. For instance, a farmer may visit an extension office for pest control. He can identify the type of insect by consulting a database through photographs, consult the local entomologist and select suitable pesticides as a measure of pest control. The quality of extension material and process can be supplemented from time to time by multimedia, computer simulation and the like. Moreover, these extension systems can also make earnest efforts to organize farmers’ groups and motivate and direct them so that they can demand appropriate and better extension services on a cost-sharing basis. The
empowerment of small and marginal farmers through the cost-effective intensive use of electronic communication technologies is one of the most important possibilities.

Technologically, it is possible to develop suitable systems to cater to the information needs of the Indian farmer. User friendly systems, particularly in local languages, can generate interest in farmers. It is possible to create dedicated networks or harness the power of the Internet to make these services available to farmers in all parts of the country. But the task of creating application packages and databases to cater to the entire spectrum of Indian agriculture is a giant task.

Specialized Indian Institutions cater to various aspects of agriculture and can play a crucial role in designing the necessary applications, databases and services. Efforts should be made to promote a coordinating agency, which would have an advisory role and evolve a standard interface for users. This will call for urgent measures to introduce state-of-the-art technologies, such as remote sensing, geographical information systems, bio-engineering, satellite technology, and the like, to effectively monitor agricultural performance. This will not only help in planning, advising and monitoring the status of the crops, but also in responding quickly to crop stress conditions and natural calamities. But while developing these systems it must be borne in mind that the population that is targeted is not comfortable with the use of computers. And a major challenge is the dissemination of information.

QUESTIONS FACING EXTENSIONISTS WITH REGARD TO ICTS

There are many ICT related questions that extensionists are now addressing. Some of these are listed below, with responses drawn from the literature:

- What role will the Internet and other new ICTs play in rural and agricultural development given the changes facing agricultural in general and agricultural extension specifically?

  Response: Local organizations and groups require a voice to highlight their judgement on ICT priorities and implementation of policies, programmes and projects so as to negotiate on equal footing with outsider institutions in choices of communication for development approaches and media choices (Ramirez, 1998). Extension can play a role in helping catalyze and support this voice;

  Response: Cultural and social sensitivity to the use of ICT tools for educational and informational purposes are critical. The launching of ICT projects needs to be accompanied by advocacy so that communities are aware of the purposes and people have a clear understanding of their roles, and in particular how they will part of decision making about objects, applications, content, etc. (Michiels & Vann Crowder, 2001). Extension can support and advocate for rural stakeholder participation in ICT project planning, implementation and evaluation.
• **Who will benefit? Who should benefit?**

Response: Local people and their needs should be the driving force behind ICT projects and not the projects, or the technology (Richardson, 1996). Participatory extension planning techniques have a very important role to play.

Response: ICT programme design should reflect an understanding of the different ways in which individuals and groups learn, communicate and use information; without incorporating this understanding, programmes are likely to fail (Anderson et al., 1998);

Response: Choices of communication technologies and methods to employ them can only be determined with the participation of all relevant stakeholders (Michiels & Vann Crowder, 2001; Ramirez, 1998; Batchelor & Sugden, 2003);

Response: Identifying and supporting local champions who support information sharing, is key to the success of communication for development efforts (Richardson, 1998).

• **What is the role for agricultural extension as a broker between rural and agricultural client groups and telecommunication infrastructure providers, regulators, and policy makers?**

Response: External institutions seeking to enable local organizations and groups to participate in ICT initiatives need to establish a rapport with the local groups to enable a trustful, learning relationship to emerge (Ramirez, 1998). Extension is well placed to play the role of convener in the establishment of ICT infrastructure. Marry the use of new ICTs with existing technologies, especially rural radio (Richardson, 1997).

Response: Collaboration among agencies supporting traditional media and new ICTs can achieve important multiplier effects as agencies harmonize their efforts (Richardson, 1997).

• **Are there adequate software and hardware, and support, available in the countries or regions we serve?**

Response: Simpler technology often produces better results. Telephone access and use can add considerable value to the communication systems of the poor in developing countries (Batchelor & Sugden, 2003; Richardson, 2003). Basic telephone connectivity to rural areas remains a huge need and priority;

Response: Using Internet technologies as a stand-alone communication medium is not usually a cost-effective choice for effective communication for development initiatives (Batchelor & Sugden, 2003).

• **What types of training, planning, and financing is required to advance appropriate ICT access?**
Response: Local organizations and groups capable of acting on rural and agricultural development plans require new skills and knowledge to make informed choices about communication for development approaches and media choices. Capacity building and institutional strengthening for intermediary organizations that serve rural and agricultural development is necessary so that they can make the most appropriate and creative use of traditional media and new ICTs.

CONCLUSION

Farmers in India operate in widely distributed rural locations, which deprive them of the benefits of timely and useful information from research centres and service organizations. A comparison of the yield of rice, cotton, Soya beans and maize between India and China or Egypt, indicated that Indian generates only a third of what is produced elsewhere. This is because of the inadequate dissemination of agricultural technology and its adoption. Hence, information technology (IT) has a definite role to play in making the Indian farmer more prosperous.

Practically, there is no area in agriculture in which IT has no role to play. In the light of Globalization and the impact of WTO on agriculture and agro-based industries, the use of IT based services in this field has become imperative. The immense scale and diversity of Indian agriculture provide the ultimate challenge to the potential of information technology. The rapid strides that the country has registered in the IT field will remain incomplete unless IT is fully utilized to ensure more efficient and productive Indian agriculture.

Since IT has revolutionized the world and forms an integral part of all sectors, e-commerce has a tremendous potential in agribusiness too. Information of the required quality has the potential of improving efficiency in agriculture. Hence, there is a need to examine the latest developments in IT that facilitate effective IT penetration into rural areas and types of systems required in this post-WTO environment. With modern IT, extension services can provide advice tailor-made for each farmer to help him select the most profitable route to creating optimal conditions for plant growth.

Due to population growth and the shrinking of natural resources, the increase in food productivity has to be through higher and more efficient use of inputs, like quality seeds, fertilizers and water. The availability of timely and adequate information on these critical inputs is essential for sustainable high productivity and food security. This depends on the judicious use of natural resources, such as soil, water, live stocks, plant genetics, forestry, climate, rainfall and topography. Developments in enabling technologies, such as information and communication technology (ICT), geographical information system technology (GIST) and global positioning system technology (GPST) facilitate informatics-led agricultural development, which will be a step towards enhancing the quality of life of the farming community.
REFERENCES


5. www.itcportal.com
6. www.indiagriline.com
7. www.eidparry.com
COPYRIGHT AND IPR ISSUES IN DIGITAL ERA

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INTRODUCTION
In the modern technology oriented e-society, libraries are also getting ICT oriented, giving due importance to digital resources to provide rapid, easy and seamless access to information. Digital technology has converted the library from paper based to electronic access point, where information is transmitted with a single click over interactive network. ICT and internet technology has changed the nature of libraries to establish a free flow of information, across the globe. Modern libraries are more powerful, dynamic and can reach their users without the restrictions of geographical boundaries, and open the opportunities for interoperability and information exchange. It allows users to access wide variety of information resources such as text, sound, images, video, according to their need under one umbrella. Internet, the ever expanding technology, is self sufficient to fulfill the varied needs of user community be it information, education, communication or research.

INTELLECTUAL PROPERTY RIGHT (IPR)
Intellectual property is a term referring to a number of distinct types of creations of the mind for which a set of exclusive rights are recognized. Under the corresponding fields of law. (1) The term IP includes law protected intangible creation of human intellect.

IPR connotes the right to literacy, artistic and scientific work, performances of performing artists, phonographs and broad-cast inventions in all fields of human endeavor; scientific discoveries, industrial designs, trademarks, service marks and commercial names and designations and all other products resulting from intellectual activity in the industrial, scientific, literary and artistic fields. It is a generic term covering patents, registered design, trademark, copy right, layout of integrated circuits, trade secrets, geographical indicators and anti-competitive practices in contractual licenses. (2).

IPR represents the legal rights related to the form in which ideas are expressed. It protects use of information and ideas that are of commercial value.

IPR can be defined as “mix of ideas, inventions and creations on which society is willing to bestow the status of property”.

Today, the persons creating new ideas seek protection under IPR.
AREAS OF IPR

There are three main areas of IPR Copyright, Trade-mark and patent.

Copyright

Copyright is a type of property that is found on person’s creative skill and labour. It is designed to prevent unauthorized use by others.

It is a document granting exclusive right to an originator or an assignee to print, publish, perform, film or record literary, artistic or musical material.

Copyright is an exclusive privilege to the authors to reproduce, distribute, perform or display their creative works. Copyright is a legal concept that concern rights to copy, for a limited duration of time. It is an exclusive, legally secured right to publish and sell the literary, scientific, musical, dramatic and artistic works. A copyright is granted to the creator for his original work. It is a set of rights which include right to copy, distribute and adapt the work. Copyright owners have controlling right over copying, translating and any other exploitation of the work for a limited period of time. Copyright helps to shape the culture of modern society by preventing reproduction of works of original creator without prior permission of copyright owner.

Copyright protection helps in controlled and fair use of all creative works such as literary writings-fiction and nonfiction, scientific and technical texts, artistic works including drawings and paintings, architectural drawings, fine arts, photographs, musical works, audio-visual works, sound recordings, broadcasts, motion pictures and also the computer programs preparatory design material for a computer program and databases. The copyright does not cover ideas, facts, titles, phrases, short titles, slogans, unrecorded extemporaneous speech, and works whose copyright have expired.

The first copyright statute of British (1709), says, ‘An act for the encouragement of learning, by vesting the copies of printed books in the authors or purchases of such copies, during the times therein mentioned.’

The copyright holders has the full right to control reproduction and/or adaptation of work for a certain period of time life of author plus several decades.

Copy right holders can license or permanently transfer or assign their exclusive rights to others.

In essence, copyright is a legal advice designed to provide the opportunity for economic reward that enables authors to expand their time and talents to creating the works of literature, music and art, and enables publishers to invest their resources and efforts in making the authors’ work available to the public. Copyright seeks to achieve this end by giving to authors, who may grant to publishers or other producers, broad rights, of controlling over the various modes of reproduction of their works, or, at least, the right to exact payment for their reproduction’(3).
Thus, copyright is an intellectual property right which gives limited monopoly to creators, publishers, authors to copy, adapt, perform and broadcast their literary and artistic works. The copyright is an extremely relevant right to control the reproduction and publication or performance of the work with an objective to maximize the protection of intellectual property.

**Trademark**
Trademark, trade mark or trade-mark is a word of symbol used by manufacturers to identify goods.

Trademark is a legally registered symbol, word or words or established by use as representing a company or product. It is a distinctive sign or indicator used by an individual, business organization or other legal entity to identify that the products or services with which the trademark appears originate from a unique source, and to distinguish its products or services from those of other entities.(4)

Trademark is the means by which a business make itself visible in the market place.

A trademark can be any distinctive name or logo designated by the following symbols:

- **TM** It is an unregistered trademark, used to promote or brand goods.
- **SM** It is an unregistered service mark, used to promote or brand services.
- **R** It is a registered trademark or service mark. Owner of registered trademark may commerce legal proceedings for trademark infringement to prevent unauthorized use of that trademark.

The main objective of trademark is to help the customer to get authentic and reliable products.

**Patent**
Patent is a kind of IPR granted by the Govt. to the inventor or applicant of the product or process. Patent is a legal monopoly granted for a limited period generally 20 years to the owner of an invention.

Patent is an exclusive right granted for an invention that provides, in general, a new way of doing something, or offer a new technical solution to a problem.

Patent protection means that the invention cannot be commercially made, used, distributed or sold without the patent owner’s consent.

Patent provides incentives to individuals by offering them recognition for which creativity and material reward for their marketable invention. These incentives encourage innovation, which assures that the quality of human life is continuously enhanced.

In order to get patentable, the invention must fulfill certain conditions –

- Must be an element of novelty.
• Should add new characteristics to already existing body of knowledge.
• Must be of practical use.
• The subject matter should be patentable under law.

COPYRIGHT DEFINED

Under the Copyright Act, 1709 (enacted in the reign of Queen Anne), copyright meant "the sole right and liberty of printing; but under the subsequent Literary Copyright Act, 1842, it was extended to include copying by other means than the press and the right of multiplying copies by printing, including the right to publish and sell. Obviously, copyright, before the enactment of the Imperial Copyright Act of 1911, meant the sole exclusive right of multiplying copies of a book by printing or otherwise and it extended throughout the British Dominions. It did not include the performing right in dramatic and musical works.

In 1911, the law of copyright was codified in England and was made applicable to India as well. Under the provision of this Act; the Indian Legislature was empowered to modify or alter its provisions, by the requisite legislation. By virtue of this power, the Governor-General of India enacted the Indian Copyright Act of 1914 (Act III of 1914) with certain modifications in the Act of 1911. After India became independent, this Act was suitably revised and became the Copyright Act, 1957.

THE INDIAN COPYRIGHT ACT 1957

Meaning 14(1)

For the purposes of this Act, "Copyright." means the exclusive right, by virtue of, and subject to the provisions of this Act,—

(a) In case of a literary, dramatic or musical work, to do and authorize the doing of any one of the following: act, namely to reproduce the work in any material form

(i) to publish the work
(ii) to perform the work in public
(iii) to produce, reproduce, perform or publish any translation of the work
(iv) to make any cinematograph film or a record in respect of the work
(v) to communicate the work by radio-diffusion or to communicate to the public by a loud-speaker or any other similar instrument
(vi) to make any adaptation of the work
(vii) to do in relation to a translation or an adaptation of the work any of the acts specified in relation to the clauses (i) to (vi);
(b) in the case of an *artistic work*, to do or authorize the doing, of any of the following acts, namely
   (i) to reproduce the work in any material form
   (ii) to publish the work
   (iii) to include the work in any cinematograph film
   (iv) to make any adaptation of the work;
   (v) to do in relation to an adaptation of the work acts of the acts specified in relation to the work in clauses (i) to (iii),
(c) in the case of a *cinematograph film*, to do or authorize the doing, of any of the following acts, namely
   (i) to make a copy of the film;
   (ii) to cause the film, in so far as it consists of visual images, to be seen in public and, in so far as it consists of sounds to be heard in public;
   (iii) to make any record embodying the recording in any part of the sound track associated with the film by utilizing such sound track;
   (iv) to communicate the film by radio-diffusion.
(d) in the case of a record to or authorize the doing of any of the following acts by utilizing the record namely
   (i) to make any other record embodying the same recording.
   (ii) to cause the recording embodied in the record to be heard in public;
   (iii) to communicate the recording embodied in the records by radio-diffusion,

Section 14(2)
Any reference in sub-section (1) to the doing of any act in relation to a work or a translation or an adaptation thereof shall include a reference to the doing of that act in relation to a substantial part thereof.(5)

The Indian Copyright Act of 1957 brings into force a new body of copyright law to suit modern and up-to-date conditions prevailing in the world and particularly in India which is developing slowly but steadily. The Act has wrought radical changes in the law of copyright. It was enacted to protect literary, dramatic, musical and artistic works as the Act of 1914 did, but the language and phraseology derived from the Act of 1914 have not been blindly followed, but mostly discarded, substituting entirely new provisions. Obviously, the Act contains revolutionary changes.

Beside protecting literary, dramatic, musical and artistic works, the novelties of the present Act are manifold, viz., affording protection to films, broadcasting and radio-diffusion, and provision for voluntary registration of copyrights—none of which was the subject of the former Indian copyright enactments.
The other distinguished features are that the Act has established a copyright office. It has also appointed the Registrar of Copyrights, and the Copyright Board with powers akin to the Performing Right Tribunal as established under the U.K. Act of 1956 with powers for settlement of certain disputes or objections concerning the public performance of copyright works with powers to grant compulsory licences, including the power to grant translation rights of copyrights works under certain conditions and circumstances. It must, however, be noted that copyright does not extend to ideas, plots, dramatic situations and events. Rather it is limited only to the form of their expression.

India is a member of two International Conventions on copyright (1948) and the Universal Copyright (1952). Both these conventions were revised in Paris in 1971 whereby special concessions were given to the developing countries to enable them to issue compulsory licences for reproduction/translation of books of foreign origin for educational purposes.

The Indian Copyright Act, 1957 which came into force on January 21, 1958 was amended in August, 1983 with the specific purposes of (a) incorporating the provisions of the Paris Text of 1971 of the Berene Convention concerning the grant of compulsory licences for translations and reproduction of foreign works for required educational purposes; (b) providing adequate production to author’s rights (Sec. 19 A); and (c) removing administrative drawbacks and other lacunae experienced in the administration of the copyright Act, 1957. The copyright (Amendment) Act, 1983 came into force w.e.f. 9 August, 1984.

The Copyright Act was further amended in 1984 in order to check the problem of wide-spread piracy in India. Provisions have been made in it to combat piracy by making punishment for various offences more stringent. Infringement of Copyright has been made a cognizable offence. The Act provides for enhanced punishment for the infringement of copyright, namely imprisonment upto 3 years, with a minimum punishment of six months, and a fine upto Rs. 2 lakh, with a minimum of Rs. 50,000. The Act came into force w.e.f., 8th October, 1984.

COPYRIGHT IN DIGITAL ERA

In ICT era, copyright should be effective in preventing the commercial redistribution of information. Latest technologies are useful for the libraries to fulfill their objectives of immediate retrieval and instant dissemination of information. But, at the same time the new technologies have made the administration and protection of copyright quite difficult. The unauthorized copying and distribution of copyrighted works is badly affecting the owners.

Charles Clark rightly says, that the ‘answer to the machine is the machine’. Thus the problems of technology should be handled by technology, protected by law. Licensing and fee collection should be automated. The copy right law will balance the intellectual property interest of authors and publishers, leading to fair use. The purpose of copying
should be private and not the commercial. It should be in parts. As with digital technology document can be altered without detection, the copyright should be effective in preventing the commercial redistribution of information. Copying should be done with an object to promote the progress of knowledge.

Institutional repositories are using (1) Deposit License which is an agreement between the creator or the copyright holder and the institution. It gives a right to repository for distributing and preserving the work and (2) Distribution license which is a agreement between the author or creator or copyright holder and the end user. It governs the uses of the work.

IPR and copyright issues are manifested in terms of license in digital world.

A License is an agreement between the publisher and the user wherein the publisher transfers the non exclusive and non transferable right to use materials to the users or licensee.

License agreements are used by the publishers as legal method for controlling the use of their e-resources.

E-resources are licensed and should be downloaded for personal, educational and research purpose only. Downloading and printing of entire issue of the journal should be prohibited. It is again unfair to print several copies of an article. The copyright laws protect published material in digital format also, so it should not be copied except in accordance with fair un-harmful and non commercial use. If originals are not available in market, complete works may be copied keeping in mind the word fair use. With the same motive, artistic works may be copied. The new technology has increased the importance of intellectual property on web. Copyright is key issue in intellectual property rights in digital era.

Computer database are also eligible for copyright protection as it is a great deal of effort, skill and labour leading to originality. Database are protected as collections and compilations of literary and artistic works.

The Indian Copyright Act, amended in 1994, provides protection for database as ‘literary works’ which includes Computer Program, tables and compilation and computer databases (The Copyright Act, 1994). It is protection of the skill, labour and judgment of the author, irrespective of the form of the product.

The information technology act, 2000 defines ‘Data’ under section 2(0) as a representation of information, knowledge, facts, concepts or instructions, which are being prepared or have been prepared in a formalized manner and in intended to be processed, is being processed or has been processed in a computer, computer system or computer network and may be in any form (including) computer print outs, magnetic or optical storage media, punched cards.
Under the TRIPS Agreement, computer programs now qualify for copyright protection just as any other literary work as well as for other forms of IP protection. Most commonly, they need affordable access to off-the-shelf business software packages, such as word processing, spreadsheets, email, and internet browsing products.

CONCLUSION

Intellectual property rights are serving as life-saving medicines providing right to literary, artistic and scientific work. Copyright laws have dual functions to protect the claims of authorship expressed through different media and also to prevent the illegal copying of copyrighted products. The copyright law balances the intellectual property to bring a fair use of knowledge, by limited legal reproduction to make the society well informative.

REFERENCES

3. Abe A Golman: Philosophical bases of copyright.
4. Wikipedia, the free encyclopedia.
ROLE OF LIBRARIES IN PROMOTING INDIGENOUS KNOWLEDGE IN AGRICULTURE

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ABSTRACT

Knowledge Management is a hot topic in current information age. The paper presents main concept of Indigenous knowledge and how the libraries can promote to access and preserve indigenous knowledge for betterment of the agriculture society.

Keywords: Indigenous knowledge, Libraries, Agriculture, Knowledge Management

INTRODUCTION

Agriculture has been a part of human life since the beginning of the human race and the need for agricultural information is probably almost as old as agriculture itself. Babylonian clay tablets have been found to contain agricultural information. Blanchard (1997) hypothesized that, "the great library at Alexandria undoubtedly had many treatises on agriculture inscribed on papyrus". Throughout history, in many civilizations, there have been libraries that have included agricultural information, and separate agricultural libraries were established in Europe in the mid-eighteenth century. In India, special attention was paid to development of an agricultural research infrastructure immediately after Independence. The Indian Council of Agricultural Research (ICAR) acts as a repository of information and provides consultancy on agriculture, horticulture, resource management, animal sciences, agricultural engineering, fisheries, agricultural extension, agricultural education, home science, and agricultural communication. It has the mandate to coordinate agricultural research and development programmes and develop linkages at national and international levels with related organizations to enhance the quality of life of the farming community.

Library and Information profession has a great deal to learn if they are to effectively meet the information needs of indigenous people and manage indigenous knowledge in an appropriate way. This calls for a fundamental rethinking with regard to strategies on how best to exploit indigenous knowledge to realize the goals of sustainable development. It is common knowledge that the world over modern science has begun to recognize the constructive role that indigenous knowledge of the local ecosystem can play in the formulation and implementation of sustainable development policies and projects in developing countries.
The International Federation of Library Associations (2003) also acknowledges the intrinsic value and importance of traditional knowledge and local knowledge and the need to consider it holistically as a tool for socio-economic development. IFLA (2008) recommends libraries to collect, preserve, and disseminate Indigenous knowledge, publicize the value, contribution, and importance of IK to both non-indigenous and indigenous people, involving elders and communities in the production of IK and encourage the recognition of intellectual property laws to ensure the proper protection and use of IK.

**INDIGENOUS KNOWLEDGE**

Warren (1991) and Flavier (1995) present typical definitions by suggesting:

Indigenous knowledge (IK) is the local knowledge – knowledge that is unique to a given culture or society. IK contrasts with the international knowledge system generated by universities, research institutions and private firms. It is the basis for local-level decision making in agriculture, health care, food preparation, education, natural-resource management, and a host of other activities in rural communities. (Warren 1991)

Indigenous Knowledge is the information base for a society, which facilitates communication and decision-making. Indigenous information systems are dynamic, and are continually influenced by internal creativity and experimentation as well as by contact with external systems. (Flavier et al. 1995: 479)

**IMPORTANCE OF INDIGENOUS KNOWLEDGE**

In the emerging global knowledge economy a country’s ability to build and mobilize knowledge capital, is equally essential for sustainable development as the availability of physical and financial capital. (World Bank, 1997) The basic component of any country’s knowledge system is its indigenous knowledge. It encompasses the skills, experiences and insights of people, applied to maintain or improve their livelihood.

- Significant contributions to global knowledge have originated from indigenous people, for instance in medicine and veterinary medicine with their intimate understanding of their environments. Indigenous knowledge is developed and adapted continuously to gradually changing environments and passed down from generation to generation and closely interwoven with people’s cultural values. Indigenous knowledge is also the social capital of the poor, their main asset to invest in the struggle for survival, to produce food, to provide for shelter or to achieve control of their own lives.

- Today, many indigenous knowledge systems are at risk of becoming extinct because of rapidly changing natural environments and fast pacing economic, political, and cultural changes on a global scale. Practices vanish, as they become inappropriate for new challenges or because they adapt too slowly. However, many practices disappear only because of the intrusion of foreign technologies or development concepts that promise short-term gains or solutions to problems without being capable of sustaining them. The tragedy of the impending disappearance of indigenous knowledge is most obvious to those who have developed it and make a living through it. But the implication for others can be
detrimental as well, when skills, technologies, artifacts, problem solving strategies and expertise are lost.

- **Indigenous knowledge is part of the lives of the rural poor;** their livelihood depends almost entirely on specific skills and knowledge essential for their survival. Accordingly, for the **development process**, indigenous knowledge is of particular relevance for the following **sectors and strategies**:
  - Agriculture
  - Animal husbandry and ethnic veterinary medicine
  - Use and management of natural resources
  - Primary health care (PHC), preventive medicine and psychosocial care
  - Saving and lending
  - Community development
  - Poverty alleviation
- Indigenous knowledge is **not yet fully utilized in the development process**. Conventional approaches imply that development processes always require technology transfers from locations that are perceived as more advanced. This has often led to overlooking the potential in local experiences and practices.
- Indigenous knowledge is **relevant on three levels for the development process**.
  - It is, obviously, most important for the **local community** in which the bearers of such knowledge live and produce.
  - Development agents (CBOs, NGOs, governments, donors, local leaders, and private sector initiatives) need to **recognize it, value it and appreciate it** in their interaction with the local communities. Before incorporating it in their approaches, they need to understand it – and critically validate it against the usefulness for their intended objectives.
  - Lastly, indigenous knowledge forms part of the **global knowledge**. In this context, it has a value and relevance in itself. **Indigenous knowledge can be preserved, transferred, or adopted and adapted elsewhere**.
- The **development process interacts with indigenous knowledge**. When designing or implementing development programs or projects, three scenarios can be observed:

  - The development strategy either
    - relies entirely or substantially on indigenous knowledge,
    - overrides indigenous knowledge or,
    - incorporates indigenous knowledge.

### ROLE OF CENTRE FOR INDIGENOUS KNOWLEDGE IN AGRICULTURE (CIKA)
Many of our indigenous technologies in agriculture and allied fields have been replaced by the so-called modern and hazardous technologies and they have become obsolete, especially among the younger generations. Now these indigenous practices are endangered ones and they are available only with the aged and elderly farmers and animal healers as an unwritten body of knowledge and hence, there is a possibility for them to become extinct particularly during this era of liberalization, privatization and globalization. Therefore, there is a need to systematically document, validate, standardize and to propagate the Indigenous Knowledge/ Technologies so as to reduce dependence on external inputs, to reduce the cost of cultivation and to propagate eco-friendly agriculture.

With this background, the Centre for Indigenous Knowledge in Agriculture (CIKA) has been established with the approval of appropriate authorities/ academic bodies of the Gandhigram Rural University with the following objectives and activities:

OBJECTIVES OF THE CENTRE

- To serve as a research and development centre for carrying out advanced research activities on the Indigenous Agricultural Practices existing in different farming systems of Tamil Nadu.
- To establish and maintain demonstration farms and exhibition on the Indigenous Agricultural Practices and their inputs.
- To serve as a centre for providing training to farmers, farm women and extension workers on various aspects of Indigenous Agricultural Practices.
- To serve as an extension centre for propagating and promoting the adoption of Indigenous Practices in various agricultural enterprises among the farmers.

ONGOING ACTIVITIES OF THE CENTRE

1. A research/resource book entitled Indigenous Agricultural Practices for Sustainable Farming has already been published through Agrobios (India) Ltd., Jodhpur and another book entitled Indigenization of Indian Farming: Problems and Prospects is about to be published soon.
2. Three scholars are already working for their Ph.D. programme on IK; one on ‘Indigenous Practices on Horticultural crops of Kerala’, second one on ‘Ethno-veterinary practices for Wound Healing in Livestock’ and the third one on ‘IAPs in Tribal Areas’. Two more scholars are about to start their work on ‘Indigenous Dry Land Practices’ and ‘Indigenous Post Practices’.
3. Publication of research and popular articles on IAPs in various journals and magazines.

HIGHLIGHTS OF ACHIEVEMENTS OF THE CENTRE

- Documented about 1200 Indigenous Agricultural Practices on 61 crops in Dindigul District
- Documented about 1100 Indigenous Horticultural Practices on 40 crops in Kerala state
- Documented about 600 Indigenous Dryland Practices on 29 crops in Southern Dryzone of Tamil Nadu
- Six inventories on various dimensions of IK items prepared and documented
- Documented 95 Photographs and six Drawings on various dimensions of IK items.
- Preserved 33 Herbarium specimens on various Crop Varieties and Bio-control Inputs and Seed samples of seven crop varieties.
- Validated Two fresh herbs viz. Centella asiatica and Tridax procumbens and a Traditional Poly Herbal Formulation (Aristolochia bracteata based) on wound healing management in Livestock.
- About 85% of the Indigenous Dryland Practices documented were found Rational.
- Thirty eight Indigenous Dryland Practices being subjected to Validation in 10 Field Experimental Trials and Laboratory Studies.

LINKAGES WITH OTHER ORGANIZATIONS
This Centre is also having Linkages with Centre for Indian Knowledge Systems, Chennai, SEVA, Viratipathu, Madurai and other leading organizations for undertaking collaborative programmes for the promotion of Indigenous Knowledge.

ROLE OF LIBRARIES IN ACCESS TO INDIGENOUS KNOWLEDGE
- The UNECO Public Library Manifesto (1994) describes the public library as the local center of information which provides access to all kinds of knowledge and information. It describes the role of the librarian as that of “an active intermediary between users and resources.” The Manifesto further notes that the library services and collections must include all types of appropriate media and modern technologies as well as traditional materials.
- Wendland(2007) notes that libraries and archives as repositories of formal scientific and indigenous and other cultural materials fulfill vital preservation, educational, scholarly and functions of access for the benefit of whole society. Libraries play a critical role in collecting both modern and indigenous knowledge and organizing it for dissemination to the Wendland (2007) further states that libraries and archives as part of the superstructure they need to “reassert cultural integrity, cultural authority, and preservation of context, cultural sovereignty and respect.”
- Burtis (2004) argues that the discord of modern Library and Information systems is that they are oriented towards a scientific logic of information retrieval and access whereby knowledge is reduced into information without due consideration to the cultural context in which it was created. The author further states that it is not enough to catalogue, abstract, classify, index, and digitize materials to facilitate access but what is needed is for Library and Information professionals to put indigenous knowledge into a cultural context.”
- Indigenous claims for protection of indigenous knowledge systems and cultural materials lie, albeit perhaps only superficially at right –angles to some of the core objectives of libraries
and other information services, such as: freedom of speech, intellectual freedom, diffusion of knowledge, research and learning, access to information and preservation of cultural heritage.”

- Okore, et al., (2009) state that developing countries are endowed with a wealth of indigenous knowledge but access to such knowledge is hampered by lack of an environment that permits free flow of ideas amongst members of the community. The author recommends libraries to promote access to indigenous knowledge by creating an environment which permits face-to-face forums and network formation to discuss and debate on issues that might be useful to members of the communities. For example, the use of talk shows promoting intergenerational dialogue between the young and the old on different subject areas ranging from agriculture, ecosystem, medical care, and conflict resolution.

- Libraries should also use other sources of indigenous knowledge, including indigenous experts, opinion leaders and village elders, farmer-to-farmer interaction involving neighbours, friends or village gatherings in social spaces.

- Okore et.al (2009) argue that libraries managing indigenous knowledge should not view themselves as owners of such knowledge but rather custodians who are freely available to dialogue with members of the community, through creating social spaces for communities to learn from each other. This implies that when dealing with indigenous knowledge Library and Information Professionals should descend from their elitist and anachronistic ivory towers shrouded by the brick and mortar print based alphabetized services and be able to be sensitive to the pulse of the community with regards to the provision of information to promote agriculture.

CONCLUSION

The progress of information technology has truly transformed every aspect of our lives throughout the world. Indigenous knowledge is characterized by integrated systems of cognition, belief, and practice. Vital information on natural resource management ensuring sustainability is often encoded in unique forms such as proverbs, myths, rituals, and ceremonies. Librarians are facing greater opportunities and challenges. We are capable to receive more achievements in the formation of agricultural digital libraries and its knowledge management if we closely work together from now onwards in the ways to enhance knowledge managers capability in KM; to develop suitable knowledge management policies to protect intellectual property; to promote knowledge innovation in agricultural research in science and technology; and to keep and increase core competence of the agricultural libraries and information system by using KM advantages in developing our professional activities.

REFERENCES


2. CIKA. www.ruraluniv.ac.in/cika.pdf

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Conference Papers
ROLE OF AGRICULTURAL LIBRARIES IN KNOWLEDGE MANAGEMENT

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ABSTRACT

This paper describes different aspects of knowledge Management and its applications. The paper states the value of knowledge for an organization, knowledge management process & KM Tools. The importance of Librarians and Information professionals in knowledge management of organizations is described.

Keywords: Knowledge Management, Knowledge Sharing, Knowledge exchange, Tacit knowledge, Explicit knowledge, Agricultural Libraries

INTRODUCTION

The present generation of libraries and professional recognize the advent of ‘Information revolution’ in the field of science and technology. Latest digital technology helps to transit the large quantum of data in convenient way. It is essential to understand the information needs of the users, to lead, direct and support the emerging information needs of the users for the overall development of the nation.

Agriculture has been a part of human life since the beginning of the human race and the need for agricultural information is probably almost as old as agriculture itself. In India special attention was paid to development of an agricultural research infrastructure immediately after Independence. The Indian Council of Agricultural Research (ICAR) acts as a repository of information and provides consultancy on agriculture, horticulture, resource management, animal science, agricultural engineering, fisheries, agricultural extension, agricultural education, home science and agricultural communication. It has the mandate to coordinate agricultural research and development programmes and develop linkages at national and international levels related organizations to enhance the quality of life of the farming community. ICAR has established various research centers in order to meet the agricultural research and education needs of the country.

Digital preservation, processing, and managing of agricultural information involves a number of issues and problems. The process initially starts with preservation of information in archives or by conversion to other digital formats. The second issue facing agricultural research and information is the rapid growth of technology, whether
biotechnology or information technology, which also influence agricultural information management. Technological advances create new challenges and often require new skills and infrastructure. The third issue is diversity. Agriculture practice and research are becoming increasingly interdisciplinary while serving widely diverse populations. Agricultural information experiences a high level of diversity, too, in content, format, technology, audiences, and services.

The future growth in agriculture must come from new technologies which are not only “Cost effective” but also “in conformity” with natural climatic regime of the country (Singh, 2004); The largest and best agricultural libraries are generally affiliated with the largest and best agricultural research programs.

The traditional concept of library as ‘storehouse’ of knowledge and librarian as its ‘custodian’ is redefined with the evolution of knowledge and its ever increasing demand. As early as 1965, Peter Drucker pointed out that “knowledge” would replace land, labour, capital, machine etc. to become the chief source of production.

There are two main streams: Tacit knowledge and Explicit knowledge.

**Tacit knowledge** include Sharing experiences, observing, brainstorming without criticism, experiences, chats, electronic meeting which kept in human minds and skills and shown through behaviors or performances. There are five key factors consisting of the Tacit knowledge e.g. knowledge, mood, worship, experience and skill.

**Explicit knowledge** means that the knowledge is carried by some explicit material like characters, pictures, printed and electronic material etc.
Knowledge Management in agriculture libraries should be focused on effective research and development of knowledge, creation of knowledge bases, exchange and sharing of knowledge between library staff and users, training library staff. User’s delight, staff’s quality and enrichment as well as an all-round improvement of agriculture library starting from housekeeping activities to knowledge marketing will become important objective of knowledge management in agriculture libraries. Knowledge management, therefore, deals with creating, securing, capturing, coordinating, combining, retrieving, and distributing knowledge.

The concept “knowledge management” was started and popularized in the business word during the last decade of the 20th century. It was the business world that first recognized the importance of the knowledge in the “global economy” of the “knowledge age”. The application of knowledge management have now spread to other organizations like government agencies, research and development department, universities and others.

Knowledge Management in libraries is to promote relationship in and between libraries, between library and user, to strengthen knowledge internetworking and quicken knowledge flow. With the growing interest in knowledge management, many questions have been raised in the minds of the librarians regarding the difference between information and knowledge, difference between information management and knowledge management, who will be in-charge of information and knowledge management, would librarians and information professionals with appropriate education and training in library and information science be most suitable for the position of “Chief
Knowledge officer “(CKO) in their organizations, and what libraries can do in implementing knowledge management.

DEFINITION OF KNOWLEDGE MANAGEMENT

There are several different and sometimes quite confusing statements that claim to be a definition of Knowledge Management. For example:

- KM is about systems and technologies
- KM is about people and learning organizations
- KM is about processes, methods and techniques
- KM is about managing knowledge assets
- KM is a holistic initiative across the entire organization

Unfortunately, there is no universal definition of knowledge management (KM), just as there is no agreement as to what constitutes knowledge in the first place. For this reason, it is best to think of KM in the broadest context.

Gartner Group defines it as “a discipline that promotes an integrated and collaborative approach to the process of information asset creation, capture, organization, access and use.” Knowledge Management is the discipline of enabling individuals, teams and entire organizations to collectively and systematically create, share and apply knowledge, to better achieve their objectives”

IMPORTANCE OF KNOWLEDGE MANAGEMENT IN LIBRARIES

The aim of Information specialists in to organize and classify documents or create metadata of network, electronic and digital resources or to help their users to get the right information they need at the right time. To clearly understand users’ needs is the first importance in creating helpful KM system within Digital library environment. There are following more objectives as under.

(a) The objective of knowledge management of libraries is to promote knowledge innovation. Knowledge innovation is the core of the knowledge economy society. As basis for collection, processing, storage and distribution of knowledge and information.

(b) Knowledge Management in libraries will carry out research on development and application of information resources, construction of virtual libraries, protection of intellectual property rights in the electronic era etc, thus founding the base for knowledge innovation.

(c) Knowledge Management in libraries is to promote relationship in and between libraries, between library and user, to strengthen knowledge internet working and quicken knowledge flow.
TECHNOLOGIES AND TOOLS USED IN KNOWLEDGE MANAGEMENT

There is no single technology that takes care of all the KM needs. For developing knowledge sharing culture good technology becomes an essential ingredient of Knowledge management. There are some traditional tools useful to Knowledge management like cataloguing, classification, accessing, bibliographies But in modern age following tools are used in Knowledge management

(a) Internet  (b) Intranet
(c) Extranet   (d) Data warehouses
(e) Data Mining  (f) Hyper text
(g) Expert systems (h) Web conferences
(i) Geographical Information systems (j) Databases,
(k) Various softwares

KNOWLEDGE MANAGEMENT PROCESS

In an Information Week article, Jeff Angus and Jeetu Patel describe a four-process view of knowledge management that we have put into a table:

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There are three basic processes of KM i.e. Knowledge Acquisition, Knowledge Sharing, Knowledge Utilization.

1. **Knowledge Acquisition**: The process of development and creation of insights, skill, and relationship. An experienced stockbroker who can see the trend line on the computer monitor and tell which way the market is headed is an example of intuition or acquired Knowledge. It is this type of Knowledge on which IT components surrounding this process need to focus. Data computer tools with filtering abilities, intelligent databases, keyboard scanners, note-capture tools and electronic whiteboards are examples of information technology components that can support Knowledge Acquisition.

2. **Knowledge Sharing**: Dissemination and making available what is already known. An expert system that helps a novice technical support person answer tech support calls at the help desks of Microsoft is a good example of knowledge that is being shared with that person.

3. **Knowledge Utilization**: Learning is integrated into the library. Whatever is broadly available throughout the libraries can be generalized and applied, at least in part, to new situations.

**HOW CAN WE EFFECTIVELY MAINTAIN KNOWLEDGE MANAGEMENT**

Thomas H. Davenport et.al. in their study of a number of knowledge management projects were able to categorize them into four broad types of perspectives:

1. **To create knowledge repositories**, which store both knowledge and information, often in documentary form. These repositories can fall into three categories:
   - (a) Those which include external knowledge, such as competitive intelligence.
   - (b) Those that include structured internal knowledge, such as research reports and product-oriented marketing materials, such as techniques and methods.
   - (c) Those that embrace informal, internal or tacit knowledge, such as discussion databases that store “know how”.

2. **To improve knowledge access and transfer**.

   Here the emphasis is on connectivity, access and transfer. Technologies such as video conferencing systems, document scanning and sharing tools, and telecommunications networks are central.

3. **To enhance the knowledge environment**

   so that the environment is conducive to more effective knowledge creation, transfer and use. This involves tackling organizational norms and values as they relate to knowledge.
   - Increase awareness on sharing knowledge embedded in client relationship and engagements.
o Provide awards for contributions to the organization’s structured knowledge base.

o Implement decision audit programs in order to assess whether and how employees were applying knowledge in key decisions.

o Recognize that successful knowledge management is dependent upon structures and cultures.

4. To manage knowledge as an asset and to recognize the value of knowledge to an organization.

BENEFITS OF KNOWLEDGE MANAGEMENT

Some of the advantages claimed for KM systems are:

1. Sharing of valuable organizational information throughout organizational hierarchy.

2. Can avoid re-inventing the wheel, reducing redundant work.

3. May reduce training time for new employees

4. Retention of Intellectual Property after the employee leaves if such knowledge can be codified.

5. Time management

ROLE OF AGRICULTURAL LIBRARIES IN KNOWLEDGE MANAGEMENT

From various sources to capture useful information in different formats is really a tough work. By using knowledge capture techniques, knowledge managers can organize knowledge for users to use. In establishing digital knowledge resources, coordination and collaboration is very much needed within agricultural information system to avoid duplication and time waste.

To understand the future of agricultural information integration and access, one must understand present-day information networks in the proper context, i.e., how information networks evolved as a result of new digital technologies; how end users have affected the design of information networks; and how the increased demand for technology transfer and evolving role of information systems in this knowledge transfer process have influenced the structure of national, regional, and international information networks. A viable digital library network is an association of research organizations with sufficient common objectives to share current research programs and invest resources in digital library network activities.

Library and information Centres, are the centres of knowledge and considered it as power but never a commodity, need to change mindset. The library professionals have skills to organize published knowledge using ICTs. It is high time to think of handling
institutional knowledge. It is team effort and librarian alone can’t play the role. The university and research institutes have to reinvent themselves by collaborating and sharing the institutional knowledge riding the technology wave.

The ultimate goal of knowledge management is to provide the variety of quality services to the users in order to improve the communication, use and creation of knowledge. Speaking of KM, its basis of the knowledge collection, capture and classification and process, its aim is knowledge share and exchange, and its core is knowledge utilization and innovation. Like information use, the key aspects of KM are also user oriented services. These services are as the following.

(a) **Knowledge research and analysis**
Specialized selective dissemination of knowledge (SDK) are recommended to users or research projects for more critical and accurate knowledge delivery. “My library” service is another good choice for individual user collecting and establishing his/her own knowledge based libraries on the web.

(b) **Knowledge searching and linking**
Digital knowledge databases should be established on the core fields in engineering digital library system. Linkage of various databases and web sites will be needed and portal should be set up to indicate users to access the information or knowledge needed. Knowledge managers have the responsibility to help users to search whatever information they require.

(c) **Knowledge issuing and exchanging**
Within the vast knowledge sea, knowledge exchange and innovation are needed to be distributed quickly for a better share and effects. Digital libraries will provide fast communication channels and any other infrastructure for this purpose.

(d) **Knowledge resource sharing**
Knowledge resource sharing is our ultimate goal in digital library knowledge management. To set up a mutual web platform for digital libraries to manage their knowledge resources will benefit all users from different fields and sectors. And the system follows the international and national standards which will help us to share the knowledge more easily.

**CHALLENGES FOR KNOWLEDGE MANAGEMENT**
Challenges for knowledge management in Agricultural libraries are as under

(a) Lack of training of extension and agriculture research personnel,

(b) Lack of familiarity with computers,

(c) Lack of infrastructure,

(d) Lack of information to create a database,
CONCLUSION

Knowledge Management is a hot topic today and has become a powerful tool for promoting innovation and realizing re-engineering the various walks of life. Knowledge Management is not owned by any one group in an organization, nor by any one profession or industry. Knowledge management requires a holistic and a multidisciplinary approach to management process and an understanding of the dimensions of knowledge work. Librarians and information specialists, if they want to be key players in the emerging knowledge management phenomenon, have to understand the multiple perspectives of the other players.

REFERENCES

1. Shuchun, Pan, Digital library and Knowledge Management: Basis for agricultural Scitech Innovation.
KNOWLEDGE ORGANIZATION SYSTEMS (KOS) IN DIGITAL LIBRARIES

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ABSTRACT

Knowledge Organization Systems (KOS) such as classification schemes, authority files, semantic networks, ontologies are mechanisms are used to organize content for the purpose of retrieval and to manage a collection. This serves as a bridge between the user’s information need and material in the collection. Knowledge Organization Systems help the user to identify their need without prior knowledge of its existence. It guides user through a discovery process.

INTRODUCTION

Librarians are increasingly called upon not only to collect information in electronic form but also to organize it into digital libraries. Digital library (DL) research and development has concentrated primarily on collections and on the services to build and access them (Arms, 2000). To some extent, there has also been a focus on users and uses and on how well digital library constructions satisfy them (Borgman, 2000). A class of DL components has been missing from this development. This class we call knowledge organization system (KOS) resources and by this we mean the set of familiar and evolving systems that organize and define the terminology and notations we use to represent and organize concepts and real world objects. Essential to the successful implementation and use of any digital library is the organization of that library, either directly or indirectly, by one or more knowledge organization systems (KOS).

KNOWLEDGE ORGANIZATION SYSTEMS

The term knowledge organization systems are intended to encompass all types of schemes for organizing information and promoting knowledge management. Knowledge organization systems include classification and categorization schemes that organize materials at a general level, subject headings that provide more detailed access and authority files that control variant versions of key information such as geographic names and personal names. Knowledge organization systems also include highly structured vocabularies, such as thesauri, and less traditional schemes, like semantic networks and
ontologies. Because knowledge organization systems are mechanisms for organizing information, they are at the heart of every library, museum, and archive. All digital libraries use one or more KOS. Just as in a physical library, the KOS in a digital library provides an overview of the content of the collection and supports retrieval.

COMMON CHARACTERISTICS OF KNOWLEDGE ORGANIZATION SYSTEMS
KOSs have the following common characteristics that are critical to their use in organizing digital libraries. (Hodge, 2000)

- It imposes a particular view of the world on a collection.
- Same entity can be characterized in different ways, depending on the KOS that is used.
- Sufficient commonality between the concept expressed in the system and real world object.

NEED FOR KNOWLEDGE ORGANIZATION SYSTEMS
Digital libraries can be accessed by users from all over world, meaning that digital libraries have to meet the needs of a vast range of groups and individuals. To succeed in connecting users to the information they seek, digital libraries need to use KOSs to their full extent.

Terminologies
Authority files: Authority files are lists of terms that are used to control the variant names for an entity or the domain value for a particular field. Examples include names for countries, individuals, and organizations.

Glossaries: A glossary is a list of terms, usually with definitions. The terms may be from a specific subject field or from a particular work. The terms are defined within a specific environment and rarely include variant meanings. Examples include the Environmental Protection Agency (EPA) Terms of the Environment.

Dictionaries: Dictionaries are alphabetical lists of words and their definitions. Variant senses are provided where applicable. Dictionaries are more general in scope than are glossaries.

Gazetteers: A gazetteer is a list of place names. Traditional gazetteers have been published as books or have appeared as indexes to atlases. Each entry may also be identified by feature type, such as river, city, or school
Classification schemes, Taxonomies, Categorization schemes: These terms are often used interchangeably. Examples include classification systems such as CC, DDC, UDC etc for KO. Traditional KO activities, which were using various tools such as classification schemes; cataloguing, indexing etc have played a prominent role in organizing documents in a collection. In recent years this process has been challenged by developments in information technology. The new electronic environments pose a threat and challenge to the theory and practice of knowledge organization. KO in the new electronic environments must show that KO is worth pursuing and that is a valuable support to user’s information retrieval systems.

Subject Headings: This provides a set of controlled terms to represent the subjects of items in a collection. Subject heading lists can be extensive and cover a broad range of subjects. Examples include the Medical Subject Headings (MeSH) and the Library of Congress Subject Headings (LCSH).

Thesauri: Thesauri are based on concepts and they show relationships among terms. Relationships commonly expressed in a thesaurus include hierarchy, equivalence (synonymy), and association or relatedness.

Semantic Networks: With the advent of natural language processing, there have been significant developments in semantic networks. These KOSs structure concepts and terms not as hierarchies but as a network or a web. Concepts are thought of as nodes, and relationships branch out from them. Semantic web digital library would contain features like semantic blogs, semantic wikis, semantic search, social networks, semantic social information spaces etc. These will have open access, open information and open source.

Metadata: This is defined as ‘data about data’ or ‘information about information’. In the other words, metadata is data that describe information resources. Metadata is any data that supports the effective use of data, including information that can facilitate knowledge management, knowledge access and analysis. The data that metadata capture to describe an information resource can be divided into two categories viz., intrinsic and extrinsic data. Intrinsic data are characteristics extracted directly from the information resource such as title, author, and subject. The extrinsic data are those related to the administration and other non-bibliographic data such as author e-mail, author department, password or digital signature. The first is useful for knowledge management and administrative purpose which the second facilitates resource descriptions, identification and discovery.

Ontologies: Ontology is the newest label to be attached to some knowledge organization systems. The knowledge-management community is developing ontologies as specific concept models. They can represent complex relationships among objects, and include the rules and axioms missing from semantic networks. Ontologies that describe knowledge in a specific area are often connected with systems for data mining and knowledge management. To retrieve information about relevant sources in minimum time and efforts matching the given query from the vast amount of print and digital information sources is its implication.
ORIGIN AND USE OF KNOWLEDGE ORGANIZATION SYSTEMS

In the physical library, classification schemes such as Universal Decimal Classification (UDC), Dewey Decimal Classification (DDC) reflect among other things, the need to store a single item at a single location on a shelf. However, KOSs can be found in settings other than libraries. An awareness of the KOSs available from alternative sources is valuable when considering the development of digital libraries for a specific audience.

ABSTRACTING AND INDEXING SERVICE

This is a very fruitful way of knowledge management. The user can go through the abstract of the document and decide whether it’s relevant for further references. In a physical library, professional librarian can go through the document and trace the major keywords for indexing purpose. This helps to user to search his needs without wasting time and can find out exact information for his research purpose. For many years, the KOSs related to A&I services were applied only by catalogers and indexers trained in using the KOS indexing for a particular product or products.

PLANNING AND IMPLEMENTING KNOWLEDGE ORGANIZATION SYSTEMS IN DIGITAL LIBRARIES

The framework for developing an infrastructure to support the use of KOSs in digital libraries requires an analysis of user needs, the identification and location of the appropriate KOSs, and the development of the hardware, software, and network architecture to support its integration and maintenance. The digital librarian must take decisions concerning the degree to which they will be presented to the user, acquisition and intellectual property issues, and maintenance and update procedures. There are several technical ways to make the link between the digital library and the KOS.

VALUE OF KNOWLEDGE ORGANIZATION SYSTEMS IN DIGITAL LIBRARIES

There are two important principles in applying knowledge organization in digital libraries:

1. Use KOS behind the scenes to assist users and improve search and processing results.
2. When it is beneficial for users to interact with a knowledge organization system, provide user-friendly displays and interaction that guide users in making sense of what they see.

DL services interact with collections, KOSs, and users (both machines and human). They tend to be modular and designed for special purposes. They are designed to work
through networks and to be compatible with networking standards for machine-to-machine communication. In general, DL services support the functions of:

- acquisition and cataloging: collection building, metadata creation, and maintenance;
- search and retrieval: distributed query and response, query enhancement, access methods; and analysis and evaluation (including visualization)

**ROLE OF KNOWLEDGE ORGANIZATION SYSTEMS IN DIGITAL LIBRARIES**

In a DL, knowledge organization comes into play in several closely inter-related ways:

1. Organization of information in substantive databases;
2. Organization of information within documents;
3. Organization of information about documents and databases (metadata);
4. Organization of information about any type of subject treated in documents (needed to support finding documents and other digital objects);
5. Information about concepts and terms and their relationships; organization of ontological and lexical information. Knowledge Organization Systems in the core sense.

**CONCLUSION**

Knowledge organization systems include a variety of schemes that organize, manage, and retrieve information. They range from authority files to classification schemes, thesauri, and ontologies. Libraries and other information management organizations have developed KOSs to organize and retrieve information. In addition to their primary function, which is to provide access to materials for a specific community or audience, KOSs can perform functions that further enhance the digital library. A well-planned infrastructure for KOSs is required. This includes the resources, processes, and policies for analyzing user needs; locating KOSs to answer these needs; and acquiring, implementing, and maintaining the KOS. The existence of free-standing and accessible KOS resources will counter the tendency to build such systems into particular metadata standards and service protocols.

**REFERENCES**


12. www.indianjournals.com

13. www.dsoergel.com/.../SoergelDigitallibrariesandknowledgeorganiz..
BEST PRACTICES IN KNOWLEDGE MANAGEMENT: A CASE STUDY OF MADRAS UNIVERSITY LIBRARY (MUL), CHENNAI

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INTRODUCTION
The best practice is a great deal with the information science professional and that to all types of librarians. Librarians are doing innovative things and services and developing successful programs with help of Information Technology. There are lots of new tools available on the Internet; the great block is one of the sharing information among the social networking tools. The Customer (user) focused library services should be designed to study library services and service attitudes from a user perspective. Best practices from users were applied to library space utilization, service philosophy, and service visibility. With the great goal is being the achieved developing a customer-focused service model in the libraries.

BEST PRACTICES: CONCEPT EXPLAINED.
ODLIS (Online Dictionary of Library and Information Science) describes best practices as follows: “In the application of theory to real-life situations, procedures that, when properly, applied consistently yield superior results and are therefore used as reference points in evaluation of the effectiveness of alternative methods of accomplishing the same task. Best practices are identified by examining empirical evidence of success.”

Australian Best Practice Demonstration Program defines best practice as, “the pursuit of world class performance. It is the way in which the most successful organizations manage and organize their operations. It is a moving target. As the leading organizations continue to improve the ‘best practice’, goalposts are constantly moving. The concept of continuous improvement is integral to the achievement of best practice”.

In the modern 21st century knowledge based society, knowledge is the main primary resource. Efficient utilization of existing knowledge can create comprehensive wealth of the nation, and also improve the quality of life. There is a strong ability to create and maintain the knowledge infrastructure, develop knowledge workers and enhance their
productivity through creation, growth and exploitation of new knowledge, which will be
the key factors in deciding the prosperity of a society or a nation. Library and Information
Centres (LIC) in institutions of higher learning play the central role in facilitating
dissemination and creation of new knowledge.

Several attempts have been made at the international level to develop broad-based,
generic guidelines / best practices which can be suitably reoriented and implemented.
International Federation of Library Associations and Institutions (IFLA) has developed
best practices guidelines for various types of libraries as well as for specific services
(http://www.ifla.org). Australian Department of Education, Training and Youth Affairs
has brought out the “Best Practice Handbook for Australian University Libraries”.
American Library Association (http://www.ala.org) and its various organs like ACRL
have also brought out best practices for various types of libraries and their services.

In India, The National Assessment and Accreditation Council (NAAC), which
advocates for the best practices benchmarking approach in higher education in India, also
strives for quality and excellence in library and information services (LIS) in improving
academic environment. As a part of the institutional accreditation, it assesses the LIC of
that institution. The NAAC has identified a set of best practices with the help of a few
case presentations from selected libraries of the accredited universities and colleges. It
sponsored a “National Seminar on Best Practices in Library and Information Services”
which was held at the University of Bangalore, Bangalore from 9-12 August 2006. NAAC has also developed “Guidelines on Quality Indicators in Library and Information
Service” for universities / autonomous, college, and affiliated / constituent colleges. These are welcome steps in encouraging the LICs in identifying, sharing and adopting
best practices in India.

BEST PRACTICES IN LIBRARY & INFORMATION CENTRES

Best practices in a modern LIC, means the LIC that offers services and processes of the
highest order. Such LICs provide borderless services and are regarded as the valuable
resource. These LICs become partners in the achievements of the institutions’ mission
and goals. Its collections, systems and services reflect the organizations’ objectives. The
best LIC can be said to have following characteristics:

1. It reflects the values, mission and the goals of the institution
2. It accommodates myriad new information and learning technologies and the way
information is accessed and used
3. It is the only centralized location where new and emerging technologies can be
combined with traditional knowledge resources
4. As an extension of class room, it embodies new pedagogies including collaborative
and interactive learning
5. It offers user-focused, service-rich environment supporting contemporary social and educational patterns of learning, teaching, and research
6. It offers an ambiance that is extremely conducive for assimilation and creation of new knowledge. Whereas the Internet has tended to isolate people, the library as a physical space, has done just the opposite.
7. It enables acquiring life long information gathering skills so that they can acquire, access, evaluate, and use the information whenever they need even after completion of their formal education.
8. It facilitates technology-enhanced distance and continuing learning
9. It collaborates with users in service creation, evaluation and updating
10. Rapid changes - flexible enough to adapt to the changing scenario in terms of size of the collection, user requirements, technology application, organizational structures, and periodic up gradation
11. It makes library space (both virtual and physical) more interactive, collaborative and driven by community needs
12. Chief Knowledge and Learning Resource where one can truly experience and benefit from the centrality of an institution’s intellectual community.

MADRAS UNIVERSITY LIBRARY: BRIEF NOTE
Madras University Library was established 1907, even though the University was established in 1857. Since then the library has grown substantially, both in terms of collections, users, infrastructure and services.

The total collections of the library is nearly 5 lakhs spread in four campus Libraries. The Main Library(MUL) catering to needs of Arts, Social Sciences, Humanities, Foreign Languages and general reading publics. The Marina Campus Library caters to needs of oriented Languages. Guiney campus offers Sciences’ and the Basic Medical Sciences is served by Taramani Campus in Chennai city.

Further, the Library has been identified by INFLIBNET as one of the major centre for Retrospective Conversion of Manual catalogue into machine readable form (RECON) Project). So far the Library computerized about 120,000 documents in computerized form and supplied the same to UGC-INFLIBNET for merging with books databases created by the INFLIBNET Centre. As a part of its development activities, the Madras University Library has plan to network all its campus libraries situated in different parts of Chennai city.
MUL BEST PRACTICES – CASE STUDY

In the forthcoming paragraphs, the practices being followed in Madras University Library Chennai – considered to be one of the proud and the oldest Library in the country, are presented,

The Mission

Bringing the world of electronic information contents to the desktop of the clientele for their better performances in the arena of research and development. Better refinement of existing physical and electronic environment of Madras University Library for efficient and effective use of the clientele and to cope up with the paradigm shift in Education Sector.

Standardising the functions and services of the library on par with the International library standards so as to enable this library to be in the list of top most academic and research libraries of the country.

Restructuring and refurbishing the library premises so as to provide conductive reading environment to attract more number of clientele and inculcating the habit of regular use of the library.

The Vision

The vision is to establish knowledge revolution among the academic and researchers of the country by collecting, organizing and disseminating nascent information so as to have better control over the information explosion by creating information infrastructure and resource base including e-resources.

For the first few years after the inception of the Library, it did not lend books. The fellows and faculty of the University, members of the Staff of affiliated colleges and registered graduates only were allowed to refer the documents in the Library premises. Though the reference of the books in the Library was restricted to those who are engaged in special research work and advanced teaching or who were studying for the higher degrees of the University, under graduates and students attached to affiliated colleges were on the special recommendations of the Principals of the colleges were admitted for the purpose of consulting documents at the discretion of the Chairman of the Library Committee.

The total users during 1913 were only ninety. In 1914 library was thrown open to all persons entitled to make use of the Connemara Public Library and thus the general public.
In the same year teachers of colleges, graduates and research students residing at Madras were allowed to borrow books on payment of Rs.20 as refundable deposit. In 1921 the loan privileges was further extended to the under graduates studying for Hons Degree in the City of Madras.

In 1926 the library began to deliver books at the residence of the graduate members of the library in the city on a quarterly subscription of a rupee. In 1928, the privilege was further extended to the teachers for the affiliated colleges in the moffusil and to all the under graduates in the city. From 1936, graduates of the university residents in the moffusil areas have been allowed to borrow on payment of the usual deposit. The amount so collected as deposit from members was deposited in the post-Office savings Bank Account, Rs.100 being retained as a working balance. These depositary procedures are still followed in the Library with Rs.250 caution deposit from 2004.

Since the year 1957 there is a sharp rise in membership. The growth of membership is been presented in the Table No.2.

**GROWTH OF MEMBERSHIP OF THE LIBRARY**

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<tbody>
<tr>
<td>No. of Members</td>
<td>1636</td>
<td>5019</td>
<td>5883</td>
<td>10,212</td>
<td>17,215</td>
<td>38,600</td>
<td>1,738</td>
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From the year 2004 the General Public membership has been stopped. Only University faculty, staff, students, affiliated colleges and institutions are permitted to enroll as registered member of our Library.

**REFERENCE SERVICE**

For the better use of library collections, it is decided to allow the users to search the required materials by using OPAC. This change helped many users to have free access of books. To strengthen the Reference collections some important reference books have been procured and added to existing collections. Long range and Short range Reference books have been Procured and added to existing collections. Long range and short range Reference services are being offered to library users.

**REPROGRAPHY SERVICE**

The University Library provides Photocopying facilities for the users particularly the research scholars and educational institutions.
DATABASE SEARCH SERVICE
Researchers were allowed to do CD-Search on “International Dissertation Abstracts”, “International Periodical Abstracts” and other databases. A total number of 2000 research scholars are benefited per year by this service.

RESOURCE CELL FOR COMPETITIVE EXAMINATIONS (RCE)
A Resource Cell for Competitive Examinations has been functioning for the benefit of the users. This Cell caters to the resource needs of all types of competitive examinations like IAS, IPS, GATE, GRE, TOFEL, TNPSC, CAT, etc. About 1500 books were added to RCE Unit every year. An Average of 50 users per day visited the unit and availed the facilities.

AUDIO VISUAL AIDS
The weekly video film show is conducted on every Friday on different topics of interest. More than 300 library users per year viewed the shows and got benefited by this Programme.

PROFESSIONAL TRAINING
The Department of Information Science, University of Madras has sent students to undergo training at the MUL under the Internship Training Programme. They have been given training at different work spots of our Library under the direct control and supervision of the Librarian. Apart from this, library is regularly organizing different workshops to train the library professionals working in the different libraries of Chennai city.

UGC-INFONET
The UGC-Infonet Project is a joint effort by UGC and INFLIBNET Centre, Ahmedabad to promote electronic information resource sharing activity among major University Libraries. The University of Madras has signed MOU for UGC-Infonet Project with UGC INFLIBNET on 20.12.2002. As per the MOU, the physical connection will be established by ERNET-India. New Delhi with a 2 Mbps leased line from ERNET Pop Centre and the electronic resources distribution will be made by INFLIBNET Centre to the respective universities through the exclusive network made and maintained by ERNET- India. Currently, our University is getting about 4600 full text e-journals and 9 databases out of this programme.
DIGITAL LIBRARY

The Digital Library development has been initiated in the library. In the initial stage, the digital process is initiated to the theses available in the library. And also there is a plan to incorporate the Internet resources along with the other e-documents. As a part of UGC-Infonet Programme, the users are privileged to access more than 4600 e-journals through the digital library mode. About 4,00,000 pages of Ph.D. thesis have been digitised and the Thesis Digital Library (TDL) is functioning at our library.

UPE PROGRAMME

Under UWPFE (University With Potential For Excellence) : Library Modernisation Programme the Main Library has been allotted with Rs.143 lakhs out of the total grant of Rs.380 lakhs. The projects envisaged under this programme are:

- Automated Document Management System (ADMS)
- Online Public Access Catalogue (OPAC)
- Online information Zone (OLIZ)
- Video Conferencing Suite (VCS)
- Multi Media Lecture Hall (MLH)
- Digital Library System (DLS)
- E-Resources

TOUCH SCREEN FACILITY

The Touch Screen facility was installed at our Main Library to provide information on library collection, activities, services and other facilities available for user population.

- Library Services
- Reference Service
- Referral Service
- Book Acquisition Service
- Book Lending Service
- Inter-Library Loan Service
- Stack Maintenance Service
- User Assistance Service
- Reprographic Service
- British Council Library Membership
CONCLUSION
Best practices do not have one template or form for everyone to follow. Documenting and charting of these practices may be complex and difficult for many libraries to implement due to several constraints, it is the pursuit of superior performance that can motivate and lead libraries to Best Practices. LICs need to take a first leap forward, even at a moderate level. A vibrant sense of curiosity, willingness to change and learn from experience of others is a key to success.

Libraries should also encourage the transfer of knowledge and experience from experienced staff to new staff members. A mentoring system should be in place to help newcomers to learn from experienced library staff. Informal seminars and brownbag sessions where staff can interact and exchange “lessons learned”, “best practices” and other specific experience and knowledge should be scheduled at regular intervals and at convenient times. Special interest groups and chat rooms can be created through intranet. Since many valuable experiences have been accumulated over time, libraries should pay attention to favorable working conditions and environment, which will contribute to better staff retention.

REFERENCES


ABSTRACT

This article attempts to define on Knowledge Management, its definition, the value of KM and the scope of KM system is discussed. There cannot be a single standard model for KM systems as the KM work is highly attuned to variations in environmental factors. Here a model is suggested which encompasses the most common components at a generalized level.

Keywords: Knowledge Management, KM Model, Information System, Value of KM.

INTRODUCTION

Knowledge management is understood to be an umbrella term encompassing many unique but related facets of knowledge – exchange, transfer and uptake among them. While there is no universally accepted definition of KM, most are extremely similar. For this paper, the working definition of knowledge management has been determined to be “... the systematic process by which knowledge needed for an organization to succeed is created, captured, shared and leveraged.”

KM is consistently linked to making good decisions based on available information. “Knowledge is the combination of data and information, to which is added expert opinion, skills and experience, to result in a valuable asset which can be used to aid decision-making. Knowledge may be explicit and/or tacit, individual and/or collective”.

KNOWLEDGE MANAGEMENT (KM)

Knowledge Management refers to managing data gathered into information aimed towards a specific approach or pattern which, in turn, helps in further generation and
dissemination of knowledge. It is considered to be enhancing intellectual property and efficiency of productivity in any organization.

Definition
The knowledge in an organization is its valuable asset. Based on this belief the activities of assessing the knowledge required by and used by the organization are determined. The area of information science dealing with these activities has emerged as a new subject of study called Knowledge Management (KM). Knowledge management is the integrated and collaborative process of information asset creation, capture, organization, access, and usage.

According to Cronin and Davenport, the definitions of KM derived from the different angles are as follows:

- Knowledge Management is predominantly seen as ‘information management’ in the context of LIS
- Knowledge Management is seen as management of ‘know-how’, in the context of business processes
- Knowledge Management denotes a major conceptual shift, from knowledge as a resource, to knowledge as a capability, a readiness to respond which allows organizations to co-evolve effectively within a given environment (organizational theory)

SCOPE OF KNOWLEDGE MANAGEMENT SYSTEMS (KMS) AND INFORMATION SYSTEMS

Knowledge management encompasses a very wide range of activities, links and tools. It is difficult to demarcate the modules and assign the tasks involved because many of the tasks are overlapping or should be conducted in recursive loops. Simplifying the complex functional definition to a more work-driven one, the processes involved in KM can be enlisted as follows:

As a set of activities comprising the following actions on knowledge.

- **Development** – acquiring, capturing, creating, discovery
- **Application** – using, enacting, executing, exploiting
- **Assessment** – appraising, evaluating, validating, verifying
- **Preservation** – storing, securing, conserving, retaining
- **Update** – evolving, improving, refreshing, maintaining
- **Transfer/dissemination** – communicating, deploying, disseminating, sharing
- **Transform/Re-packaging of knowledge**. – compiling, formalizing, standardizing, explicating, extracting.
THE VALUE OF KNOWLEDGE MANAGEMENT

In an organizational context, data represents facts or value of results, and relation between data and other relations have the capacity to represent information. Patterns of relation of data and information and other patterns have the capacity to represent knowledge. For the representation to be of any utility it must be understood, and when understood the representation is information or knowledge to the one that understands.

The value of Knowledge Management relates directly to the effectiveness with which the managed knowledge enables the members of the organization to deal with today’s situations and effectively envision and create their future. Without on-demand access to managed knowledge, every situation is addressed with the sum total of everything anyone in the organization has ever learned about a situation of a similar nature. Which approach would you perceive would make a more effective organization?

DESIGN OF KNOWLEDGE MANAGEMENT SYSTEM (KMS)

The design aspect mainly depends on agreeing upon the boundaries that define KM. The solution perhaps is in marking the difference between ‘information’ and ‘knowledge’. The two terms are often used as synonyms. But it is necessary in the light of KM, to note the difference.

The term “knowledge” is used to refer to processed information, the acquired skills and experience, the resources and the understanding that individuals need to perform complex jobs or solve a problem.

There are two distinct forms of knowledge: “tacit knowledge”; and “explicit knowledge”. Tacit knowledge represents the greater part of knowledge. It is linked to the “experience” of people and is difficult to formalize. Explicit knowledge is linked to processes and information and can be easily recorded, codified, stored and shared.

A project on knowledge management at University of Edinburgh, states in its objectives that it is concerned with how specific aspects of modeling, ontology’s and planning techniques can support Knowledge Management. The recommended approach is a multi-perspective modeling approach. Several models need to be developed, each of which represents a different perspective on the organization which can be characterized as “How, What, Who, Where, When and Why”

- How the organization carries out its business - modelling the business processes
- What the processes manipulate - modelling the resources
- Who carries out the processes - modelling capabilities, roles and authority
- Where a process is carried out - modelling of the communication between agents
- When a process is carried out - this specifies the control over processes
Taking into consideration the above discussion a model for KMS is suggested as below:

![KMS Model](image)

**COMPONENTS**

**Knowledge base**

The basic component is the knowledge. There are two ways of incorporating knowledge:

1. Build databases of existing documents and procedures.
2. Incorporate a learning module or add by inferencing mechanism.

The knowledge base is generally in a distributed model. Knowledge at the individual nodes logically integrates into the knowledge base, which is accessible from all the nodes.

**Processes**

In a KMS, the processes play an important role. The key factor is that the output from one stage becomes an input to other. The process flowchart determines the information flow. Also, the feedback and adjustment will have a cascading effect on all the linked processes.

**Environment**

This is not a tangible component but has tremendous impact on the design and output of KMS. The KMS depends upon environmental factors such as changes in the processes, people or ideas and technology deployment. There is always interaction between the different components to have a dynamic effect on the system as a whole. Accordingly the
other components of the system vary. For example, for the KM model planned over an intranet the products may be delivered online and the feedback also could be evaluated and be incorporated online.

**Products**

The range and the type of products that may be deliverables in KM Model vary to a great degree. However they may be broadly classified as under:

1. **Direct information products**: these may be in the form of regular information products like current contents of publications in soft copy or printed. They are directly utilized by the users in the projects. The difference between information systems being that the knowledge within maybe linked and manipulated till a desired output is obtained. Output is again varied according to requirement -- it may be an end product or a design of a process.

2. **Indirect tools**: these are deployed by the users to package knowledge or convert it to a usable form. These indirect tools may be treated as links in the processes. Examples of this type are software programs that are used to generate data after manipulation of input or scientific formulae which may be used for calculations, to arrive at intermediate results.

**CONCLUSION**

The Knowledge Management Systems model has a structural and functional basis in the information systems model. The main difference is the high degree of dynamic activity involved in the KMS. To summarize in the words of Dr. Malhotra, ‘use of the information and control systems and compliance with pre-defined goals, objectives and best practices may not necessarily achieve long-term organizational competence. This is the world of ‘re-use,’ ‘re-engineering’, ‘re-cycling’ etc, which challenges the assumptions underlying the ‘accepted way of doing things.’ This world needs the capability to understand the problems afresh given the changing environmental conditions. Knowledge management focuses on ‘doing the right thing’ instead of ‘doing things right.’

**REFERENCES**


3. [http://www.aiai.ed.ac.uk/~alm/KAMSLIDES/sld004.htm](http://www.aiai.ed.ac.uk/~alm/KAMSLIDES/sld004.htm)


7. *http://www.brint.com/interview/maeil.htm*


CHANGING ROLE OF LIBRARIANS IN SPECIAL LIBRARIES: KNOWLEDGE MANAGEMENT

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ABSTRACT

This paper presents the concept of knowledge management, the role of special library and information centers in managing the knowledge and information in the digital environment. It also highlights the benefits of knowledge management and it explains the implementation of knowledge management in special library.

Keywords: Special library, knowledge management

INTRODUCTION

The application information technology in agricultural practices and research has given a new force to all stakeholders of agricultural knowledge producers and users viz. agricultural scientists, entrepreneurs, farmers, policy makers and of course librarians, information professionals etc. There is a vital sense of interconnectivity among these players nationally and internationally, giving rise to agricultural knowledge revolution that increased the extensity, intensity and velocity of agricultural knowledge production and use. As we know knowledge is power and knowledge management is a powerful tool that helps to realize, share and nurture this power for the benefit of our large scientific and farming community.

Agricultural knowledge management comprises of a range of strategies and practices in an organizations to identify, create or capture, represent or index, integrate, distribute and enable adoption of insights and experiences. Such insights and experiences comprise knowledge either embodied in individuals’ mind or embedded in organizational process.

Knowledge management is generally understood to mean the sharing of knowledge inside or outside of an organization. Knowledge sharing has been greatly facilitated by modern computer based technology. The term is used loosely to refer to a broad collection of organizational practice and approaches related to generation, capturing and disseminating know-how and other content relevant to the organizations’ business.

Knowledge management may be defined as the set of processes for enabling individuals within an organization to effectively share information and knowledge to save time and make better decisions. Knowledge management has become a strategic
initiative in many organizations, yet during difficult economic times special libraries, information centres or knowledge management is often targeted as cost saving opportunities.

**PRINCIPLES OF KNOWLEDGE MANAGEMENT**

The following are the principles of knowledge management given by Thomas. H. Duvenpart

- Knowledge management means improving work process knowledge
- Knowledge management access is only the beginning
- Knowledge management is expansive
- Knowledge management is highly political
- Knowledge management never ends
- Knowledge management requires a knowledge contract

**KNOWLEDGE MANAGEMENT AND SPECIAL LIBRARIES**

Knowledge Management is considered as an organizational asset. KM embraces Information Management, and other concepts such as Tacit and Explicit Knowledge, and information professionals are the major players in this field. KM involves exploiting the expertise knowledge, interaction and communication of individuals, forming a collective knowledge base for communities of practice and there is a necessity for storing, creating, sharing and re-using knowledge.

Information is a central need for organizations. Information Management is “an impressive term for the various activities that contribute to the effective production, coordination, storage, retrieval and dissemination of information in whatever format, internal or external sources, leading to the more efficient working of the organization” (Harrods1995). To remain competitive it is necessary for organizations to efficiently and effectively create, locate, capture and share their organization’s knowledge and expertise which necessitates making explicit and storing for distribution and reuse (Zack 1999)

Libraries are repositories of information with documentary sources, centers of storing and organizations for information and knowledge. The Special Librarians are Information resource experts who collect, analyze, evaluate, package and disseminate information to facilitate accurate decision making in corporate, academic and government settings (SLA). The Special Librarian’s job involves apart from providing traditional services through an operational documentary base and online searching the access, organization, sorting, repackaging, synthesizing, finding answers and understanding members’ specializations. Librarians who are experienced in the information field are constantly working closely with the user who is a member of the organization, and it is easy for the promotion of interaction between the users. Librarians have an interaction with other libraries. They are an important knowledge base for the organization.
NEED FOR KNOWLEDGE MANAGEMENT

Knowledge management is an important asset for an organization because knowledge management provides access to various aspects like experience, knowledge and expertise that creates new capabilities which enable better performance, encourage innovation user value. Today every organization needs to know their knowledge assets, how to manage and make use of these assets to get maximum benefits. In library and information centers knowledge management needs to be applied to capture information, create knowledge improve services to users and enable users to share and learn.

BENEFITS OF KNOWLEDGE MANAGEMENT

Knowledge management applications could benefit in research process, curriculum development process, users' and services, administrative services and strategic planning in the following way.

- Improved services for scientists
- Facilitation of interdisciplinary research.
- Improved services capability of staff.
- Improved effectiveness and efficiency of administrative services.
- Improved responsiveness and communication capabilities.

APPLICATION OF KNOWLEDGE MANAGEMENT IN SPECIAL LIBRARIES

Special libraries have been involved in Knowledge management along with computer centers, research units, personal and business offices and provide the leadership for corporate efforts.

They can use knowledge management as a way to expand library’s role to areas as administration or support services. Knowledge management offers an opportunity to manage some of these issues and achieve institutional goals by using organisational knowledge.

CHANGING ROLE OF LIBRARY PROFESSIONAL IN DIGITAL AGE

In the present technological/Internet era the professionals have to change themselves as the information profession is being changed. Now information specialists have to work as e-information resources in which various professional groups are expected to map strategies that lead to produce, manage, maintain and service the information. An information professional has to work as:

- Librarian
- Information Manager
- Information adviser/instructor
- System & Networking professional
The special librarian may be a full-time member of an information management team in an organization. The unique contributions of the special librarian include expertise in the content and selection of the best available print and electronic information resources as well as a commitment to putting knowledge to work. In other words, linking the information user with the right information resource at the right time.

The special librarian identifies, retrieves, organizes, repackages and presents information in an actionable form so that the potential for goal attainment is maximized. The special librarian helps control the flood of available information by selecting what is relevant and usable and, when required, analyzing or synthesizing the content.

The special librarian is a technology application leader who works with other members of the information management team to design and evaluate systems for information access that meet user needs. Where required, the special librarian provides instruction and support so that end users can make optimal use of the information resources available to them. The special librarian is capable of working in the hybrid world of print and electronic media and providing the best mix of information resources in the most appropriate formats for the environment.

The special librarian also plays another important role in ensuring that contractual, legal and ethical obligations regarding information use are met. The electronic information age provides new opportunities for organizations to produce as well as use information products. Special librarians, given their familiarity with the information marketplace, can be key contributors to the development, marketing and use of information products.

Special librarians are knowledge-based practitioners who use research as a foundation for their own professional practice and who support the conduct of research through their professional associations. In the information age, special librarians are essential -- by responding with a sense of urgency to critical information needs they provide the information edge for the knowledge-based organization. In order to fulfill this key information role.

**QUALITIES OF A LIBRARIAN TO BECOME A KNOWLEDGE MANAGER**

- Providing services to the end user
- Sharing of information and understanding the user needs
- Analysing documents, classifying and storing them for easy retrieval
- Knowledge of current advances in information systems and technologies and their application in libraries.
CONCLUSION

Digital age has brought a tremendous change in the way of information is stored and accessed. This has brought about a change in the concept of librarian, their collection and services. Many new terms viz. Digital Librarian, Libraries without walls, virtual libraries, are emerging to describe the libraries of digital age.

REFERENCES

7. Shivnthi, Weerasinghe. Knowledge Management: Challenges for the Special Librarian.
APPLICATION OF CONTENT ORGANIZATION & KNOWLEDGE MANAGEMENT IN AGRICULTURAL LIBRARIES IN INDIA: AN OVERVIEW

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ABSTRACT
The information products created by organizations are the essential means of communication and exchanging knowledge within the organization on which it depends for its livelihood. It depends upon the flow, exchange, application, and preservation of information and knowledge. However, they are seldom considered as a whole, or seen as part of the domain of information and knowledge management. The full range of stakeholders in them, particularly the users, goes unrecognized. This paper focuses on three key groups of stakeholders: LIS professionals, IT/information systems professionals and information designers. Their collaboration will be helpful to upgrade the quality and effectiveness of information products. It discusses the common ground where they share the knowledge and skills they could contribute to organizational information products and why their potential contribution is not recognized by top management. Means of overcoming the obstacles and achieving productive mutual understanding are proposed and opportunities for initiatives by LIS professionals are suggested.

Keywords: Content Organization, Knowledge Management, Agriculture, Library, metadata, ontology, e-resources.

INTRODUCTION
A library is considered as a storehouse of knowledge. Major part of the knowledge of a library is engaged to record books, journals, newspapers, patents, standards, theses, reports, and other documents in the form of data and information. Majority of these are procured from outside and rest are generated locally from annual reports of the organizations, trip reports, committee reports, budget proposal, case descriptions of successful projects, audited statement of income and expenditure, and locally compiled databases. Well-established rules and procedures are followed to record these items in any library. Among these rules, some rules are framed locally by the library staff for the proper management.

The other part of the knowledge of a library lies with the library staff themselves. Knowledge of the library staff varies from person to person. Somebody may be well-versed in classification, another in cataloguing, and someone may be in reference service. A good librarian must have adequate knowledge about the expertise of his staff and utilize their expertise to the optimum level. An effective knowledge management can be performed utilizing such type of person in a proper way. However, if the head of organization is unaware about the potential of staff, then it may be the worst case of knowledge management in a library.
DIRECTORATE OF KNOWLEDGE MANAGEMENT IN AGRICULTURE (DKMA)

The Directorate of Knowledge Management in Agriculture is aimed at promoting the ICT driven technology and information dissemination system to all the stakeholders in agriculture in an easy and cost-effective way. Keeping pace with the current knowledge diffusion trends, Directorate is delivering and showcasing ICAR technologies, policies and other activities through print, electronic and web mode. The Directorate acts as the nodal center for design, maintenance and updating of ICAR website along with facilitation of network connectivity across ICAR institutes, SAUs and KVKs. Besides. The Directorate provides public relation and publicity support to the council and its constituents in the country.

THRUST AREAS OF DKMA

Dissemination and sharing of agricultural knowledge and information are done through value added information products in print, electronic and web mode.

- To develop e-resources on agricultural knowledge and information for global exposure.
- To facilitate strengthening e-connectivity among ICAR institutes State Agricultural Universities and KVKs.
- To assist in capacity building for agricultural knowledge management and communication.

ACHIEVEMENTS OF DKMA

- Reoriented ICAR popular magazines to make demand-driven and competitive.
- Facilitated online access to 2000 journals from a single subscription in more than 123 libraries under CERA project of NAIP.
- Revamping of ICAR website to make it more user-friendly with links to related organizations and issuing weather based agro-advisories.
- Developed National Agricultural Research Database and bibliographic inputs were provided for inclusion in Agris database (FAO).
- A hub has been operationalized at ICAR Hq. for e-connectivity of 192 Krishi Vigyan Kendras (KVK) and 8 Zonal Project Directorates (ZPD) in the country.
- A centralized and secure state-of-the-art data center has been established for providing e-mail and website hosting services for whole ICAR system.

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- A National Knowledge Network project of Government of India has provided link to 9 ICAR institutes/SAUs and rest of the institutes will be linked gradually to 100 mbps broadband.
- Established Video Conferencing and IP Telephony facility at 23 selected ICAR Institutes connected on ICAR-ERNET network.
- Under outreach programme, video films depicting successful technologies were produced and telecasted over National and Lok Sabha channel. Dedicated radio (AIR) and television (Doordarshan) programmes on ICAR launched.
- Facilitating organization of Media Meets at ICAR institutes.
- Made available the monthly research journals like *Indian Journal of Agricultural Sciences* and *Indian Journal of Animal Sciences* in open-access mode besides availability of in-house journals on ICAR website.
- Launched/co-operated NAIP sponsored projects for E-publishing of research of publications, standardization of websites of ICAR institutes, development of a digital information dissemination system for ICAR and mobilization of mass media support for sharing agricultural knowledge.
- Capacity building of ICAR scientists for agricultural communication and knowledge management through training courses at Indian Institute of Mass Communication, New Delhi and Indian Institute of Management, Lucknow.

**RKMP DIGITIZATION OF LIBRARY RESOURCES IN NARS**

A prototype of Rice Knowledge Management Portal (RKMP) was developed with SQL Server as back end an ASP.Net as front end. Five information systems (General, Extension, Farming, Research, Service Information system) have been developed. Contents for extension information system (EIS) and farming information system (FIS) has been collected and integrated with RKMP portal. Location specific FAQ page has designed. A web application including static and dynamic information was developed.

**SOFTWARES USED IN INDIAN AGRICULTURE LIBRARIES**

For the purpose of computerisation of library activities some ready-made, commercial software packages are available in market. A librarian can procure the integrated version of the package for full library automation or the abridge version with requisite modules by paying the price accordingly. Some the internationally repute agriculture library specific software being used in India are: Citation 7, End note Plus 2, TLC, CDS/ISIS, Libsys, Alice for Windows, SOUL, SANJAY, MINISIS, WINSIS etc. for total library automation. Besides the above software, few more software are required to be installed for the purpose of scanning, bar-coding, master chips reading, magenic sensitizing digitization etc.

**ABSTRACTING AND INDEXING SERVICE**

This is a very effective way of knowledge management. At first, the users go through the abstract of the document and then decide about the relevance of the document for further reference. In a physical library, professional librarian can go through the document and trace the major keywords for indexing purpose. This helps to user to search his needs without wasting time and can find out exact information for his research purpose.
PLANNING KNOWLEDGE ORGANIZATION SYSTEMS

To analyze the usefulness of KOS in a particular digital library, it is essential to understand the environment of the user. Librarian should analyze the user needs and it is necessary to locate KOSs to meet the need. Many users are aware of KOSs on the web within their discipline. Developers may also turn to directories, librarians in the field, and reference sources or they may perform a general search of the Internet. If the KOS is stored in database, user would need log on information such as user ID and password from the digital library system to the external KOS, in order to provide access to the web-enabled database. In the case of more direct link, the access may be by URL. The KOS can be exposed to the user in different ways. Material can be grouped into KOS related themes or categories on the digital library’s web site. The KOS may be used at a higher level to identify specific portals for different uses or users. If the content of the digital library includes meta data records, the KOS may be displayed as index terms on the records or in its entirely as a navigation aid to searching.

Metadata

This is defined as ‘data about data’ or ‘information about information’. In the other words, metadata is data that describe information resources. Metadata supports the effective use of data, including information that can facilitate knowledge management, knowledge access and analysis. The data that metadata captures to describe an information resource can be divided into two categories such as intrinsic and extrinsic data. Intrinsic data are extracted directly from the information resource such as title, author, and subject. The extrinsic data refer to the administration and other non-bibliographic data such as author e-mail, author department, password or digital signature. The first is useful for knowledge management and administrative purpose which the second facilitates resource descriptions, identification and discovery. Metadata therefore, captures the wide range of intrinsic or extrinsic information about a variety of objects. These intrinsic or extrinsic characteristics and features are described in the individually structured data elements that facilitate object use, identification and discovery.

Standard bibliographic information, indexing and cataloging information and classifications are all structured data that describe the characteristics and contents of information resources to facilitate their discovery and use. In the traditional libraries, the user can consult with the librarian, as an intermediary, to interpret the metadata used for resource description; but in the web the story is different. The information provided by a wide range of resource description communities, each with his own metadata, and accessed through one portal.

Semantic Web

The Semantic Web is a collaborative movement led by the World Wide Web Consortium (W3C) that promotes common formats for data on the World Wide Web. By encouraging the inclusion of semantic content in web pages, the Semantic Web aims at converting the current web of unstructured documents into a "web of data". According to the W3C, "The Semantic Web provides a common framework that allows data to be shared and reused across application, enterprise, and community boundaries."
The main purpose of the Semantic Web is driving the evolution of the current Web by enabling users to find, share, and combine information more easily. Humans are capable of using the Web to carry out tasks such as finding the Irish word for "folder", reserving a library book, and searching for the lowest price for a DVD. However, machines cannot accomplish all of these tasks without human direction, because web pages are designed to be read by people, not machines. The semantic web is a vision of information that can be readily interpreted by machines, so machines can perform more of the tedious work involved in finding, combining, and acting upon information on the web.

Some of the challenges for the Semantic Web include vastness, vagueness, uncertainty, inconsistency, and deceit. Automated reasoning systems will have to deal with all of these issues in order to deliver on the promise of the Semantic Web.

The term "Semantic Web" is often used more specifically to refer to the formats and technologies that enable it. The collection, structuring and recovery of linked data are enabled by technologies that provide a formal description of concepts, terms, and relationships within a given knowledge domain. These technologies are specified as W3C standards and include: Simple Knowledge Organization System (SKOS).

**Ontology**

The prerequisite of this web is metadata that explicitly represent semantics of data which is called ontology. This is the newest label to be attached to some KOSs. The knowledge management community develops ontologies as specific concept models. They can represent complex relationships among objects, and include the rules and axioms missing from semantic networks. Ontologies describe knowledge in a specific area that are often connected with systems for data mining and knowledge management. Now, ontology as a new emerging form of metadata is revolutionizing the current classificatory approaches towards semantic metadata.

**KNOWLEDGE MANAGEMENT**

1. According to Karl Sveiby KM is, “The art of creating value from an organization’s intangible assets.”

2. According to Davenport and Prusak, “KM is concerned with the exploitation and development of the knowledge assets of an organization with a view to furthering the knowledge objects.”

3. According to Despres, and Chauvel, “The purpose of Knowledge Management is to enhance organizational performance by explicitly designing and implementing tools, processes, systems, structures, and cultures to improve the creation, sharing, and use of different types of knowledge that are critical for decision-making.”

4. According to the World Bank, “KM is the management of knowledge through systematic sharing that can enable one to build on earlier experience and obviate the need for costly reworking of learning by making the same repetitive mistakes.”
COMPONENTS OF KNOWLEDGE MANAGEMENT

1. Some essential components of Knowledge Management are as follows:
2. Treating the knowledge component of business activities as explicit concern of business reflected in strategy, policy and practice at all levels of the organization.
3. Making a direct connection between and organization’s intellectuals assists both explicit and tacit and positive business results.
4. Identifying and mapping intellectual assets within the organization, generation new knowledge for competitive advantage within organization, making vast amounts of corporate information accessible.
5. Sharing of best practices and technology enables all of the above.

Process of Knowledge Management

The focus of successful KM program is to make this implicit knowledge about organizational knowledge explicit and to put in place of systematic process that identify it, develop it, share it and explicit it.

STRATEGY OF KNOWLEDGE MANAGEMENT

The different KM strategies to match their culture, priorities and capabilities in organization are categorized into six KM strategies. These are as follows:

1. Transferring information and best practices via IT systems for capturing and employee’s tacit knowledge into software (for example, best practices databases, analytical models in spreadsheets).
2. Capturing about customers,. Here also IT systems are used to capture customer date (for example. FAQ databases, Customer Profiles).
3. Leveraging R & D into several applications.
4. Creating more value from existing intellectual assets.
5. Creating strategy focused on individual’s innovation and knowledge creation.
6. Commitment to a knowledge focused strategy.

NEED FOR KNOWLEDGE MANAGEMENT

The KM will help in the following ways:

1. To enhance users satisfaction.
2. To interact and retain new information seeker.
3. To increase public faith in the organization to strive, meet and manage needs of user community.
4. To be able to justify the spending of funds allocated to the organization/library and information center by the parent body.
5. Recruiting the best people for the job.
6. Exposing professionals to the complexity of real problems to stimulate and cultivate professionals know how to retain professionals to react fast in problem solving techniques.
7. Boost professional’s problems solving abilities by capturing knowledge in system and software.

**KM IN LIBRARY AND INFORMATION SCIENCE (LIS)**

Knowledge Management has reached in a respectable position in the creation of the knowledge innovation systems of a country. Now a day, librarians need to be aware of the implication of the changes in knowledge society. They have to develop technological and managerial skills that will help them for effective use of information to meet their organization changing needs. Now-a-days libraries are acting as a bridge between knowledge generator and knowledge user. The knowledge in digital library resides in data bases, knowledge bases, text bases, gopher spaces or the WWW. The digital assets of libraries in the present electronic era affect the prosperity of their present organization for achieving their goals. Hence, it is the high time to incorporate the Knowledge Management into library operation to improve its effectiveness.

Information technology is a necessary though not solely sufficient component of profitable knowledge management. All types of technologies are today being associated with knowledge management. Some of these are:

- Internet
- Intranet
- Artificial Intelligence
- Expert Systems
- Data Mining
- KBMS
- DBMS
- Simulation
- Web Technologies
- Web Mapping Tools

**SUCCESS OF KNOWLEDGE MANAGEMENT**

Majority of barriers to success with knowledge management are entrenched within the culture and structure of the organization. Success of KM also depends on allocation of budget of the institute and demand from students and teachers. Knowledge Management is often offered as a universal therapy for improving the profitability of modern institutions. The theoretical benefits of knowledge management are apparent in order to maximize internal efficiency, internal co-ordination, service to clients, and overall profitability, one needs to make tacit knowledge explicit to keep it updated and accessible.
CONSTRAINTS OF KNOWLEDGE MANAGEMENT IN AGRICULTURAL LIBRARIES

There are several barriers of knowledge management some of them are:
- Lack of co-operation between seniors and junior staff
- Lack of communication skills
- Lack of staff training
- Lack of financial assistance
- Lack of tool and modern technologies

CONCLUSION

Content organization / knowledge organization / technical information organization in agricultural libraries has become a challenging job. Content organization and knowledge management help library and information professionals in improving the services being rendered to their users. The librarian’s roles should not be limited to being the custodians’ of information but they have to acquire skills to keep themselves updated so as to cope intelligently and objectively with the effective and efficient knowledge management and concept organization in agricultural libraries. In this digital era we use keyword indexing widely for knowledge management. It is very easy way of managing the knowledge and easy to locate a document without wasting precious time of its users. In a traditional library system, librarian used to compile cumulative indexes for the benefit of their users. But in a digital system librarians can use various databases, library networks, search engines, websites etc. to search information.

REFERENCES


DIGITAL LIBRARY: AN OVERVIEW

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ABSTRACT

The modern era digital libraries are being formed upon the partnership of earlier importance work of the high end information system of the future. The forming part of whole library becoming popular with well establish support of repository components, especially through open access initiatives. So we can use digital objects, metadata, Indexing, searching, browsing, right management etc. are for powerful of service. Flexible integration will be possible through a variety of architecture, using agents and other technologies. Field as a whole in undergoing rapid growth, supported by advanced storage, processing, networking, algorithms and interaction. So there are many developments to supporting education.

INTRODUCTION

The information revolution in rapidly widening the horizon of application of up coming technology promising the accessibility of relevant information to the users on one hand and enhancing the productivity of information work and services on the other. The revolution of digitization is not instantaneous; it is likely to start with slow pace and accelerates over the time. But it is clear that the emergence of digital libraries will severely affect the traditional functions of libraries, publishers, book sellers etc. A digital library is popularly viewed as an electronic thought replacing the conventional archival and print media by electronic version with the inclusive sense of greater information.

LIBRARY TRANSFORMATION

In attempting to define the infrastructure and the rationale for the creating of the digital library following point are to be noted. A “shared vision is essential.” A business plane must be created. The implementation must be based on present organization structure. Realistic funding models are required to sustain the infrastructure. The definition of technical standards is an essential step. Technical capabilities should be carefully assessed and designed. Tools are required for the searching, organizing storage and
retrieval of information. Leverage should be sought from existing legancy system. Authentication mechanisms are a key to successful implementation.

Partnership is essential with publishers at the national and international level. Distribution printing and changing will be important critical success factors.

CHARACTERISTICS OF DIGITAL LIBRARY
The transformation effects a digital technology brings into information system are as follows.

a. Collections: Digital Library Collection contains fixed permanent documents. Not only those current libraries have more dynamic collection but digital environment will enable quick handling of ephemeral information.

b. Technology: Digital libraries are based on digital technology. The digital libraries will contain only digital collection, may be wrong. It is likely that both digital and Non-digital information collection will have to coexist.

c. Work: Digital libraries are to be used by individuals working alone. There is work oriented perspective focusing on group of information analysis, work being done and the documents and technologies that support it.

d. Information Transformation: Breaking the physical boundaries of data transfers with in and outside countries. It is viewed that the support for communication and collaboration is as important as information seeking activities. Compact data storage enable storage of conventional works in digital form. Bulk space is being converted into table top swiftly by electronic publishing. The telecommunications is facilitating the use of electronic methods to get back, browse and connect to teleconferencing, video, text, paging, massaging etc. with the capacity to copy from master version, the mechanical aspect of publishing and printing of books and magazines will gradually disappear as soon as replicating facility of digital library takes it.

DIGITAL LIBRARY ASSUMPTIONS
In the context of digital libraries, four assumptions can be identified. These are as.

a) It is a totally paperless system with computer networks and communication facilities.

b) It is a supplementary facility to traditional library for better retrieval and faster communication.

c) Any individual can have a direct link, to electronic publishers, their agents, with or without librarianship.
d) Any commercially interested organization or any individual with or without knowledge of librarianship having a direct access to electronic publishers can become local promotional trade agent in information service, like that present day the ISD/STD centers, electronics typing centers.

DIGITAL LIBRARY DESIGN
The design of digital library features two major distinctions. The system incorporation two-tier repository system to facilitate content management and the system incorporates an object-oriented model to facilitate the management of temporal information and exploits information extraction and deductive interface to derive implied knowledge based and the contents of the digital library. The two-tier repository system relieves the system manager from manually maintaining the hyperlinks among web pages. He should be temporal information among web pages. He should be temporal information manager and serve replied relations among the objects in the digital library. The motivation behind developing these knowledge processing utilities is to create a system that complements the capabilities of human being.

FEATURES OF DIGITAL LIBRARY
- Enquires may be either vague or specific.
- Searching is only through indexes resident in the system.
- Selections of titles are possible.
- Physical availability/accessibility of the document/information is always insured.
- Loss of time is only in browsing on the screen and using inefficient search tools.
- Assistance of staff is needed frequently.
- Cost of accessibility may not be free.
- Computer literacy is essential.
- Communication is by e-mail, rarely person to person or telephone.

ADVANTAGES OF DIGITAL LIBRARY
- Quick retrieval and time saving
- Reliability and quality of data seeking.
- Shrinking of bulk space
- Increasing scope for information marketing.
- Scope for knowledge augmentation.
- Thrusting global connectiveness.
Increasing resources-sharing opportunities
High speed communication and internet working

REQUIREMENT FOR DIGITAL LIBRARY

Internet and World Wide Web provide the impetus and technological environment for the development and operation of a digital library. The internet provides the TCP/IP and or its associated protocol for accessing the techniques for publishing the information over internet. In the digital environment it is reasonable to say that a central back up or archive should be created at the national level, which will store information output of the region as well as information from outside the country. The following are requirement of the digital libraries.

- Computer: Server, P.C. with multimedia, U.P.S. etc.
- Network: LAN, MAN, WAN, Internet etc.
- Printer: Laser printer, Dot matrix, Barcode printer, Digital graphic printer etc.
- Scanner: HP Scan jet, flatbed, sheet scanner, Digital camera, Barcode scanner etc.
- Storage Devices: Optical storage device, CD-ROM, Jukebox etc.
- Software: Any suitable software, which is interconnected and suitable software for LAN and WAN connection.

RESOURCES OF DIGITAL LIBRARY

The resources of a digital library are those, which the computer can store, organize, transmit and display without any intervening conversion or digital material. The digital material may be of multimedia types or any other i.e. only digital audit, video, full text information, photograph, drawing, digitized sound, e-book, v-book, electronic tax, map, image, 3D representation etc. The collection may also include structured/unstructured text, scanned images, graphic audios, video recording etc.

On Line Resources

- Local database of traditional books in machine-re database form.
- E-Book, v-book, electronic tax, map, image, sound, video, and multimedia etc.
- E-Journals
- LAN, MAN, WAN for web browsing, e-mail etc.
- Well trained manpower for online help.
Off Line Resources
- CD-Rom, Jukebox etc.
- Audio visual aid etc.

DIGITAL LIBRARY USERS
Users of digital information can be broadly divided into the following major groups.
- Those who have started using the latest technology of digitized information.
- Those who have been using these technologies and digitized information retrieval.
- Those who have the fear of using new technology for information and are expanding it rapidly.
- Those who are intermixed between the above three groups, but have no training to use the technology for accessing global information.
- Among all the above groups, the last one is the largest of three groups.

VIRTUAL AND DIGITAL LIBRARY
As newer technology is always adopted by the libraries, these basic commitments are to be fulfilled. The terms digital electronic and virtual library are being used synonymously, which is not the exact case. Digital libraries may not be networked necessarily, but would largely contain digitized information along with print based publications. The virtual library is a library without walls, spread across the globe, from where one is able to reach the whole world of information through a properly networked workstation. Virtual library gives the impression of a big library, visited by the users. Such type of accessibility cannot be easily defined in both the systems. At present consultants charge for all information services. Institutions such as, public libraries, companies etc. who usually establish, the facility for the sake of their obligation to the clientele, provide almost free access to them.

REFERENCES
APPLICATION OF MOBILE PHONES TO PROVIDE
LIBRARY AND INFORMATION SERVICES: AN
EXPLORATION OF THE GADVASU STUDENTS’
PERSPECTIVES

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Sciences University Ludhiana-141 004 (Punjab), India
nirmal02@yahoo.co.in

ABSTRACT
Implementation of Information and Communication Technologies (ICTs) has changed the way people access and communicate information. Users want easy and instant access to relevant information, putting pressure on Library and Information Science (LIS) professionals to think out of the box for meeting their information needs. Application of mobile phones to provide library and information services is a significant step in this direction. Present paper aims to explore the opinion of the students of Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana about provision of library and information services through mobile phones.

Keywords: Mobile phones, Library services, Handheld devices

INTRODUCTION
The technological advancements have extremely transformed communication processes. Implementation and application of Information and Communication Technologies (ICTs) have not only changed the way people access information, but has also given birth to the new channels of communication. Invention of mobile phones is an imperative triumph of technological developments. The plunging prices of handsets and nominal call charges have put mobile phones in the pockets of common people in India, where, even landline connectivity was a jewel of rich, a few years ago. The ease of use and affordability has consequently the application of mobile phones for various purposes in different sectors beyond merely talking and texting. “From remote access to email to use as a trusted token in financial transactions to emergency response communications, researchers and developers increasingly task mobile phones with critical operations” (Traynor and others). As per report of the Internet and Mobile Association of India (IAMAI) & e-Technology Group “Mobile phones today have moved beyond their fundamental role of communications and have graduated to become an extension of the persona of the user. We are witnessing an era when users buy mobile phones not just to be in touch, but to express themselves, their attitude, feelings & interests”.

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Today, libraries are functioning in a user centered, technology based environment, providing individualized value added services. The Internet and networking of libraries and information centers have facilitated information access 24x7 at one’s fingertips. Library and Information Science (LIS) professionals are no more merely caretakers of books. They do the challenging, non-commercial business of satisfying information needs of users. Therefore, today’s LIS professionals look forward to adopt new means of communication for outreaching the users to take information at their ease. Like other sectors, including banking, real estate, entertainments etc., libraries can deliver information and services to users’ palms through mobile phones. It will improve the efficiency and increase the significance of libraries in life of individuals by facilitating information and services even when they are on move and will rationalize the need for frequent visits to physical library. Universities and Colleges in various countries are successfully providing library and information services through mobile phones. The Oxford University Library provides access to the online library catalogue, maps, contacts, news, travel information and podcasts through mobile phones (University of Oxford). Similarly, libraries of Athabasca University, Alberta, Canada, American University, Washington D.C., Mississippi State University, Black Hills State University, Wayne State University, Boston College, Duke University, Texas Christian University, etc. offer mobile interfaces, applications and services over mobile phones. Ryerson University Library sends call numbers and location of information resources from catalogue to users. Three international conferences have been organized to explore possibilities and share success stories of application of mobile phones to provide library and information services in different types of libraries. Though application of mobile phones to provide library services has opened new possibilities for outreaching users, but not a single practical initiative about application of mobile phones to deliver library services in India is heard yet.

MOBILE PHONE USERS IN INDIA

India is a fast developing economy having state-of-the-art information communication technologies. Mobile phone revolution has influenced Indian nationals to a great extent. The reducing prices of handsets and subsidized call charges due to competition in market have made mobile phones affordable to common people. Up to 31st May 2011, India had total 874.68 million telecom subscribers with tele-density of 73.11% (Telecom Regulatory Authority of India). Out of this total, 840.28 million are wireless subscribers with overall wireless tele-density of 70.23%. The wireline subscriber base has declined from 34.55 Million in April 2011 to 34.40 Million at the end of May 2011, reducing the overall wireline tele-density to 2.88% only. Private operators hold 88.30% of the wireless market share, whereas, Bharat Sanchar Nigam Limited (BSNL) and Mahanagar Telephone Nigam Limited (MTNL), two Public Sector Units (PSUs) hold only 11.70% market share. On the other hand, aforesaid PSUs have 82.29% of the Wireline market share. The wireless subscription base has multiplied noticeably after the service providers made incoming calls free. India grips second position in the world in terms of number of mobile phone subscribers, next to China only (Wikipedia).
NEED FOR STUDY

University libraries are challenged in meeting information needs of academic community, which is demanding and dynamic. These are active users of technological gadgets and are deeply interested in emerging channels of information communication to meet the information curiosity of users. Majority of the users of mobile phones comprises of youngsters, falling in the age group of under 30. According to the report of Market Analysis and Consumer Research Organisation (MACRO), major reason for this is “most of the content on the ‘wireless web’ has been youth and entertainment oriented.” Thus, provision of library services through mobile phones has more prospects of use by university and college students. Therefore, to investigate the perspectives for providing library and information services through mobile phones at Guru Angad Dev Veterinary and Animal Sciences University (GADVASU), Ludhiana, students’ opinions have been invited.

BRIEF ACCOUNT GADVASU

Guru Angad Dev Veterinary and Animal Sciences University (GADVASU), Ludhiana came into existence in 2005 by an act of the Punjab State Legislature. It started functioning in 2006 for promoting livestock production, health and prevention of livestock diseases through teaching, research and extension programmes. It aims to ensure the adequate supply of trained veterinary professionals at different levels, capable of handling livestock health and production aspects and undertakes research in concerned areas. University has 3 constituent colleges including College of Veterinary Sciences, College of Dairy Sciences and College of Fisheries and a School of Animal Biotechnology. College of Dairy Sciences is the youngest, established in 2008.

GADVASU Library is a hub of academic and research activities of the university. It remains open from 9 a.m. to 7 p.m. on all working days and 9 a.m. to 5 p.m. on holidays. It is centrally air-conditioned and fully automated using LIBSYS. About 519 students have been enrolled as members of library. Library has collection of about 20,000 information resources including books, back volume of journals, theses and dissertations, reports, Compact Discs (CDs) etc., in the discipline of Veterinary and Animal Sciences and allied subjects. A separate section of general and fiction books is also maintained. Library subscribes to reputed foreign and Indian periodicals. It renders reference, photocopy, inter library loan, reservation of books and document delivery services. Online Public Access Catalogue (OPAC) of the Library can be accessed from any terminal campus wide using Internet Protocol. Library facilitates access to Consortium for e-Resources in Agriculture (CeRA) providing access to 2000+ online journals in the broad spectrum of Agricultural Sciences and around 600 journals in the subject of Animal Sciences and allied area.

OBJECTIVES OF THE STUDY

Following are the main objectives of the study:

1. To ascertain the users’ frequency of visits to library and their awareness about library services.
2. To find for what purposes students use mobile phones.
3. To ascertain the users’ opinion about provision of library services through mobile phones.
4. To identify the services that could be delivered through mobile phones.
5. To disclose the obstacles that libraries may face in providing information and services through mobile phones and make suggestions to ensure adequate provision of these services.

**METHODOLOGY**

User surveys are reliable means to get feedback from users of a system. Before taking steps to introduce new services or improving existing, it is essential to ascertain the views of its end users. Recognizing the significance of user studies, a user survey was conducted to ascertain the opinions of GADVASU students (including under graduate, post graduate and Ph.D. students) about application of mobile phones to provide library and information services in their institution. Questionnaires were administered to 83 students constituting nearly 15% of the library membership, while they entered library premises. Out of total 83 questionnaires distributed, 65 were received back, ensuing response rate of 78.32% approximately.

**DISCUSSION AND ANALYSIS**

Analysis of the responses revealed that all 65 respondents were members of GADVASU Library. Around 81.53% were male respondents, while remaining 18.47% were females. All respondents had mobile phones and 61.53% also owned Laptops. Nearly 78.47% students had one mobile phone each, whereas 21.53% owned two mobile phones each. Responses revealed that in addition to messaging facility in all mobile phones, 89.23% mobile phones have camera to take pictures, 80% have video recording facility and 78.47% have MP3 features. Nearly 73.84% students responded that their mobile phones have GPRS facility and 23.08% revealed the provision of office document viewers. About 24.61% students had touch screen phones.

Responses revealed that students were using different network connections. Nearly 41.53% respondents were using Airtel connections. About 24.61% were using BSNL and other 24.61% were using Vodafone connections. Only a few students subscribed to Idea, Tata Indicom and reliance mobile connections.

**Frequency of Visit to Library**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Frequency of Visit</th>
<th>No. of Respondents</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Daily</td>
<td>34</td>
<td>52.30</td>
</tr>
<tr>
<td>2</td>
<td>2-3 Times a week</td>
<td>27</td>
<td>41.54</td>
</tr>
<tr>
<td>3</td>
<td>Once a week</td>
<td>4</td>
<td>06.16</td>
</tr>
<tr>
<td>4</td>
<td>2-3 Times a Month</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>5</td>
<td>Any Other</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>65</strong></td>
<td></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>
It is evident from table 1 that majority of the students forming 52.30% visited library daily. Nearly 41.54% were visiting two-three times a week. Only 06.16% users visited library once a week. Users’ frequent visits to library reveal that they need information regularly.

**Awareness about Library services**

**Table 2 Level of Awareness about Library Services**

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Level of Awareness</th>
<th>No. of Respondents</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Fully Aware</td>
<td>15</td>
<td>23.08</td>
</tr>
<tr>
<td>2</td>
<td>Partially aware</td>
<td>48</td>
<td>73.84</td>
</tr>
<tr>
<td>3</td>
<td>Not aware</td>
<td>02</td>
<td>03.08</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>65</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 2 shows that almost 3/4th of the students were partially aware about library services. Only 23.08% respondents expressed full awareness with library. About 3.08% users were not familiar with the services delivered by library. When asked about orientation, 53.84% users responded that they were given orientation for using library services. Users’ partial awareness about library services reveals that orientation was not given in an effective way.

**Purpose of Using Mobile Phones**

Students were using mobile phones for various purposes discussed below:

**Table 3 Purpose of Use of Mobile Phone**

<table>
<thead>
<tr>
<th>S. N.</th>
<th>Purpose</th>
<th>No. of Respondents</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>To make calls</td>
<td>65</td>
<td>100.00</td>
</tr>
<tr>
<td>2</td>
<td>To exchange text messages</td>
<td>57</td>
<td>87.70</td>
</tr>
<tr>
<td>3</td>
<td>To browse the Internet</td>
<td>40</td>
<td>61.53</td>
</tr>
<tr>
<td>4</td>
<td>For video conferencing</td>
<td>7</td>
<td>10.77</td>
</tr>
<tr>
<td>5</td>
<td>To check e-mails</td>
<td>27</td>
<td>41.53</td>
</tr>
<tr>
<td>6</td>
<td>To take pictures</td>
<td>44</td>
<td>67.70</td>
</tr>
<tr>
<td>7</td>
<td>To make and watch videos</td>
<td>23</td>
<td>35.39</td>
</tr>
<tr>
<td>8</td>
<td>To listen to music</td>
<td>47</td>
<td>72.30</td>
</tr>
<tr>
<td>9</td>
<td>Other</td>
<td>01</td>
<td>1.53</td>
</tr>
</tbody>
</table>

Table 3 reveals that in addition to talking 87.70% respondents were using mobile phones to exchange messages. About 72.30% respondents were using mobiles to listen music and 67.70% to take pictures. Around 61.53% students were using mobile phones for browsing the Internet for various purposes. About 85% of them were using Internet for academic
purpose. Nearly 41.53% students used mobile phones to check e-mails. A student responded that he used mobile phone to record lectures delivered by professors in classrooms. It is obvious from the above discussion that in addition to talking and texting, students were using mobile phones to access Internet also.

**Services**

The idea of providing library and information services through mobile phones got wider acceptance from students as 95.39% expressed interest in using such services. On the other hand, remaining 04.61% responded otherwise. Students’ responses about individual services are discussed below:

**Text Alerts**

In text alert service, libraries can send same text (message) to all users listed in address book in library management software, through broadcasting. Libraries can provide text alerts to inform users about:

1. When reserve documents are ready for circulation.
2. When books are due for return.
3. New arrivals in the library.
4. New services introduced by libraries.
5. Forthcoming events in the institution, etc.

Nearly 62.90% of the 62 students who were willing to use library and information services through mobile phones responded that they shall be provided text alert service. This service can be provided by text messages and by via e-mail. Following table depicts the respondents’ preferences for the methods of delivering text alerts:

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Purpose</th>
<th>No. of Respondents</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Text messages</td>
<td>21</td>
<td>33.88</td>
</tr>
<tr>
<td>2</td>
<td>E-mail</td>
<td>08</td>
<td>12.90</td>
</tr>
<tr>
<td>3</td>
<td>Both</td>
<td>33</td>
<td>53.22</td>
</tr>
</tbody>
</table>

Table 4 reveals that majority of the students constituting 53.22% opted to receive text alerts by both text messages and e-mail. Nearly, 33.88% preferred to get alerts through text messages. Only 12.90% respondents wanted text alerts through e-mail. Students’ responses lead to the generalization that they find text alerts over mobile phones more convenient than e-mail.

Provision of text alert service requires integration of this feature in Library Management Software. This also needs trained staff to setup a suitable service to deliver notifications as text alerts. The text messages should be carefully drafted to make these brief and informative, as size of the text has to be limited.
Short Message Service (SMS) Reference Service

SMS Reference Service allows users both to make queries to helpdesk and get answers through text messages. In Chat reference users can interact with library staff in real time using instant messaging. SMS reference service is suitable to answer short reference queries. Long range reference is appropriate through e-mail or in person. Nearly 48.39% students want SMS reference service over mobile phones.

Mobile Online Public Access Catalogue (OPAC)

Responses revealed that 25.80% students used mobile phones to take pictures of catalogue cards, books and other places in library for later reference. Online Public Access Catalogue can be made accessible using mobile phones. This is possible with integration of mobile version of library catalogue in Library Management Software.

About 24.20% respondents were willing to access OPAC over mobile phones to get bibliographical information about library holdings. The bibliographical details of documents can also be send through text messages to library users. Such information can then be used later on mobile phones while the user is in the stacks to locate needed books.

Library website

Library website has to be made mobile compatible to make it accessible through mobile phones. About 73.84% respondents have mobile phones with GPRS facility. This requires developing a mobile-friendly website with concise information and minimum number of links which can be accessed using mobile phones. Mobile compatible website will appear some what different from the websites intended for computers.

Nearly 53.22% students responded that they will access web site of library through mobile phones. Such site will have little resemblance with the website that displays on a laptop or desktop computer.

Virtual tour to library

Virtual tours to library enable users to learn more about library and its services. About 53.84% students admitted that they were given orientation to library, but only 23.08% were found fully aware with library services. About 2/3rd of the respondents were partially familiar. This reveals the need for introducing students with library and its services. The video recordings of different sections of library can be made available for downloading. Nearly 80% respondents have mobile phones with video recording and playing features. About 22.59% students responded that they would like to have virtual tour to library to get familiar with library and its services.

Online information literacy programmes

Information literacy programmes can be offered online to develop capabilities among users for accessing, organization and optimum utilization of information. About 41.93% respondents were willing to participate in such programmes. Audio tours, screen casting, twitter etc. can be used for online information literacy.
User Surveys

Text messaging is a good way to get feedback from users without waiting for their arrival in library premises. Users can reply to a particular phone line through coded text specifying their preferences. This will lead to quick responses and automatic organization of the responses. Nearly 25.80% students responded that they will participate in user surveys conducted through mobile phones. It will help to improve library services as per expectations of users.

Purposes of use of library services by mobile phones

Table 5 Use of Services through Mobile Phones

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Purpose</th>
<th>No. of Respondents</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>To get information about recent arrivals</td>
<td>45</td>
<td>72.59</td>
</tr>
<tr>
<td>2</td>
<td>To access OPAC</td>
<td>16</td>
<td>25.80</td>
</tr>
<tr>
<td>3</td>
<td>To make queries to reference desk</td>
<td>26</td>
<td>41.93</td>
</tr>
<tr>
<td>4</td>
<td>To access e-books</td>
<td>46</td>
<td>74.20</td>
</tr>
<tr>
<td>5</td>
<td>To access e-journals</td>
<td>42</td>
<td>67.74</td>
</tr>
<tr>
<td>6</td>
<td>Access databases</td>
<td>24</td>
<td>38.70</td>
</tr>
<tr>
<td>7</td>
<td>Access images of animal, diseases, etc.</td>
<td>42</td>
<td>67.74</td>
</tr>
<tr>
<td>8</td>
<td>To get information about library rules and regulations</td>
<td>18</td>
<td>29.03</td>
</tr>
<tr>
<td>9</td>
<td>To find contact information of library staff</td>
<td>20</td>
<td>32.26</td>
</tr>
<tr>
<td>10</td>
<td>To get information about information literacy programmes</td>
<td>11</td>
<td>17.74</td>
</tr>
<tr>
<td>11</td>
<td>To get information about important websites in area of interest</td>
<td>34</td>
<td>54.83</td>
</tr>
</tbody>
</table>

Table 5 depicts that 74.20% of the 62 respondents who wish to use library services over mobile phones, want to access e-books through handheld devices. Nearly 72.59% students want information about recent arrivals in library. Around 67.74% respondents were interested to access e-journals and an equal number of students want to get pictures of animals and diseases, etc. through mobile phones. Similarly, 54.83% students want information about important websites in their area of interest. About 29.03% respondents would like to use library services over mobile phones to get information about the rules and regulations of library.

From where library services will be used

Table 6 From Where Library Services will be Used

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Purpose</th>
<th>No. of Respondents</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>While traveling</td>
<td>33</td>
<td>53.22</td>
</tr>
<tr>
<td>2</td>
<td>While at residence</td>
<td>42</td>
<td>67.74</td>
</tr>
<tr>
<td>3</td>
<td>Within library</td>
<td>14</td>
<td>22.59</td>
</tr>
<tr>
<td>4</td>
<td>On campus (outside library)</td>
<td>43</td>
<td>69.35</td>
</tr>
<tr>
<td>5</td>
<td>Any other</td>
<td>03</td>
<td>04.83</td>
</tr>
</tbody>
</table>
Table 6 reveals that majority of the students will use library services through mobile phones from campus, outside the library premises. About 67.74% respondents would like to use library services from their residence over handheld devices. Three students responded that through mobile phones they will be able to use library services from anywhere within the country.

**Use of services against nominal charges**

Responses revealed that users hesitate to use library services against charges. Only a little more than 50% respondents were willing to use library services against nominal charges, where as remaining students want services free of cost. Majority of the students not having web enabled phones responded that they will purchase if library starts providing services through mobile phones.

**Students’ opinions regarding impact of library and information services through mobile phones**

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Purpose</th>
<th>No. of Respondents</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Will attract users to library</td>
<td>12</td>
<td>19.35</td>
</tr>
<tr>
<td>2</td>
<td>Will save time of users</td>
<td>28</td>
<td>45.17</td>
</tr>
<tr>
<td>3</td>
<td>Will improve the staff-users cooperation</td>
<td>5</td>
<td>08.07</td>
</tr>
<tr>
<td>4</td>
<td>Will keep users informed even when they are on the move</td>
<td>22</td>
<td>35.49</td>
</tr>
<tr>
<td>5</td>
<td>Will make a difference by increasing importance of library in their lives</td>
<td>12</td>
<td>19.35</td>
</tr>
<tr>
<td>6</td>
<td>All of the above</td>
<td>30</td>
<td>48.39</td>
</tr>
<tr>
<td>7</td>
<td>None of the above</td>
<td>3</td>
<td>04.83</td>
</tr>
</tbody>
</table>

It is evident from table 7 that 45.17% respondents opined that provision of library services through mobile phones will be time saving for them. Nearly 35.49% think that this will help to keep them informed about library even when they are outside the campus. Around 19.35% students agreed that it will attract users to library. About 19.35% students believe that it will make a difference by increasing importance of library in their lives and 08.07% consider it to be helpful in improving staff user co-operation. Around 48.39% respondents are of the opinion that such services will do all of the above.

**COMMENTS OF STUDENTS**

Students gave useful comments about provision of library services through mobile phones. They responded that this will prove to be a time saving effort and will encourage them to use library services. Two students responded that provision of library services through mobile phones will be innovative and will be helpful to get information about library, its services and recent arrivals even from distant places. Similarly a user said “it
will enable us to access information from our pockets”. Two students responded that while implementing, such services should be explained to users to exploit these to the maximum. A few users suggested that these services should be provided without any charges. Students’ responses revealed that they were interested to use service.

**OBSTACLES IN PROVIDING LIBRARY SERVICES THROUGH MOBILE PHONES**

1. It is expensive service
2. Requires staff expertise
3. Problem of Network congestions
4. Poor quality of screen display as compared to Laptop and Desktop.
5. Slow speed of the Internet on mobiles than computers
6. Features of mobile phones owned by students are not uniform
7. Multiple service providers

**SUGGESTIONS**

1. A detailed survey of user needs and expectations should be conducted before introducing such services.
2. Initially, free text messaging services like Way2sms.com, 160by2 and SpiceSMS.com, etc. can be used to experiment the application of mobile phones to provide library services.
3. The institutions should contact mobile phone service operators for improved transmission of information at nominal charges.
4. Proper training of library staff should be ensured for setting up services and mobile interface.
5. Users also need to be trained about how to utilize these services.
6. A common interface compatible to all mobiles/networks should be developed.

**CONCLUSION**

The growing information needs and expectations of users and emerging technologies are making LIS professionals to think about new means of approaching the stakeholders. Users want easy and speedy access to relevant information. Application of mobile phones to provide library and information services will open new pathway towards this trend. This can be an astonishing means to outreach the users, enabling them to access library resources and services from anywhere any time even when they are on move.

Study revealed that students need information regularly as nearly 3/4th of them were visiting library everyday. Though, more than 50% respondents admitted that they were given orientation for using library, only 23.08% were familiar and fully aware with library services. This requires reshuffling the methods of initiation. It has been found that
in addition to talking and exchanging messages, students were also using mobile phones for other purposes including accessing the Internet. Students are keen to use library and information services through mobile phones. The text alerts, SMS Reference, mobile compatible library website, mobile OPAC are the major services that users want to access through mobile phones. These can also be utilized for imparting information literacy programmes and conducting user surveys. Students were excited to access library and information services through mobile phone, but were reluctant to pay for that. The provision of value added services at nominal cost will win the cooperation from users. It will be fundamental to promote use of library and its resources.

REFERENCES

1. Internet & Mobile Association of India (IAMAI) and eTechnology Group@IMRB (2006). Mobile value added services in India. http://www.iamai.in/Upload/Research/mobile.pdf (17-7-11).


DIGITISATION INITIATIVES OF NBSS & LUP PUBLICATIONS: A CASE STUDY

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ABSTRACT
Digital information is now an integral part of research. Institutes are actively digitizing their resources in order to stabilize and protect the resources so that they will be permanent and durable besides being retrievable, readable and useable overtime. The purpose of this paper is to critically analyze the need, environment, advantages, disadvantages and implementation of DI to provide a central source of information about National Bureau of Soil Survey & Land Use Planning (NBSS&LUP). It is useful for librarians responsible for Digitization initiatives. It is an attempt to provide a comprehensive background and scenario of organization, description and retrieval of local content resources in electronic forms.

Keywords: Digital Access, Digitization Initiatives (DI), Digital Preservation, NBSS publications, PITS, Institutional Repository.

INTRODUCTION
A Digitization initiative is any project that creates and provides access to digitized resources. The content exchange will enable organizations to aggregate their content globally in an effective and efficient way. Information which is traditionally kept in paper format can be digitized and stored in the system, and made publicly available. Basically, Digitization converts materials from formats that can be read by people to a format that can be read only by machines (digital). Flatbed scanning, digital cameras, planetary cameras and a number of other devices can be used to digitize materials like bulletins and maps. The main reasons to digitize are to enhance access, and improve preservation. With digitized collections, institutions can make information accessible that was previously available only to a selected group of researchers. Digital projects allow users to search collections rapidly and comprehensively from anywhere at any time. Digitization also helps preserve precious materials and can reduce wear and tear of fragile items.

THE IMPORTANCE OF SOILS INFORMATION
NBSS&LUP published various scale maps of India and different States.
NBSS&LUP publications from 1980-2012

<table>
<thead>
<tr>
<th>NBSS&amp;LUP publications from 1980-2012</th>
<th>Nos.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soil resource maps</td>
<td>33</td>
</tr>
<tr>
<td>Salt affected soils of different states</td>
<td>12</td>
</tr>
<tr>
<td>Soil research bulletins</td>
<td>126</td>
</tr>
<tr>
<td>Atlas</td>
<td>13</td>
</tr>
</tbody>
</table>

NBSS&LUP publications from 1980-2011

<table>
<thead>
<tr>
<th>Years</th>
<th>Nos.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980 - 1985</td>
<td>11</td>
</tr>
<tr>
<td>1986 - 1990</td>
<td>18</td>
</tr>
<tr>
<td>1991 - 1995</td>
<td>39</td>
</tr>
<tr>
<td>1996 - 2000</td>
<td>35</td>
</tr>
<tr>
<td>2001 - 2005</td>
<td>44</td>
</tr>
<tr>
<td>2006 - 2011</td>
<td>37</td>
</tr>
</tbody>
</table>

From the above Tables, it is obvious that during the period 2001 to 2005 the publications were the highest. The information in a soil survey can be used by farmers and ranchers to help determine whether a particular soil type is suited for crops or livestock and what type of soil management might be required. Most of the publications are on soil series, soil erosion, land use planning, soil survey, land evaluation, etc.

**SIGNIFICANCE OF DIGITIZATION OF BOOKS AND MAPS**

NBSS publications are recognized as scientific resources required for the present and future. Digitization and online distribution of these publications facilitate for marketing, for researchers and students, and for the public at large in the subject field.

NBSS & LUP publications are based on the soil data surveyed, collected and analysed on national level by the scientists. Therefore, these publications (bulletins and maps) are invaluable. Hence, damage to these publications is a great loss. The repeated incorrect handling and storage of books / bulletins / maps can quickly transform them into torn or even unusable ones. Proper handling and storage in a stable, cool, clean, non-humid environment can prolong their life.

The environment around the book is a major concern because unacceptable levels of temperature and humidity will accelerate deterioration. For example, the high humidity in an attic or basement can promote moth growth, cockle pages, and attract insects. Extremely low humidity, as found above hot radiators, can dry out leather bindings. Direct sun-light, with a large ultraviolet (UV) component, will fade leather and cloth. Dust and dirt while handling, can adversely affect books. Many people shelve their books in closed glass cases away from brightly lit windows or damp exterior walls to minimize
the amount of dust and grime that will accumulate. How we handle and use a book contributes to its longevity.

Based on the problems in preserving written and reading materials, it is highly suggested to digitize these materials for future purpose, and it is more handy. Scientists and researchers are more interested in digitized maps than printed ones.

The first step in the process of digitizing publications is to review the following considerations:

- What is the purpose of the digitizing project?
- Who will be the users of the digitized materials?
- How will the digitized resources be presented?
- What will be the effect on the original printed material after digitizing the same?
- How will the digitized files be accessed and stored?

Custodians of NBSS&LUP publications need to address these questions before the Digitization project is implemented. After these questions are answered, Preservation and Information Technology Specialists (PITS) should assess the project requirements, and create project workflows. These documents define the guidelines offered by PITS in the implementation of the digitization project in the Institute.

REQUIREMENTS FOR DIGITIZATION OF PUBLICATIONS

They include the following considerations:

- Is the condition of the publication such that the publications can be handled safely throughout the digitization process?
- Can the risk of damage to the publication be minimized with appropriate scanning equipment, workspace and by training the scanning staff?
- What is the most cost effective scenario for timely Digitization without damage to the publication?

PROCESS OF DIGITIZATION

A scanner is a device that reads or scans an image and converts it into a digital format. The process of using document scanning software and high speed document scanners is to convert an image of paper to a digital picture or format. These electronic images can then be indexed, linked and stored in a document storage system. Document storage system keeps scanned images as PDF, HTML or JPEG files. This software identifies contrasts in shading, clarity, contrast and brightness enabling the hardware to make appropriate adjustments during processing to ensure the most crisp image display possible. Once the image is scanned, software is needed to convert the digital code to a viewable image. Most scanners come with basic software. There are many brands of imaging software available in the market.
FineDocs is a Document Management System that handles the documents by electronically storing, organizing, indexing and filing them. They can be retrieved when required, without any loss of time. It can also be used for imaging technology to enable access to the unstructured data in the form of documents present in the organization. This helps bring all the documents to your desktop and enables you to work with them, eliminating the need for paper-based documents. It is a powerful document archival system, which ensures safety of documents, faster access to them, and above them huge cost savings.

The Remove Lines option allows you to eliminate unwanted lines in the scanned documents stored in a Batch. It helps to remove the unwanted black dots in the current image. The Remove Border option allows you to eliminate unwanted borders in the scanned documents stored in a Batch. The Despeckle option removes the noises and minute dots from the current images. The Remove Punch hole option allows you to eliminate punch-hole marks on the scanned documents stored in a Batch.

**OBSTACLES IN DIGITIZATION INITIATIVES**

DI encounters financial constrains, limitation in availability of manpower, laxity and lack of know-how.

- **Cost:** Digitization is labour-intensive and expensive
- **The risks associated with the use of inappropriate technologies and inadequate standards**
- **The technical and organizational challenges related to long-term preservation of and access to digital objects**
- **The lack of consistency in approaches to Intellectual Property Rights (IPRs)**
- **Limitation of check and control of copyright**

Therefore, Digitization Initiative activities demand a better awareness about the policy, process and implementation of DI. This will contribute to improve the effectiveness of DI.

**BENEFITS OF DI**

1. It provides technical Digitization support, and services to those institutions that are not able to wholly or partially do it themselves.
2. It provides or mobilizes experts to conduct training and support for persons and institutions that would like to embark on Digitization and digital preservation exercise.
3. It coordinates collaborative Digitization and digital data preservation initiatives among soil survey institutes on national and state level that are keen to collaborate and / or provides Digitization support to others
4. It facilitates the sharing of knowledge.
CONCLUSION

In today’s modern information society, scientists expect services that enable them to retrieve information by subjects. Thus, a network of resources with similar content is required. Digitization initiatives focus on the means of selecting, collecting, transforming from analogue to digital information, and making it available for searching, retrieving and processing through communication networks.

Digitization helps us to avoid possibility of duplication of soil survey. With the establishment of NBSS&LUP Digital Repository, the soil survey institutes would be able to resolve challenges in a more comprehensive manner and also share costs, access systems and infrastructure. It would also benefit the smaller institutions. Obviously, the establishment of this Repository is crucial, because it will serve as a reference point for the soil scientific world to access information and knowledge.

REFERENCES

5. www.emeraldinsight.com/journals.htm?
7. www.nowaldigitisation.wordpress.com/large-scale-digitisation-initiatives-lsdi/
DIGITAL LIBRARY AND DEVELOPMENT

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ABSTRACT
The present paper focuses on digital library. Digital libraries are expected to bring about significant improvement over current models of information publishing and access methods. Educators, researchers and students will be among the first to benefit from digital libraries.

Keywords: Digital library, Networks, Internet, Information Sources, Electronic Library.

INTRODUCTION
Digital library is an organized collection of digitized material developed over the intranets and the Internet via web. A digital library is organized and focused collection of digital objects including text, images, video and audio along with methods for access and retrieval and for selection, creation, organization and maintenance of the collation. Digital libraries provide an infrastructure for publishing and managing content so it is discovered easily and effectively. The digital library has been used to characterize a large storehouse of digital information accessible through computer. The digital library services as an archive for knowledge that span many topics, provides information that changes quickly, and also provides access to events as they occur.

Digital library basically store materials in the electronic format and manipulate large collection of those materials effectively. The major objective of library is to provide information or reading materials for user. Digital libraries are organizations that provide the resources, including the specialized staff to select structure offer intellectual access to interpret, distribute preserve the integrity of and insure the existence users’ time of collection of digital works so that they are readily and economically available for use by a defined community or a set of communities.

LIBRARIES IN FUTURE
One of the great achievements of 21st century is availability of online knowledge or libraries through the internet. Internet removed all sort of barriers between user and formats. The concept of libraries without walls and book paper is becoming papule e-learners. The satellite communication and excellent networking facility made everything
available at the door step of the end user with minimum cost and time. The challenging opportunities know the doors of library professionals.

Digital libraries are the current in innovation which came into being as a result of technological advancement in the field of electronics engineering as well as the changing requirements and expectations form the traditional libraries. They also referred as the collection of information stored in digital format accessible over a communication network.

OBJECTIVES OF THE DIGITAL LIBRARIES
- To collect store, organized and access information in digital form via communication channels.
- To meet the requirement of patrons by providing better services
- To have larger digitalized databases.
- To save time of library staff by avoiding routine jobs.
- To serve widely dispersed communities throughout the network.
- To reduce cost involved in varies libraries activities.

SALIENT FEATURES OF DIGITAL LIBRARIES

OPEN ACCESS
Powerful access and browse facilities invest the DLs with open access library characteristics facility of serendipitous discovery of information. Whatever is available on web transparent to end users?

GREATER VERTITY OF INFORMATION
Information is not limited to metadata or bibliographic information, or text or discursive information but can include all digital objects, that can be digitized are potentate DL content. Digital information generated by different organization and institution prove that the available information has verity and granularity.

ALWAYS AVAILABLE
No library house .resources is available 7/24 hours. User can access information at any of the day.

UNIVERSAL ACCESSIBILITY
Universal accessibility raise implications for both the content and use interface of DL system.
SHARING OF INFORMATION
Digital Libraries enhance the sharable resources concepts of tradition libraries.

DIGITAL LIBRARY SERVICES
Digital library provide following services more effectually than tradition libraries.

- Content creation, storage, search and access retrievals and preservation.
- Digital library are to generate new type of information resource as well as new approaches to acquisition, classification and cataloging.
- Specialized digital libraries’ provide recording of single medium object such as image statistical data sound recovery or films.
- Shared cataloging.
- Union cataloging.
- Web-OPAC
- E-mail

COMPONENTS OF DIGITAL LIBRARY

Hardware Requirements
- Computer servers
- LAN / WAN
- Scanners
- Storage media
- UPS
- Networks
- Converters
- Internet Connectivity.
- Multimedia Interface

Software Requirement
Liner Operating Systems.
Digital Library Software.
- Greenstone.
- D-space.
- E-print.
- Fedora.
Editing Software.
MERITS OF DIGITAL LIBRARY

- It saves the library manpower and funds.
- Helps in resource sharing facilities.
- Helps in inter library loan.
- Helps to get bibliographical information, retrospective. Search, union catalogue, Abstracting and indexing.
- Researches will get information with minimum time
- Support both formal and informal learning.
- Media integration.
- Finds right integration of traditional library facilities and current web bared approach.

DEMERTS OF DIGITAL LIBRARY

- The developed countries are the major producers of digitalized information source which lack coverage of literature produced from third world countries.
- Imbalance between the manpower produced in library science schools and the manpower requirements in libraries.
- Problems in the scholarly publishing.
- Locating the information of the internet require good skills.

LIBRARIES IN FUTURE

One of the great achievements of 21st century is availability of online knowledge or libraries through the Internet. The Internet removed all sort of barriers between user and formats. The concept of libraries without walls and paper is becoming popular e-learners. The satellite communication and excellent networking facility made everything available to the door step of the end user with minimum cost and time.

Digital libraries are the current innovation which came into being as a result of technological advancement in the field of electronics engineering as well as the changing requirements and expectations form the traditional libraries. They also referred as the collection of information stored in digital format accessible over a communication network.

PROSPECTS AND DEVELOPMENTS

The publishers who create the majority of materials which are found in current libraries, and so could be expected to contribute greatly to digital library development. These areas
include data browsers, network development, network security, electronic publication of scholarly materials, and developments in resource sharing for libraries. Data browsers for network access have been ubiquitous on the Internet since about 1990. In the near future, network data browsers will incorporate the ability to display data from a variety of formats, and to the increased role of the microcomputer for home and office user. In higher education. The Internet connectivity and basic access for faculty, students, and staff is nearly universal. This widespread access to the Internet from the home, office, schools, etc. means that access to digital libraries, when they exist, will be easy to obtain. As discussed above, the ability of materials found in digital libraries to be encrypted and transmitted securely may be important to publishers. The ability of digital libraries (or publishers) to identify and bill users of materials appropriately is also likely to be extremely important. These needs of digital libraries will be directly met by commercial interests in security for the Internet transactions. The future of scholarly self-publishing for digital libraries is not entirely clear, as it may be that such publishing is superseded by the digital libraries of the future (hopefully to the satisfaction of all parties and purposes involved). Current efforts for edited electronic journals, refereed preprint collections, and moderated electronic discussion are all relevant practice for large-scale digital library development. A final area of development relevant to digital libraries is continued progress with bibliographic standards and bibliographic interchange formats both academic libraries and library automation vendors, among others, are making gradual progress towards remote queries and bibliographic standards for electronic materials. Other areas of development for digital libraries are underway as well. Issues for effective storage and delivery hardware are not trivial, as are increases in network speed and reliability. Interface design is another area of research with key implications for digital libraries. And, many user studies are underway which can help to identify the information needs, situations, individual factors, and other components that must be combined appropriately to create environments for effective information retrieval

COUNCLUSION

The professional librarian will have to ascertain the impact of information technology on the library and will have to monitor and acquire skills to copy intelligently and objectively for effectiveness and efficient function of a library. Library and information science people must be well equipped with up-to-date skills, knowledge on the computer and network with other librarian and be flexible. Librarian should take positive approach to provide better services. Digital library plays an important role in promoting the use of information. Due to information explosion, technological development, increasing cost, globalization etc. there is a need for global library with modern facilities.
REFERENCE

LIBRARY CONSORTIA IN MODERN ERA

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ABSTRACT

The explosion of information and inadequate library urged the libraries to adopt new philosophies and technologies for collection development and reduce the costs of information. A library consortium is the sharing of resources among the participant’s libraries. The emergence of the internet, particularly, the World Wide Web (WWW) as a new media of information delivery triggered proliferation of web-based full text online resources. Increasing number of publishers is using the Internet as a global way to offer their publications to the international community of scientists. This paper discusses the definition, needs, advantages, disadvantages of library consortia. Also, this paper covers various models and presents the information of the library consortia in India.

Keywords: Library consortia, definition, objectives, advantages, disadvantages, model, Networks.

INTRODUCTION

Information is essential for national development. But the explosion of information, financial crunch, interdisciplinary nature of research, diversified nature of user’s need etc., have surpassed the ability of libraries and information centres to cope with it. Thus, not a single library/information centre can meet the thrust of information of all users from its collection of information up to the fullest extent. So the present scenario urged the libraries to adopt new philosophies and technologies for collection development and reduce the costs of information. To cope up with this situation, the concept of library consortia is very useful with wide coverage and is applied to different collaborative arrangements between libraries/information centres. This concept is considered to be a metamorphosis brought by the fast changing information environment for achieving mutual benefits through joint actions. It refers to co-operation, co-ordination and collaboration between libraries/information centres for the purpose of sharing information resources. So there must be some predefined requisites for library consortia. Consortia can be established by a group of libraries within the same geographical region, purchase as a unit with often a co-coordinator who acts as a spokes person for the group or open,
where there will not be an established formation of group irrespective of geographical location. Consortia is regarded as an effective strategy to increase the buying powers of individual libraries over the short term and as an opportunity to maximize opportunities for co-operative collection building and for resource sharing over the long term. Consortia are the basic need of the century for providing effective, efficient and useful information service to clientele. Prominent examples: OCLC, Virginia’s VIVA, Ohio’s OHIOLINK etc and in India particular in MHRD consortia, UGC-INFONET, AICTE-INDEST etc. Library consortia vary in their type, goals, structure, membership, and funding. Consortium may be a formal or informal agreement between libraries based on a common principle. For example, a consortium may be based on library type – academic, medical, or public. A regional consortium may be based on a geographical principle. A statewide or nationwide consortium may incorporate all its libraries, government funded and those in private institutions.

LIBRARY CONSORTIA
The term consortium existed for decades but it is gaining so much importance in the recent years. The consortium model will require the librarian to shift from the “Owning Model” to an “Access Model”. Library consortia means to co-operation, co-ordination and collaboration between, and among, libraries for the purpose of sharing information resources. Consortia are generic term to indicate a group of libraries that are working together for a common goal whether to expand co-operation for traditional library services such as collection development or electronic media. Libraries in developing countries have been working on consortia at national, regional and international levels. However, some barriers such as poor technological and communication infrastructure, inadequate finances, culture and context, attitude toward consortia and multiple efforts are reported to be limitations of consortia activities in developing in India.

DEFINITION OF CONSORTIA
A consortium is “an agreement, combination, or group formed to undertake an enterprise beyond the resource of any one member” and it “usually involves horizontal collaboration among direct competitors”.

Consortium is a “community of two or more information agencies which have formally agreed to coordinate, cooperate in, or consolidate certain functions” to achieve mutual objectives. Consortia may be formed on a local, regional, or larger basis, or on a subject basis.”

Consortium could be described as a group of organizations who come together to fulfill a combined objective that usually requires cooperation and sharing of resources.
OBJECTIVES OF CONSORTIA

- Rational utilization of funds.
- Maximize the cost benefit per subscription.
- More utilization on resources.
- Develop technical skill of library staff using electronic resources.
- Develop co-operation with other institutions to reduce the subscription cost and maximize utilization of resources, and
- Guarantee to information stored for continuous use by present and future.

FEATURES OF LIBRARY CONSORTIA

These are the features of library consortia following below.

- It provides each organizations and institutions with the capacity to share their resources without sacrificing the individuality of each member library.
- The collections of the Consortium libraries enable each member library to support scholarly research for its users.
- Cooperative research and development in application of information communication and technology enhances service and realizes cost effectiveness.
- Staff development and interaction with quality of service.
- It is the cooperative task to reduce the cost of purchase consortia. As a result, end users can take benefits of more resources than would be available through one library.
- To advance library services are provided with an emphasis on access to new E-resources including databases and services offered through the internet and www.
- To expanding inter library searching at less cost is possible.
- Uncertainties in legal issues are handled with more confidence.

ADVANTAGES OF CONSORTIA

Some of the important advantages of the library consortium are as following below.

- Consortia-based subscription to electronic resources provides access to wider number of electronic resources at substantially lower cost;
- Optimum utilization of funds.
- Facilities to build up digital libraries Helpful to provide better library services like CAS and SDI
• Cost Sharing for Technical and training support
• Electronic Journals demand neither library space nor shelving costs nor can they be stolen from the library
• The consortium have been offered better terms of licenses for use, archival access and preservation of subscribed electronic resources, which would not have been possible for any single institution; and Available 24/7.
• Less economy expansion.

DISADVANTAGES OF CONSORTIA

Some of the important disadvantages of the library consortium are as following below.
• Absence of a printed copy of Journals.
• Require training of staffs in handling electronic documents etc.
• Consortia require high initial investments in licensees and information and communication technology.
• Copyright problems.
• Unreliable telecommunication links and insufficient bandwidth.
• Lack of archiving and back files availability.
• Internet Access id necessary.
• Users are not accepting e-journals as per with the printed Journals.

EMERGENCE OF CONSORTIA IN INDIA

The accessibility to international journals in Indian universities and technical institutions has improved many folds with setting-up of a few Government-funded library consortia. Prior to setting up of these consortia, the access to e-journals was restricted to a premier institutions like IISc, IITs, IIMs and a few central universities who were subscribing to a few e-resources including bibliographic databases on CD ROM, a few e-journals accessible free with subscription to their print versions and a negligible fraction of journals on subscription. After launch of the “Indian National Digital Library in Engineering Sciences and Technology (INDEST) Consortium” in 2003 and “UGC-INFONET Digital Library Consortium” in 2004, availability and accessibility of e-resources increased phenomenally in centrally-funded technical institutions (IITs, IISc, IIMs, IIITs, etc.) and universities, setting in a new culture of electronic access and browsing in educational institutions. A number of library consortia have emerged in India in past five to six years. Some of the important consortia and their activities are described below:
INDEST-AICTE Consortium
The Indian National Digital Library in Engineering Sciences and Technology (INDEST) Consortium was set up by the Ministry of Human Resource Development (MHRD) in the year 2003 to provide access to selected electronic journals and databases to 38 centrally-funded technical institutions including IISc, IITs, NITs, IIMs, IIITs, ISM, SLIT, etc. Currently, the Ministry provides funds required for subscription to resources for 42 centrally-funded institutions including IISERs, new NITs and IITs. Besides, 60 Government or Government-aided engineering colleges and technical institutions have joined the Consortium with financial support from the AICTE. Moreover, the Consortium also welcomes other institutions to join it under its self-supported category. 690 engineering colleges and other educational institutions have joined the Consortium under its self-supported category. The total number of members in the Consortium has now gone up to 788.

UGC-INFONET Digital Library Consortium
The University Grants Commission initiated the UGC-INFONET Digital Library Consortium in year 2004 in order to provide access to a large number of scholarly journals from reputed publishers, aggregators, scholar societies and university presses to universities in India. Under the Consortium, more than 5,000 full-text scholarly electronic journals from 19 international publishers are made accessible to 100 universities in the first phase of its implementation. The access was extended to 150 universities in 2006. The Consortium provides current as well as archival access to core and peer-reviewed journals in different disciplines. Access would ultimately be extended to all 171 Indian universities that come under the purview on UGC. The programme would also be extended gradually to affiliated colleges. The programme is wholly funded by the UGC and monitored by INFLIBNET (Information and Library Network) Centre, Ahmedabad. The UGC-INFONET Digital Library Consortium has recently launched its “Associate Membership Programme” that facilitates private universities and other institutions to subscribed electronic resources through the Consortium on its own.

CSIR E-Journal Consortium
The Council of Scientific and Industrial Research (CSIR) constitute of 40 research laboratories in India. The CSIR E-journals Consortium was the first major and formal consortium at national level. The Consortium started with access to Science Direct (Elsevier Science) for all of its 40 laboratories in 2001. The extent of the CSIR E-Journals Consortium was restricted to only one publisher (Science Direct) till 2005 because of lack of commitment to funds and resources by the CSIR management and problems in getting commitment for retaining print subscription by participating institutions. After delay of couple of years, the CSIR E-journals Consortium, in the year 2005, has entered into
agreement with 11 publishers to access about 3316 international journals across all its the laboratories / institutions. Thus, the expansion of information base of CSIR laboratories / institutions has increased from 20 -200 print journals to 3,316 e-journals for its every user. The Consortium is wholly funded by the CSIR and is monitored by NISCAIR, a CSIR institution situated in Delhi. In 2009 the Consortium failed to reach License agreement with Science Direct forcing the Institutions to go in for their own individual subscriptions.

MCIT Library Consortium
The Ministry of Communication and Information Technology (MCIT) Consortium caters to the information requirement of 9 institutions including NIC, CDAT and CDOT (with its offices in multiple locations). Funded by the Ministry of Communication and Information Technology (MCIT), the Consortium subscribes to 5 electronic resources including IEL Online, ACM Digital Library, Indian Standards, Science Direct and JCCC. Established in 2005, other activities of the Consortium include establishing institutional repositories, national making union catalogues, creation and maintenance of library automation software called e-Granthalaya.

DAE (Department of Atomic Energy) Consortium
The Department of Atomic Energy (DAE) Consortium caters to the information requirement of 36 institutions including BARC, TIFR and SAMEER. Funded by the Department of Atomic Energy (DAE), Govt. of India, the Consortium subscribes to e-resources from 4 publishers (including Science Direct, Springer, and MathSciNet) for providing access to around 2,000 e-journals. Established in 2001, the Consortium is administered by the BARC, Mumbai.

ERMED-NML Consortium
Electronic Resources in Medicine (ERMED) Consortium is an initiative taken by Director General of Heath Services operated by National Medical Library. Started in 2008, presently ERMED members are 72 Government Medical Colleges/Institutes across the country. ERMED is providing access to over 1600 medical journals.

(7) Forum for Resource Sharing in Astronomy (FORSA)
At present, there are eleven institutional members, The Consortium facilitates e-access to Journals and Books and promotes Resource Sharing and ILL among Astronomy related Institutions.
Consortium for e-Resources in Agriculture (CeRA)
A Consortium on e-Resources in Agriculture (CeRA) has been established in 123 agricultural / animal science universities / deemed universities / research institutes of the Indian Council of Agriculture (ICAR). CeRA provides access to 1500 online journals, books and data base available in Veterinary, Animal, Fisheries and Agricultural Sciences.

HELINET (Health Science Library and Information Network)
HELINET is operated by the Rajiv Gandhi University of Health Sciences, Karnataka. The consortium was started with a vision to improve the quality of education and research in the Health Science colleges/institutions in Karnataka state through enhanced access to high quality medical information. The major benefit of this consortium is providing access to more than 600 core international e-journals.

E-PKSAR (E–Publishing and Knowledge system in agricultural Research)
The access to scientific and technical information is essential for economic and social development. The research result are mainly communicated and validated through publications in scientific journals. ICAR periodicals pay an important role in increasing public awareness about the agriculture scenario by communication national agricultural information on regional problems with international implications in English and national language.

Mobilizing Mass Media support for sharing agro-information
The project “Mobilizing Mass Media support for sharing agro-information” is designed and developed with the objective to enhance the agricultural communication and awareness in the country at grass-root level by using effective communication and information tools. The project is being implemented in the participatory mode with active contribution from consortia partners like IIHR, CISH, IVRI, IISR, CIFTR, CIPHET, ICAR, Research Complex for NEH, TNAU AND GBPUAT and like with esteemed media organizations.

KRISHIPRABHA – Indian Agricultural Doctoral Dissertations Repository
KrishiPrabha was established as a sub-project under NAIP, mainly to develop, organize, and sustain knowledge base of Indian Agricultural Doctoral Dissertations in digital form and marking it accessible online. The Repository was created at CCS Haryana Agriculture University, Hisar wherein 6000 Indian Agricultural Doctoral Dissertations submitted by research scholars to the 45 state/deemed agricultural universities during the period 01.01.2000 to 31.12.2009 were digitized and online full text access were provided for further research and development.
E-Granth

E-Granth a consortium for “Strengthening of Digital Library and Information Management under NARS” is designed to provide digital and open access to ICAR and SAUs libraries resources. The consortium was sponsored by NAIP wherein initially 12 institutions/universities have been identified for digitizing, standardize and merging there collections catalogue into union catalogue to upload in OCLC Worldcat.

Centrally Funded Consortia: In this model, consortium will solely depend on the parent body, usually a Government Agency. A few examples are INFONET by UGC, ICMR, CSIR.

Shared-budget Model: In this model, the participating libraries take the lead and form the consortium. IIM and FORSA are examples of this model.

Publisher Initiatives: The Consortium for Emerald Full-Text Library (published by the Emerald Publishing Group) is recent example. Here, consortium members will get deep discount price to the participating libraries. Few of the INDEST members have joined the Open Consortium offered by Wiley to get cross access to resources.

National Consortium: The significance of this model is national level licensing of products, as in INDEST and UGC INFONET.

OTHER CONSORTIA ARE

- Arizona university libraries consortium (AULC), USA.
- Consortium of Academic libraries in Manchester (CALIM), UK.
- Online computer library centre, OCLC, Ohio
- Consortium of University Research Libraries (CURL) U.K.
- Indian Institutes of Management Consortia (IIM CONSORTIA), India.
- Consortium on Core Electronic Resources in Taiwan (CONCERT), Taiwan.

TYPE OF NETWORKS

Computer networks exit in different shapes and sizes. Over the years, the networking industry has coined terms like "LAN" and "WAN" attempting to define sensible categories for the major types of network design. The precise meaning of this terminology remains lost on the average person, however for historical reasons the industry refers to nearly every type of networks as an "Area network". The most commonly discussed categories of computer networks include the following:
• Local Area Network (LAN)
• Wide Area Network (WAN)
• Metropolitan Area Network (MAN)
• Storage Area Network (SAN)
• System Area Network (SAN)
• Server Area Network (SAN)
• Small Area Network (SAN)
• Personal Area Network (PAN)
• Desk Area Network (DAN)
• Controller Area Network (CAN)
• Cluster Area Network (CAN)

CONCLUSION
Academic libraries have really understood that consortia based subscription is cost effective and also avoids redundant expenses and duplicate subscriptions. The consortium, with its collective strength of participating institutions, has attracting highly discounted rates of subscription with most favorable terms of agreement. Consortia are tools, which will aid in exploiting the features of the e-journals as well as in effecting saving.

REFERENCES
5. http://paniiit.iitd.ac.in/indest/
7. http://www.calico.ac.za/display.asp?id=96&linktype=1
11. http://www.inflibnet.ac.in/econ/
13. http://www.library.yale.edu/consortia/
17. http://www.wrlc.org/
UNION CATALOGUE

A union catalog is a combined library catalog describing the collections of a number of libraries. Union catalogs have been created in a range of media, including book format, microform, cards and more recently, networked electronic databases. As union catalogues have embraced the web and as pan-union catalogues have emerged and become accessible via Google, Yahoo and other search engines, the role of the union catalogue has transformed. End users are now accessing union catalogues directly. This has had an effect on the way data is presented. It has also affected physical delivery, electronic delivery and reference services both in presentation and how the services are interlinked and enacted in the background.

Union Catalogues are useful to librarians, as they assist in locating and requesting materials from other libraries through interlibrary loan service. Subscription to Online Computer Library Center (OCLC), USA would enable our libraries to be discoverable by the network of global library system and sharing of online resources more effectively.

MAJOR UNION CATALOGUES

1. **Copac National Library Catalogue**: The Copac library catalogue gives free access to the merged online catalogues of many major University, Specialist, and National Libraries in the UK and Ireland, including the British Library. copac.ac.uk/

2. **National Union Catalog**: The National Union Catalog (NUC) is a printed catalog of books catalogued by the Library of Congress and other American and Canadian libraries, issued serially beginning in the 1950s. en.wikipedia.org/wiki/National_Union_Catalog

3. **Australia's National Bibliographic Database (NBD)**: It is a national union catalogue of the catalogued holdings of the participating Australian libraries,
maintained by the National Library of Australia. The NBD is accessible through the Libraries Australia service for subscribers and through Trove as a free service for the Australian public. www.nla.gov.au/libraries/resource/cat.html

4. National Union Catalog of Manuscript Collections (NUCMC): NUCMC program is to provide and promote bibliographic access to the nation's documentary heritage. This mission is realized by NUCMC production of cataloging describing archival and manuscript collections held by eligible repositories located throughout the United States and its territories. www.loc.gov/coll/nucmc/

5. LOUISiana Union Catalog: The union catalog allows searching any or the entire Louisiana academic library catalogs at the same time. Searching the union catalog will return a list of items, along with the various libraries that own them. http://search.louislibraries.org/

6. IPCAT: The Italian Periodicals Catalogue is an online catalogue of holdings of periodicals related to Italian studies in the humanities in over 40 libraries in Great Britain and Ireland. http://ipcat.leeds.ac.uk/

7. IndCat: Online Union Catalogue of Indian Universities is unified Online Library Catalogues of books, theses and journals available in major university libraries in India. The union database contains bibliographic description, location and holdings information for books, journals and theses in all subject areas available in more than 145 university libraries across the country. http://indcat.inflibnet.ac.in/indcat/

8. ADINET's Union list: It is list of current journals subscribed by libraries in Ahmadabad and Gandhinagar. It gives information about 99 Libraries in Ahmadabad who subscribe to a total of 7159 journals and is being updated every year.

9. CSIR libraries Union Catalogue: It is List of current journals subscribed by all the CSIR libraries.

10. INFLIBNET's Serials holding database: This provides access to journals holding of different University libraries of India. The search interface is compatible with Internet Explorer.

11. MYLIBNET's Union list: It is the list of Science and Technological serials. provides access to holdings of S & T libraries in Mysore city

12. National Union Catalogue of Scientific Serials in India (NUCSSI): It is the first indigenous database serves as an ideal access tool for serials holdings information. It contains over 44,000 unique journal titles with 2.68 lakhs holdings data of more than 500 libraries of major universities, S&T institutions, R&D units of industries, higher institutes like IISc, IITs and professional institutes in S&T disciplines within the country.
13. **Union Catalogue of Biomedical Serials**: It is a database of the Serials holdings of major medical libraries in the country, which has been compiled by Indian Medlars Centre (IMC). Around 180 libraries are participating in it.

14. **Union catalogue of Current Journals**: It lists current journals subscribed by select libraries in Bangalore. It gives information about 13 libraries in Bangalore and being updated every year.

15. **Union Catalogue of Periodicals**: This provides access to journal holdings available at some selected economics, management and social science libraries in India. At present 14 libraries have participating in it.

16. **Union Catalogue of Science/Social Science periodicals**: This provides access to holdings of select management and development libraries in India, and one each in Bangladesh, Pakistan, Shri Lanka and Bhutan. In total 19 libraries have participated in it.

17. **Virtual Information Center's Union List of Periodicals**: it is a database of union list of periodicals, comprising of subscriptions for 2002 from 17 institutions who are member-partners of IKP Knowledge Network. One has to register to gain access to the catalogue.

**WORLDCAT.ORG: THE WORLD'S LARGEST LIBRARY CATALOG**

It is a union catalogue which itemizes the collections of 71,000 libraries in 112 countries which participate in the Online Computer Library Center (OCLC) global cooperative. It is built and maintained collectively by the participating libraries.

**STEPS IN MAKING OF UNION CATALOGUE**

**Online Computer Library Center (OCLC)**

OCLC is a nonprofit, membership, computer library service and research organization dedicated to the public purposes of furthering access to the world’s information and reducing information costs. More than 72,000 libraries in 170 countries and territories around the world have used OCLC services to locate, acquire, catalog, lend and preserve library materials.

**OCLC WorldShare** provides a Web-based platform for collective innovation with shared services, integrated applications and a streamlined approach to managing library workflows. Together with WorldCat, WorldShare helps the world's libraries connect in new ways to operate, innovate and collaborate at Webscale.

**MARC, Machine-Readable Cataloging**, is a data format and set of related standards used by libraries to encode and share information about books and other material they collect. It was first developed by Henriette Avram at the Library of Congress in the 1960s, and is still widely used today as the basis for most online public access catalogs.
CATALOGUING RULES

AACR2 stands for the Anglo-American Cataloguing Rules, Second Edition. It is designed for use in the construction of catalogues and other lists in general libraries of all sizes. The rules cover the description of, and the provision of access points for, all library materials commonly collected at the present time.

MARC 21 is a result of the combination of the United States and Canadian MARC formats (USMARC and CAN/MARC). MARC21 is based on the ANSI standard Z39.2, which allows users of different software products to communicate with each other and to exchange data. MARC 21 was designed to redefine the original MARC record format for the 21st century and to make it more accessible to the international community. MARC 21 has formats for the following five types of data: Bibliographic Format, Authority Format, Holdings Format, Community Format, and Classification Data Format. Currently MARC 21 has been implemented successfully by The British Library, the European Institutions and the major library institutions in the United States, and Canada.

BATCH LOADING

Batch loading is a cataloging option that enables all types and sizes of libraries and library groups to add and maintain large numbers of catalog records and library holdings information to WorldCat. To use this service one has to maintain their holdings information and receive MARC records. Batch processing is a way for the institution to maintain their holdings and add records offline. They can send files of MARC or non-MARC bibliographic records or numeric search keys to OCLC, to set and cancel holdings. Bibliographic records may also be added to WorldCat. Local data records (LDRs) may be added and updated through batch processing. Files can be prepared for batch processing by OCLC if some basic access points are available. These basic access points include:

- Library of Congress Control Number (LCCN)
- Title
- Personal name-title
- International Standard Book Number (ISBN)
- International Standard Serial Number (ISSN)
- OCLC record control number

CONNEXION SOFTWARE

The Connexion client provides much of the same cataloging functionality as exists in the browser interface, while adding productivity-boosting enhancements including macros, additional keyboard customization—one can perform all navigation and cataloging
actions using assignable key combinations—and integrated label printing. In addition, one can work offline, using client local files and batch processing to send their transactions to OCLC. It helps to make cataloging available more places and for more people by way of its web interface. The Connexion browser is utilized like any web site through a standard browser such as Microsoft Internet Explorer or Netscape Navigator.

**AgriCat @ eGranth**

"AgriCat" is a Union Catalogue of the holdings of 12 major libraries (IARI, IVRI, UAS, GBPUAT, CCShAU, ANGRAU, NDRI, CIFE, CSKHPR, MPKV, TanuVAS, DIPA) of the ICAR Institutes and SAUs combined together. It provides digital access to library resources of 12 different research institutes and agricultural universities which include OPAC, important institutional repositories, rare books and old journals and makes them publically accessible over internet under NARS with Online Computer Library Center (OCLC) partnership. Union Catalogues are useful to librarians, as they assist in locating and requesting materials from other libraries through interlibrary loan service. Subscription to Online Computer Library Center (OCLC), USA would enable our libraries to be discoverable by the network of global library system and sharing of online resources more effectively. [http://www.agricat.worldcat](http://www.agricat.worldcat)

**CONSORTIUM PARTNERS**

The 12 partners involved in the Project of e-Granth are:

1. **Indian Agricultural Research Institute (IARI), New Delhi**
   The Indian Agricultural Research Institute (IARI) is the country's premier national Institute for agricultural research, education and extension. It has served the cause of science and society with distinction through first rate research, generation of appropriate technologies and development of human resources.

2. **Indian Veterinary Research Institute (IVRI), UP**
   Indian Veterinary Research Institute (IVRI) is one of the premier research institutions dedicated to livestock research and development of the region. The institute with faculty strength of more than 275 has a major mandate of research, teaching, consultancy and technology transfer activities.

3. **University of Agricultural Sciences (UAS), Bangalore**
   The University of Agricultural Sciences was established through an Act (No. 22) by the then Mysore government in 1963. Although the university came into existence on August 21 1964, a journey into the broad-lands of history reveals it to be a much older institution.

4. **GB Pant University of Agriculture & Technology (GBPUAT), Uttarakhand**
   G.B. Pant University of Agriculture & Technology is the first State Agriculture University of the country, which was the dream of many visionaries. Foundation
stone of the University was laid by the first Prime Minister of India, Pt. Jawaharlal Nehru on November 17, 1960. This University has now become a lead Institution for agricultural education, research, and extension in the country.

5. **Ch. Charan Singh Haryana Agriculture University, Hisar**

Chaudhary Charan Singh Haryana Agricultural University popularly known as HAU is one of Asia's biggest agricultural universities, located at Hisar in Haryana. It is named after India's seventh Prime Minister, Choudhary Charan Singh. It is a leader in agricultural research in India and contributed significantly to Green Revolution and White Revolution in India in the 1960s and 70s.

6. **Acharya NG Ranga Agricultural University (ANGRAU), Hyderabad**

The Andhra Pradesh Agricultural University (APAU) was established on June 12, 1964 at Hyderabad. The University was renamed as Acharya N. G. Ranga Agricultural University on November 7th, 1996 in honour and memory of an outstanding Parliamentarian Acharya N.G. Ranga, who rendered remarkable selfless service for the cause of farmers and is regarded as an outstanding educationist, kisan leader and freedom fighter. Mandate of Institution is Education, Research, and Extension.

7. **National Dairy Research Institute (NDRI), Karnal**

The National Dairy Research Institute as country's premier Dairy Research institution has developed considerable expertise over the last five decades in different areas of dairy production, processing, management and human resource development. Information generated at the institute and the services offered have contributed to the growth of dairy industry as a whole and well-being of millions of milk producers and consumers of milk and milk products.

8. **Central Institute of Fisheries Education (CIFE), Mumbai**

CIFE has a distinctive vision, mission and history that set this apart from other agricultural and conventional universities. Over the years CIFE have trained more than 5000 people from India and abroad. Today, CIFE have Masters & Ph.D. programs in more than 10 disciplines of fishery science with state-of-the-art facilities.

9. **CSK Himachal Pradesh Krishi Vishwavidyalaya (CSKHPKV), HP**

Himachal Pradesh Krishi Vishwavidyalaya (now Chaudhary Sarwan Kumar Himachal Pradesh Krishi Vishvavidyalaya) was established on 1st November, 1978. The College of Agriculture (established in May, 1966) formed the nucleus of new farm university. The University has been given the mandate for making provision for imparting education in agriculture and other allied branches of learning, furthering the advancement of learning and prosecution of research and undertaking extension of such sciences, especially to the rural people of Himachal Pradesh.
10. **Mahatma Phule Krishi Vidyapeeth (MPKV), Maharashtra**

The Maharashtra Krishi Vidyapeeth, Rahuri is established on March 29, 1968 and subsequently named as Mahatma Phule Krishi Vidyapeeth (MPKV) after a great social reformer "Mahatma Jyotiba Phule". It has started functioning from October, 1969 at Rahuri, District Ahmednagar, Maharashtra, India. It is famous for co-operative sugar and dairy industries. The basic mandate assigned to this university is advancement in teaching, research and imparting extension education to the farmers of the State.

11. **Tamil Nadu Veterinary and Animal Sciences University (TanuVAS), Tamil Nadu**

Realizing the importance of education research in animal and fisheries sciences so as to increase its productivity towards better income generation for the resource poor farmers, the government of Tamil Nadu established the first veterinary and animal sciences university in Asia on 20th September 1989 with its head quarters at Chennai with the name Tamil Nadu Veterinary and Animal Sciences University (popularly abbreviated as TANUVAS).

12. **Directorate of Information & Publication of Agriculture (DIPA)**

The DIPA brings out various research journals, periodicals, textbooks, technical books, monographs, technical bulletins, newsletters and brochures in a lucid and popular style both in English and Hindi languages. In addition, it also provides latest information on the title of publication, author’s name; abstracts appeared in the journals, periodicals, books etc. on the ICAR website icar@org.in

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<th>Total Records in Agricat</th>
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<tr>
<td>Indian Agricultural Research Institute(IARI), New Delhi</td>
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<td>Indian Veterinary Research Institute (IVRI), UP</td>
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<td>Ch. Charan Singh Haryana Agriculture University, Hisar</td>
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<td>Acharya NG Ranga Agricultural University (ANGRAU), Hyderabad</td>
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<td>National Dairy Research Institute (NDRI), Karnal</td>
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<td>Central Institute Of Fisheries Education (CIFE), Mumbai</td>
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<tr>
<td>CSK Himachal Pradesh Krishi Vishwavidyalaya (CSKHPKV), HP, PALAMPUR</td>
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<tr>
<td>Mahatma Phule Krishi Vidyapeeth (MPKV), Maharashtra</td>
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<tr>
<td>Tamilnadu Veterinary and Animal Sciences University (TanuVAS), Tamilnadu</td>
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<tr>
<td>Directorate of Information &amp; Publication of Agriculture (DIPA)/ICAR</td>
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</table>
CONCLUSION
As libraries strive to meet the challenges of a three part collection; physical, digital and licensed, they are relying more heavily on union catalogues to achieve better, richer, shared collections and economies of scale in services and exposure. Union catalogues have evolved to perform a central role between libraries’ local systems and the Internet at large. Agricat Libraries is dedicated to offering the access to the widest possible range of resources. It helps to search the collection of twelve institutes and the collections of many other libraries worldwide using WorldCat, the world’s largest network of library-based content and services. Collaborative efforts by ICAR through e-Granth now enables the resources owned by AGRICAT libraries; available through their sharing relationships with other libraries and resources owned by all other WorldCat libraries globally.

REFERENCES
ROLE OF INFLIBNET FOR PROMOTION AND APPLICATION OF ICT BASED LIBRARY SERVICES TO NORTH-EASTERN REGION

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ABSTRACT

The paper gives the concept of Academic Library and ICT and its advantages. Discusses about the college education system in Assam and the application of ICTs in the college libraries in Assam. The paper broadly analyses the role of INFLIBNET Center in promoting the application of ICT in college libraries of Assam.

Keywords: Academic Library; ICT; Assam; North-East India, College Library; UGC; INFLIBNET.

INTRODUCTION

In 21st century, the entire world has become integrated into a single World System. The advent and use of Fiber Optic Communications, Satellites, and Internet has resulted in explosion of information and globalization. As Reddy (2010) explains, “access to information is essential for human resource development to empower people to take their destiny into their own hands, and access to the Internet is crucial in future access to information”. With the advancements of ICT applications, Internet and WWW, Library and Information Centers (LICs) have also shifted their collection from print to electronic resources. ICT is used as enabling technology for the acquisition, representation, storage, transmission, and use of resources in digital or electronic form. The application of ICTs in libraries has enabled it to introduce different new ICT based services and provide the traditional services in more effective way.

COLLEGE EDUCATION SYSTEM IN ASSAM

North-East India comprises eight sisters comprising Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Tripura and Sikkim. Total area of the region is about 2,55,168 Sq. km. Assam is the pioneer to introduce higher education in this region. At present, there are altogether 14 universities, both State and Central, in North East India.
and Assam alone has 5 universities. The number of colleges is also highest in this state comparing to other states of this area. The universities in Assam include Gauhati University (Guwahati), Dibrugarh University, (Dibrugarh), Assam Agricultural University (Jorhat), Assam University (Silchar) and Tezpur University (Tezpur) The Assam University and Tezpur University are central universities. According to Directorate of Higher Education, Assam at present there are total 367 affiliated colleges under the four universities mentioned above.

INFORMATION AND COMMUNICATION TECHNOLOGY (ICT)
Maurya & Kumar (2008) states that, in the present age of knowledge society, Information and Communication Technologies (ICT) will lead us to fast information, increased knowledge and other productive library and information services. The need to meet the demands of the faculty, students and academic support personnel, regardless of where they are located, has enforced the library managers and policy makers to utilize the facilities of ICTs in delivering library and information services.

ADVANTAGES OF ICT
Jain (2011) stated that, Information and Communication Technologies (ICTs) can be used to prepare the workforce for the information society and the new global economy. With the Internet and the World Wide Web, a wealth of learning materials in almost every subject and in a variety of media can now be accessed from anywhere at any time of the day and by an unlimited number of people.

APPLICATION OF ICT in Libraries
Reddy (2010) stated that the ‘ICT-ization’ of various sectors is creating another disparity between the information rich and the information poor in many societies. This new disparity is called the digital divide which is bound to deepen existing gaps in society unless communities work together to ensure equal access to and benefits from advanced information technologies for all. The 21st Century the scenario of academic libraries has been undergoing a sea-change. Much technological advancement is taking place and their application ensures better and equal access to information. To supplement this, several open source software have also been developed to use in the library and information centers. ICT enables one:

(a) To capture, store, manipulate, and distribute information
(b) To introduce and provide new services, revitalize the existing services by providing faster access to the resources, by overcoming the space and time barriers;
(c) To provide need-based, (tailor made), browsing and retrospective search services to the users.
NEW TREND OF ICT BASED LIBRARY SERVICES

OPAC and Web-OPAC

- Online Public Access Catalogue (OPAC) is an online bibliography of the collections of a library. Web OPAC is the library catalogue available on the Web or Internet. Today, with the use of the Internet, libraries can make their OPAC accessible to the users using a local area network (LAN) or a wide area network (WAN). The users can have access to it by connecting to the URL by using any common browser, such as Microsoft Internet Explorer or Netscape Navigator.

Subject Gateways

- Subject gateways are websites that provide links to information on various web-based resources including websites, documents, data, multimedia files and other resources available on a particular subject. These subject gateways are very helpful for the research scholars to search relevant information online, identify and retrieve high quality academic and research materials. Some Subject Gateways also provide access to e-Journals (either free or through registration), links to other related sites, discussion groups, mailing lists and may even allow users to post their materials for online public access. Generally access to subject gateways is provided through library website, designed to help library users discover high-quality information on the internet in a quick and effective way. Mentioned below some of the subject gateways are.

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<tr>
<th>Subject Gateway</th>
<th>Subject Coverage</th>
<th>Website</th>
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<tr>
<td>AHDS</td>
<td>Arts and Humanities</td>
<td><a href="http://www.ahds.ac.uk/">http://www.ahds.ac.uk/</a></td>
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<td>Astronomy</td>
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<tr>
<td>NOVAGate</td>
<td>Forestry, Food, Veterinary and Agricultural Sciences</td>
<td><a href="http://agripollute.nstl.gov.cn/MirrorResources/12450/index.html">http://agripollute.nstl.gov.cn/MirrorResources/12450/index.html</a></td>
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<tr>
<td>Sapling</td>
<td>Architecture, Planning and Landscape</td>
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<tr>
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<td>Science and Technology</td>
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<td>VirtualLibrary</td>
<td>All Subjects</td>
<td><a href="http://vlib.org/">http://vlib.org/</a></td>
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</table>

**Institutional Repository or Digital Archives**

- To make the scholarly resources globally accessible the researchers today give importance to make their intellectual output available through the Internet with seamless access facility. As library and information centers are the means to capture, preserve and disseminate the scholarly output of an institution the need to make them available and accessible to all the users have led to the concept of institutional repositories. Repositories are of two types – institutional and subject oriented. Institutional Repositories hold documents authored by its staff members and students. Subject repositories hold documents pertaining to a particular subject area. The establishment of IR in the higher education institutions helps to provide access to the scholarly documents generated in-house such as dissertation and theses, research reports etc. and represent the intellectual strength of the institution.

**ROLE OF INFLIBNET IN THE PROMOTION AND APPLICATION OF ICT**

To modernize the library and information centers of universities, higher education institutions and R&D institutions of India the University Grants Commission (UGC) established the Information and Library Network (INFLIBNET) (www.inflibnet.ac.in) programme in 1991, which plays a key role in the promotion of application of ICT. With the aim of automation and networking of the academic and R&D organizations in India, it has taken up a number of initiatives for the benefit of the academic community. Since its inception, INFLIBNET has given the North-Eastern States priority in developing infrastructure and facilities. The Centre has taken a number of steps so as to update the knowledge of LIS professionals in North-East and for keeping them abreast with new information technology. Some of the initiatives taken by INFLIBNET that can benefit the College Libraries of India, particularly the colleges in North-East India are discussed below.

1. **Providing Software for University Libraries (SOUL) to Promote Library Automation**

   The Software for University Libraries is developed by INFLIBNET and the first version of the software i.e. SOUL 1.0 was released during CALIBER 2000. It is integrated library automation software which work under client-server environment. Although the name indicates that it is meant for university libraries only, but it is developed in such a way that it can be used for automating any type or size of library. The current version of the software is
SOUL 2.0 released in 2008. The software is compliant to international standards for bibliographic formats such as MARC 21, ISO 2709, AACR-2, Common Communication Format (CCF), and networking and circulation protocols. The software along with the six modules designed to cater to its functional requirements is very effective for automation of library housekeeping operations. The application of computer in college libraries of Assam started during 2001 and the CDS/ISIS and SOUL are the two mostly used library management software. The INFLIBNET had offered the SOUL 1.0 free-of-cost to 103 libraries with extensive training for its implementation.

Fig. 1 Screen shot of the SOUL 2.0

2. Training Programmes for the LIS Professionals
   • Training on ICTs and SOUL

   For the LIS professionals of North-East India INFLIBNET has introduced the “Attachment Training Programmes (ATP)” which provides the working librarians and computer programmers from North-East the opportunity to work with the experienced INFLIBNET staff for three to six months in ongoing projects in the center. This helps the professionals immensely and to implement the practical experience and knowledge in their own libraries. The programme is free of cost and includes free local hospitality and an allowance of Rs. 500.00 per day.

   The center also conducts regional training programmes on library automation and SOUL 2.0 Installation and Operations in collaboration with department of Library and Information Science affiliated to different universities in different states.
**Promotion of Library Automation and Networking in North-Eastern Region (PLANNER)**

To expose the LIS professionals an Annual Conference called PLANNER is being organized every year in the North-Eastern region since 2003. The first PLANNER was held at North Eastern Hill University, Shillong. After that, every year it is being organized in different universities and institutions of North-Eastern states with different themes and sub-themes. All these conventions were successful with huge number of delegates coming from different states. It is a platform for the professionals to discuss their problems in automation and networking, share information and experiences and get ideas to implement. The name of the universities and institutes organised PLANNER since 2003 along with the themes are listed in the following table.

<table>
<thead>
<tr>
<th>Name of the University</th>
<th>Year</th>
<th>Theme</th>
</tr>
</thead>
<tbody>
<tr>
<td>North Eastern Hill University, Shillong</td>
<td>2003</td>
<td>Automation of Libraries in North East Region: Trends, Issues and Challenges</td>
</tr>
<tr>
<td>Manipur University, Imphal</td>
<td>2004</td>
<td>Content: Creation, Management and Access in Network Environment</td>
</tr>
<tr>
<td>Assam University, Silchar</td>
<td>2005</td>
<td>Digital Collection Development and E-Journal Management in Libraries</td>
</tr>
<tr>
<td>Mizoram University, Aizawl</td>
<td>2006</td>
<td>Digital Preservation, Management and Access to Information in the Twenty First Century</td>
</tr>
<tr>
<td>Gauhati University, Guwahati</td>
<td>2007</td>
<td>Library as a Global Information Hub: Perspective and Challenges</td>
</tr>
<tr>
<td>Nagaland University, Dimapur</td>
<td>2008</td>
<td>Open Access, Open Source and Open Libraries (O3)</td>
</tr>
<tr>
<td>Tezpur University, Tezpur</td>
<td>2010</td>
<td>Re-engineering of Library and Information Services in Digital Era</td>
</tr>
</tbody>
</table>

INFLIBNET will be organizing its ninth event PLANNER-2012 at Sikkim University, Gangtok during 4-6 March, 2012. The theme of the convention is “Building Participatory Library Services in Digital Era”.

**E-Resources Awareness or Training Programme**

INFLIBNET also organizes awareness programme on ‘UGC-Infonet Digital Library Consortium’ and “N-LIST” to its e-resources users in collaboration with
Central Libraries or Library and Information Science Departments of various universities. This programme helps the LIS professionals, faculty members, research scholars and students to get acquainted with resources, their features, functionalities and advanced options.

- **Seminars and Workshops**
  The INFLIBNET Center also organizes seminars and workshops of two to five days duration across the country in collaboration with in various academic institutions or at INFLIBNET Center, Ahmedabad. These workshops cover topics like Open Source Software, Open Access, Content Management, Operating Systems, Digital Library, E-resources, Institutional Repository, Networking, etc. These programmes include lectures as well as practical sessions to make it more effective. It aims to develop the skills needed to work effectively in ICT based environment. The participants get the opportunity to acquaint themselves with the recent developments in their field and make them comfortable to work in a digital environment.

3. **Access to E-Resources**
   - **National Library and Information Services Infrastructure for Scholarly Content (N-LIST)** (http://nlist.inflibnet.ac.in).

   The "National Library and Information Services Infrastructure for Scholarly Content (N-LIST)" project was being jointly executed by the UGC-INFONET Digital Library Consortium, INFLIBNET Centre and the INDEST-AICTE Consortium, IIT Delhi. The programme was formally launched by Honourable Union Minister of Human Resource Development Shri Kapil Sibal on 4th May, 2010. This aims to provide access to selected e-resources to the colleges, universities as well as to the centrally funded technical institutions. The students, researchers and faculty from colleges covered under Section 2F and 12B of UGC Act and Non-Aided colleges can get access to the resources. The users can download articles directly from the publisher's website according to their requirement. Apart from these colleges, all other colleges are eligible to become associate members and get benefit to access e-resources on discounted rates. The electronic resources subscribed under the N-LIST programme can be divided into Full-text E-resources, E-books and Bibliographic database. The limitation of the programme is that it does not cover resources on Agriculture, Engineering & Technology, Medicine and Pharmacology. At present, it provides access to 3000+ e-journals and 75,000+ e-books to the colleges in India with a nominal annual membership fee. Among the four
distinct components of the N-LIST project, there are two components that are related to the college libraries and their development. These are:

1. To subscribe and provide access to selected e-resources to 6,000 Govt./Govt.-aided colleges and monitor its usage; and

2. To act as a Monitoring Agency for colleges and evaluate, promote, impart training and monitor all activities involved in the process of providing effective and efficient access to e-resources to colleges.

Fig. 2 Screen shot of the N-LIST

- **Open Journal Access System (OJAS) (http://www.inflibnet.ac.in/ojs/)**

  Open Journal Access System (OJAS) is an open access platform to scholarly research developed by the Public Knowledge Project. It is designed for managing and publishing scholarly journals online. This platform can be used by the universities, colleges, and any other higher education institutions to host their publishing journals in electronic form free-of-cost on servers at the INFLIBNET Center. OJS is Open Archive Initiative-Protocol for Metadata Harvesting (OAI-PMH) compliant. Presently the system hosts twelve journals published from Assam University, Silchar and Indian Council for Social Science Research (ICSSR).
CONCLUSION

The application of ICTs helps to improve the scenario of library and information centers and has a positive impact in their modernization. Considering the advantages of using ICT, presently most of the academic institutions including the libraries are using the ICTs in library activities both in developed and developing countries. The use of ICT supports transfer and universal access to information and its proper storage, retrieval and preservation. The libraries in developed countries have yet to take many advantage of the explosion of ICT developments. Therefore, steps should be taken to make the LIS professionals aware of the latest developments in technology that are applicable to library. The workshop, seminars provides a platform to do so. Moreover, the LIS professionals should be skillful and competent to work in such an electronic environment.
In India, DRTC, Bangalore, NISCAIR, New Delhi, INFLIBNET, Ahmedabad etc. have played a very important role in this regard. The universities and institutions that offer LIS courses should also be dynamic and introduce all the latest developments in the curriculum, which will help the students to be comfortable in their work place and help in positive growth of the institution.

REFERENCES


CONSORTIUM FOR E-RESOURCES IN AGRICULTURE: AN OVERVIEW

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ABSTRACT
Library consortia or consortium is now being heard globally because of electronic or digital form of information. Consortia are all about sharing resources and improving access to information. These resources are shared among libraries that have common missions, goals and clients (Users) and act on those communalities. Consortia for resources in agriculture is an e-consortium of agricultural libraries under the Indian Council of Agriculture Research of national agricultural research systems. The paper discusses the background, main features and advantages of the consortium for e-resources in agriculture.

INTRODUCTION
A library consortium is the sharing of resources among the participant libraries. A consortium may be a formal agreement between two or more libraries based on a number and functions over their respective areas. For example, a library consortium may be based on library type academic, special, public etc. A regional and local consortium may be based on the need to provide remote users on a geographical area. A consortium is “an agreement, common platform, aiming to reduce costs for unit through or group (as of companies) formed to undertake formation of purchasing consortia.

Indian Council of Agricultural Research is a major agricultural scientific autonomous organization in the country and unique in having concurrent responsibility for research, education and extension. Formerly known as Imperial Council of Agricultural Research it was established on 16 July 1929 as a registered society under the society’s registration Act 1860 in pursuance of the report of the Royal Commission on Agriculture. The ICAR has its headquarters at Krishi Bhavan, New Delhi and is an apex body for coordinating, guiding, and managing research and education in agriculture including horticulture, fisheries, dairy and animal sciences in the entire country. ICAR has played a pioneering role in ushering Green Revolution and subsequent developments in agriculture in India through its research and technology development that has enabled the country to increase the production of food grains by four times, horticultural crops by 6 times, fisheries by 9
times (marine 5 times and inland 17 times) milk 6 times and eggs 27 times since 1950-51, thus making a visible impact on the national good and nutritional security. It has played a major role in promoting excellence in higher education in agriculture.

AGRICULTURAL LIBRARIES

An agricultural library is the special library, which primarily renders service to the policy makers, specialists, scientists, teachers, student’s researches, and farmers in agriculture and allied subjects. It is the nerve centre of all educational, research, trainings and extension activities in agriculture. Its collection and the clientele are discrete and pertaining to agriculture and allied subjects only. Agricultural libraries have now become highly complex centre with multiplicity of functions catering to a wide variety of clientele having divergent interests.

Every agricultural institute/ university has its own independent library with self-contained budget and resources to serve their users. Nowadays information explosion, diversity of user needs, multidisciplinary research duplicity of resources, escalation in cost of foreign journals, and financial crunch have made libraries to opt for resource sharing. Advent of internet, advancement of ICT facilities, easy and 24*7 accessibility have made the libraries to opt for consortium of e-journals to get maximum coverage of journals to larger number of users with minimum amount of budget. To maximize discipline-wise coverage, relevance of journals to users, number of users relevant to publishers, economics of pricing models given by publishers for using additional advantages like unlimited access, unlimited downloads, easy accessibility, anywhere at any time accessibility, full-text downloads, etc., made the authorities of ICAR to think about formation of e-consortium under the project of NAIP Component: ICAR as the Catalyzing Agent for Management of Change in the Indian NARS sub-component : information, communication and dissemination Systems (ICDS) Module information and Communication Technology (ICT) in the name of CeRA (Consortium for E-resources in Agriculture.

CONCEPT OF LIBRARY CONSORTIA

Library consortia concepts came from academic libraries for the primary purpose of sharing printed materials. Recently, academic libraries are having consortia to provide common access to electronic resources across the internet. Historically, the common platform of library co-operation was the sharing of union catalogue, document delivery services, storage facilities, collection development and human resources at local, national and regional level. Another form of co-operation was based on inter library loan services where cooperative libraries agree to share their resources among the member libraries. This form of cooperation enabled libraries to borrow books, periodicals and other reading materials which were not available locally.
FEATURES OF LIBRARY CONSORTIA

- It provides an organization and institution with the capacity to share their resources without sacrificing the individuality of each member library.
- The collections of the consortium libraries enable each member library to support scholarly research for its users.
- Cooperative research and development in application of information communication and technology enhances service and realizes cost effectiveness.
- Staff development and interaction with quality of services.
- It is the cooperative task to reduce the cost of purchase consortia. As a result, end users can take benefits of more resources than would be available through one library.

ADVANTAGES OF CONSORTIA

_Some of the important advantages of the library consortium are:_

- Consortia-based subscription to electronic resources provides access to wider number of electronic resources at substantially lower cost.
- Optimum utilization of funds.
- Facilities to build up digital libraries.
- Helpful to provide better library services like CAS and SDI
- Cost sharing for technical and training support.
- Less economy expansion
- Electronic journals demand neither library space nor shelving costs nor can they be stolen from the library.

DISADVANTAGES OF CONSORTIA

_Some of the important disadvantages of the library consortium are:_

- Absence of printed copy of journals
- Require training of staff in handling electronic documents etc.
- A consortium requires high initial investments in licenses and information and communication technology.
- Copy right problems
- Unrealizable telecommunication links and insufficient bandwidth
- Lack of archiving and back files availability.
CONSORTIUM FOR E-RESOURCES IN AGRICULTURE

The Consortium for e-Resources in Agriculture (CeRA) is a consortium of e-journals being subscribed by ICAR and provides access to more than 126 libraries of the NARS. It is in the project mode and is functional from the country’s premier national institute for agricultural research, education, and extension, i.e., IARI, New Delhi and is funded by NAIP.

MAIN FEATURES/FACILITIES OF CONSORTIUM

Springer Link: It is a platform of Springer and bouquet of e-journals on different subjects like Biomedical Sciences, Life sciences, Agriculture, Behavioral Sciences, Economics, Chemistry, Material Sciences, Engineering, Humanities, Social Sciences, Mathematics, Statistics, Veterinary, Medicine, Physics and professional and applied Computers published by Springer. The user can access the full text of around 1300+ Journals.

Annual Reviews: Annual Reviews are authoritative, analytic reviews in 33 focused disciplines within the biomedical, life, physical and social sciences etc., CeRA is subscribing 33 reviews in agriculture including Biochemistry, Biomedical engineering, Bio physics, Cell and Developmental Biology, Entomology, Genetics, Immunology, Microbiology, Nutrition, Pathology, Pharmacology, Toxicology, Physiology, Phytopathology, etc.,

CSIRO: CSIRO publishing is an autonomous business unit within Australia’s Commonwealth Scientific and Industrial Research Organization (CSIRO). It publishes globally reputed journals on agriculture, the plant and animal sciences, and environmental management. CeRA is subscribing 08 journals in agriculture and plant sciences with complete package access.

Science Direct: Science Direct is the world’s leading scientific full text database of Elsevier developed by articles/ chapters from more than 2,500 peer reviewed journals and more than 10,000 books. CeRA is subscribing 300+ journals in the field of agriculture and biological sciences.

OBJECTIVES OF CeRA

(a) To upscale the existing R&D information resource base of ICAR institutions/universities comparable to world’s leading institutions/organizations;

(b) To subscribe e-journals and create e-access culture among scientists / teachers in ICAR institutes/agricultural universities and

(c) To assess the impact of CeRA on the level of research publications measured through NAAS ID and Science Citation Index.
DELIVERABLES

(a) Online accessibility of all important journals and other resources related to agriculture and allied sciences to researchers and students of the consortium.
(b) Quick access to R&D information as available worldwide and permanent archive of the subscribed e-databases; and
(c) Improvement in the quality of scientific publications, teaching and research guidance.

ACCOMPLISHMENTS

● IP-based access to CeRA resources has been made available to NARS institutions and universities. Web based URL (www.cera.jccc.in) is available with easy and customized interface and facilitating the online access and document delivery. More than 2000 journals are covered.
● Subscription to all relevant and important resources from Annual Reviews, Springer, CSIRO, Elsevier, Taylor and Francis, Nature, SCI, Indian journals, Oxford, Wiley, ASA, etc. have been made available.
● Number of training/workshop/orientation programs have been arranged at local and national level for maximizing the usage of subscribed resources.
● Researchers being assisted to access full-text of library subscribed journals (which are not available in CeRA) the document delivery request system has been in place.
● CeRA maintains usages and other data for compiling the reports and further improving the system.
● Steering, monitoring cum negotiation, and working committees have been constituted and meetings are held periodically to achieve objectives of consortium.

e-GRANTH CONSORTIUM

Rationale of Project: The NARS has very large and extensive collection of repositories in the field of agriculture and allied sciences, spread all over the country in different libraries, academic institutions, museums, and in author’s collections. This invaluable heritage has to be documented, preserved and made easily accessible to end users, for which digitization is the solution. Digitization means acquiring, converting, storing, and providing information in a computer readable format that is standardized, organized and available on demand. Digital technology opens up a totally new perspective. The internet holds millions of websites and is a place for research, teaching, expression, publication, and communication of information. The important points as per the rationale of the project may be summarized as:

● Services too archaic in the light of ICT revolution
● Localized services
● Possible duplication of resources
● Space limitation for growth
● Staff crunch
● Budget constraints
● Poor visibility in catalogues, etc.

OBJECTIVES
(a) To create OPAC under Indian Agricultural Research Group Catalogue of all the partner library resources with OCLC partnership.
(b) To digitize important institutional repositories/resources of leading NARS libraries including rare books and old journals and make them Open Access under NARS.
(c) To strengthen capacity building for library and information management system (open to all libraries of NARS)

RESOURCES IN INSTITUTIONAL REPOSITORIES
(a) Theses, annual reports, newsletters, success stories, special bulletins, convocation addresses, endowment lectures, faculty/scientist’s profiles;
(b) Pre-prints, author’s collections, monographs, handbooks, course curricula, lecture schedules, lecture notes, proceedings of trainings, ppts;
(c) Important reports of committees, notifications, projects, statistical reports;
(d) Archives of heritage value such as awards, certificates, visitor’s handbooks, rare photos;
(e) Digital objects of plant varieties, insects, nematodes, microbes, audio/video recordings etc.

CONSORTIUM COMPOSITION
(a) Indian Agricultural Research Institute (IARI), New Delhi Lead Centre.
(b) Acharya NG Ranga Agricultural University (ANGRAU), Hyderabad.
(c) Central Institute of Fisheries Education (CIFE), Mumbai.
(d) Ch. Charan Singh Haryana Agricultural University (CCSHAU), Hissar.
(e) CSK Himachal Pradesh Krishi Vishwavidyalaya (CSKHPKV), Palampur.
(f) GB pant University of Agriculture & Technology (GfBPUAT), Pantnagar.
(g) ICAR Library, ICAR, New Delhi.
(h) Indian Veterinary Research Institute (IVRI), Izatnagar.
(i) Mahatma Phule Krishi Vidyapeeth (MPKV), Rahuri
(j) National Dairy Research Institute (NDRI), Karnal

(k) Tamilnadu Veterinary and Animal Sciences University (Tanu VAS), Chennai.

(l) University of Agricultural Sciences (UAS), Bengaluru.

HUMAN RESOURCE DEVELOPMENT

Training of library professionals and other staff associated with the project includes:

(a) Digital Library software and OAI-PMH.
(b) Library automation and World Cat.
(c) Digital library content management standards.
(d) Capacity building of librarians and other professionals on library management with reference to union catalogue.
(e) Creation, organization, and management of online digital libraries and institutional repositories.
(f) Use of web 2.0 technologies.
(g) User interaction and web-security.
(h) Online search services.
(i) Organizing annual conference cum workshops etc.

DELIVERABLES/OUTCOMES

(a) Catalogues of selected libraries are being converted into union catalogue and is now part of world Cat under the group name ‘Indian Agricultural Research Group Catalogues’.

(b) Major selected libraries becoming e-Granth or Digital libraries with the digitization of most of the institutional resources.

(c) Most of the librarians under NARS have acquired modern knowledge such as library and information management, union catalogue, Z39.50 server and client, OCLC membership, web2.0 and library 2.0 technologies, digital library and digital preservation e-publishing, etc. some of the professionals got advanced training with OCLC, NAL etc.

(d) The first annual conference of librarians and informaticians of NARS in the lines of CALIBER/NAACLIN was organized during 24-25 February 2011.

(e) The libraries and librarians would be ready to migrate to modern management paradigms with web 2.0 and library 2.0 technologies.

(f) Partner libraries would become at par with world libraries with respect to library and information management, rich with digital resources and web contents.

(g) Institutional digital repositories.
(h) Trained librarians in maintenance of digital library.
(i) Union catalogues of serials, monographs, dissertations, etc.
(j) Website with content management system
(k) Open access service provider etc.

CONCLUSION

Library consortia providing for physical and electronic delivery of materials, and integrating the collection development process are all distinct and curtail steps in moving towards the 21st century library. Agricultural libraries have realised that consortia based subscriptions is cost effective and also avoids redundant expenses and duplicate subscriptions. CeRe has helped in developing the world class R&D information base of ICAR institutes/agricultural universities and an e-access culture among scientists/teachers.

REFERENCES


3. http://www.iari.res.in


NEXT GENERATION AGRICULTURAL LIBRARY SYSTEM: NEED TO ONE SEARCH BOX TO RULE THEM AL1

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ABSTRACT
The paper succinctly describes the state of art in agriculture, changing scale of information and user demands for access, informatics in agriculture, next generation realities, needs and services, products and next generation library system. Next generation library system needs to be agile, pertinent, personalised, and convenient and compete for attention through ease of use, excellence of content and functionality space. It is concluded that in future our information services should be allow one to discover knowledge rather than to search for information and accessible from within whatever online place a user in habits and as and where networked device available. Therefore we need to strive for much simpler ways to find much more relevant information “one search box to rule them all” – federated discovery of all available resources from a single point of entry is an overarching need.

INTRODUCTION
The information services are keys to the development of agriculture education, research, extension education, and agriculture and agro industries in India. The services are rendered by the Agriculture University and ICAR institute libraries to their users for better development and to fulfil the aims and objectives of Universities and institute. In India, since 1911-2012, during the period of hundred years the libraries moved conventional to non conventional services like microfilms to digitization, fax and telex to e-mail, land lines to mobile, cable to Wi-Fi, audio visuals, T.V., VCR, computer, and from there to laptops and now it is the tablet in the classroom and in future the picture will be so varied.

It is now realized that in future the tremendous changes will be effected in agriculture education, research, and extension and agriculture sector. Therefore it is important to understand not only the current climate we must also know what will be valued in the future so that we can take appropriate action to improve knowledge management system to act as an efficient clearing-house of technology, knowledge and information in agriculture and allied sectors. Considering the importance of changing scenario and continuous development in library services it is necessary to know the services and
products for next generation in agricultural libraries, their needs, role of future cyber agricultural knowledge resource centre, national digital agricultural information centre, for strategic thinking and planning, supporting librarians in making better decisions, improving services, saving of time and money for the future development of library and users.

OBJECTIVES

➢ To know the state of art in agriculture education, research and extension education in India
➢ To identify the changing scale of agricultural information and user demands for access
➢ To find out the need of next generation agricultural library system
➢ To propose integrated agricultural library system

STATE OF ART IN AGRICULTURE EDUCATION, RESEARCH AND EXTENSION EDUCATION IN INDIA

Most people think agriculture is farming, ranching, or other forms of food, animal feed, fiber and ornamental production, processing, and consumption. However, modern agriculture encompasses much more. Agriculture and agricultural science touch every aspect of Indian society from the individual consumer’s health and safety to the nation’s welfare, security, and environmental sustainability.

Increasingly, agricultural research is fueling innovation in many parts of the economy not generally associated with agriculture, such as energy, electronics, plastics, and pharmaceuticals. Part of the impetus comes as agriculture continues to move into genomics, genetic transformation and other forms of plant and animal biotechnology, with applications that transcend the traditional definition of agriculture. Many major drug therapies, like Taxol for breast cancer and Artemisin, used to cure malaria, are based on plant derivatives.

Similarly, crop biomass engineering is showing promise for providing a larger share of the energy currently supplied by the petrochemical industry. Scientists also are working on ways to use biotechnology for environmental preservation and remediation using plants to detect, monitor, absorb and store toxic and hazardous substances. Other products currently under development include: proteins and enzymes for diagnostic, therapeutic and manufacturing purposes; modified fatty acids and oils for paints and manufacturing; and biopolymers as substitutes for plastics.

CHANGING SCALE OF INFORMATION AND USER DEMANDS FOR ACCESS

The exponential growth in computing, storage, and networking power along with concomitant growth in digital information and data are having a major impact on
research, education, and library functions. Increasingly the Web is overtaking print as the medium for communication. Almost all scientific and technical literature is now created in digital form (termed “born digital”) and large quantities have been converted to digital retrospectively (termed “reborn digital”), while new Federal guidelines require open digital publication of research results. This raises questions of how best to support the life cycle management of research and learning materials; how to develop greater systems integration among learning, library, and administrative systems; and how to integrate information skills into learning and knowledge generating activities. The traditional linear, batch processing approach to scholarly communication is changing to a process of continuous refinement as scholars write, review, annotate, and revise in near-real time across the Internet.

Research and educational materials are produced throughout universities, research labs, Agricultural Experiment Stations and Cooperative Extension offices. The diversity is immense: courseware, documents, databases, data sets, are simulations. They are hugely variable in approach, in technologies, in scope, and in complexity. Information also comes in many formats from print to digital to microfilm and audio/visual formats. Libraries expanding digital resources require new and improved tools for collaboration and for working interactively with all types of artifacts of scientific progress. This includes observed and simulated data; taxonomies; mathematical expressions; molecular, chemical and genomic expressions; structural, physical, and computational models; tables, graphs, charts, maps and images; field and laboratory notebooks; monographs and other scholarly documents; critical reviews and discourse; ontologies; bibliographic references; and remotely sensed imagery as well as sensor-generated biophysical spatial data.

As the library community works together with other organizations to develop strategies for providing efficient and effective archival, preservation, and delivery services to this plethora of information and data, user expectations have continued to expand and drive increasingly sophisticated systems for access. The majority of Indians households now have personal computers and Internet access. According to OCLC, the graduating class grew up with computers, multimedia, the Internet and a wired world. In India, the students began using computers between the ages of 5 and 8. By the time they were ages 16 to 18 all of them had begun using computers.

INFORMATICS IN AGRICULTURE
Informatics is the study of the application of computers and statistical techniques for the management of information. It is also defined as the science of information. It is often though not exclusively, studied as a branch of computer science and information technology and is related to database, ontology and software engineering. Information is critical to social and economic activities relating to the developmental process. Indian economy has already witnessed several revolutionary developments, viz. Green (food grains), White (milk), Yellow (oilseeds), Blue (fishery) and now rainbow revolution in
agriculture, biotechnological revolution, industrial revolution and information technology revolution etc. The country has made considerable progress in the communication system, telephony and digital audio, video processing etc. Good communication system coupled with information technology has a great potential for providing needed support to the agriculture in achieving sustainable production by way of timely dissemination of agricultural technology needed by the farmers.

Table 4.1 Users view towards next generation agricultural library system

<table>
<thead>
<tr>
<th>Users</th>
<th>Next generation agricultural library system</th>
<th>Conventional</th>
<th>Non conventional</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Total</td>
<td>Recd.</td>
</tr>
<tr>
<td>Students U.G., P.G., Ph.D</td>
<td></td>
<td>200</td>
<td>180</td>
</tr>
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<td>Print media, text books, reference books, journals, Indian &amp; foreign, encyclopaedia, yearbook, almanacs and dictionaries in multiple languages, biographical and bibliographical sources</td>
<td>e-resources, digital, audio video, repositories, OPAC, OCLC, on line direct access, net working, free access, mobile(cell) services, quick and easy services, etc.</td>
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<td>Academic Staff</td>
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<td>reference books, journals, Indian &amp; foreign, indexing and abstracting service</td>
<td>Need of paperless, virtual library services and to use anywhere</td>
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<td>Extension Workers</td>
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<td>49</td>
</tr>
<tr>
<td>reference books, journals, Indian &amp; foreign, regional language publications</td>
<td>One search box access, easy to use where electronic device is available</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: questionnaire

It is observed from the table 4.1 that the users required both conventional and non-conventional services for their use and they have emphasised on non conventional services and facilities of library like paperless, virtual, digital with repositories with the facility of OPAC, OCLC to use anywhere, where electronic devices are available. It is found that 37.70% users expected conventional services and 99.26% user’s non-conventional services in the library for their use in future.

USER’S PREFERENCE

Next generation
New generation is expecting instant answers to their queries and becoming library collaborators and that library of the future should work more with people rather than for people.
Products
The new technologies provide us with opportunities for customizing, developing and delivering information and knowledge in many different ways. Information managers are the best people to do this

The new products are coming on line and the users are giving preference to them due to easy and quick access and desire from the libraries simple searching without visiting to the library with the help of user ID at any where, on line availability, vast heterogeneous content, flexibility, unification, data enhancement, integration, step-by-step evolution, open access sources, OPAC, OCLC services, and need to one search box for searching required information. In view of this considering the preference of users in print and electronic collection, online searching in anywhere, quick access it is necessary to develop integrated agricultural system on national and international level with and by effecting e-resources for the development of users.

NEXT GENERATION INTEGRATED AGRICULTURAL LIBRARY SYSTEM
- Complete the migration from print to electronic collections, retire legacy print collections, redevelop library space, reposition library and information tools, resources, and expertise and migrate the focus of collections from purchasing materials to curating content
- Collect, store, organize, share, synthesize and offer computational features for huge volumes of widely disparate and distributed digital information. This includes scholarly journals, monographs, textbooks, learning objects, abstracts, manuscripts, maps, Internet resource descriptions, still images, geospatial images and other kinds of vector and numeric data, as well as moving picture and sound collections.
- Offer a federated network of institutional repositories which allows seamless, “one-stop shopping” interfaces with persistent links from a course reading list or other learning objects to the most appropriate copy of an information resource, abstracts, full-text, data, and information packages. Determine how different people need to analyze and find information and adjust to their “contexts.”
- Include formats and delivery channels that enhance use of information. Provide new knowledge management tools for collaboration and for working interactively with all artifacts of scientific progress.
- There is need to undertake National Preservation Program for Agriculture Literature under ICAR, state govt and University, to identify and preserve the most significant agricultural literature.
- To increase communication (interoperability) among disciplines, there are major efforts in the library world to develop and adhere to collection standards, classification systems (schemes), common metadata structures, and other types of tagging so that eventually researchers can search, analyze and model across all
platforms and formats simultaneously. Increasingly, too, academic libraries have moved from the traditional service role of the library into project management; database design and management; interface programming; metadata

- Integrated information system under one umbrella should be developed in the interest of users and institute.
- The creation of institutional repositories is an important first step necessary to build a national agricultural information system and “Krishiprabha” created at university library, Haryana Agricultural University, Hisar with the help of ICAR, New Delhi Generation; copyright clearance; and website hosting. Libraries are also supporting new directions in scholarly communication such as open-access publishing and self-archiving; partnerships between libraries, university presses, publishers and software developers; and the creation of institutional repositories to preserve, maintain, and provide access to institutional intellectual resources.

The next generation library systems need to be nimble, personalized, relevant, and convenient. Our library organization needs to fully embody these traits too. The library should compete for attention through ease of use, excellence of content, and functionality of space. Our information services should allow one to discover knowledge rather than to search for information. And they should to be accessible from within whatever online place a user inhabits (iGoogle; Facebook; Blackboard), in whatever language one works in, and on whatever networked device.

CONCLUSION

The next generation agricultural library systems need to be agile, quick, ongoing, relevant, personalized, convenient, and iterative. The next generation system should be defined by users for their better development and which support access, discovery, selection and filtering. The system should be easy to use and to access information anywhere with the help of user ID. There is need to have a National Digital Agricultural Information System to strengthen agricultural education, research and extension education in India. The next generation service should be radically enhanced resource integration and move us on from the isolated data silos of the present.

The conventional libraries in a technology driven knowledge society have undergone a metamorphic change in relation to the repository of information, dissemination of information, preservation of materials in different formats namely print, audio, visual and other multi-media. The effective and efficient use of ICT and internet connectivity have given new dimensions and scope for running of such knowledge centres that have now brought in new terminology for Library; namely “ Agriculture Knowledge Resource Centre”

We need to strive for much simpler ways to find much more relevant information. “One search box to rule them all” –federated discovery of all available resources from a single point of entry is an overarching need.

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REFERENCES

DIGITAL PRESERVATIONS IN STATE UNIVERSITIES
OF ANDHRA PRADESH : A SURVEY

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ABSTRACT
The survey revealed a high level of awareness of the challenges of digital preservation within universities. Findings indicated that approximately half of those institutions surveyed have taken measures to develop digital preservation policies and to budget for it, while a majority has incorporated digital preservation into their institution’s planning. Universities predict that within a decade they will need to store large quantities of data in a wide range of formats from a variety of source. The paper also discusses some of the important of Digital Preservation and Repository System using State Universities in Andhra Pradesh – A Survey.

Keywords: Digital, Preservation, Data

INTRODUCTION
The direction digital preservation must take is known, but the details and complex relationships which must be resolved are still being pursued. And it is a matter of record that the array of resources and expertise are making inroads into the solution of all this digital complexity. Almost all of the digital preservation exists within established institutions and have dedicated staff with technological expertise up to the task of wrestling with aspects of these issues. These include, for example, National Libraries, National Archives, Institutional Repositories, Universities and other places of learning and research, and media and cultural museums and archives. In other words; to develop a sustainable preservation standard digital management and storage system for a collecting institution that doesn’t happen to be one of the world leaders in digital preservation. So Digital preservation of state universities in Andhra Pradesh.

DIGITAL PRESERVATION
Digital Preservation refers to the series of managed activities necessary to ensure continued access to digital materials as long as necessary. Digital preservation is defined very broadly for the purposes of this study and refers to all of the actions required to
maintain access to digital materials beyond the limits of media failure or technological change. Those materials may be records created during the day-to-day business of an organization; "born-digital" materials created for a specific purpose (e.g. teaching resources); or the products of digitisation projects. This excludes the potential use of digital technology to preserve the original artifacts through digitization. See also Digitization definition below.

- Long-term preservation - Continued access to digital materials, or at least to the information contained in them, indefinitely.
- Medium-term preservation - Continued access to digital materials beyond changes in technology for a defined period of time but not indefinitely.
- Short-term preservation - Access to digital materials either for a defined period of time while use is predicted but which does not extend beyond the foreseeable future and/or until it becomes inaccessible because of changes in technology.

OBJECTIVES

The main objectives of the present study are as follows:

- To find out the awareness of Librarians about Digital Preservation.
- To study the purpose and utilization of online journals.
- To find out the frequency of using digital data (prepare tables on the opinion of the users)
- To describe the emerging role and fit of digital information types in scholarly practice
- To understand the impact of budget on scholarly practice
- To find out the impact of metadata standards on their learning
- To find out the hindrances and problems faced by the users while accessing and using digital preservation

SCOPE AND LIMITATION

- The study covers only 11 State Universities in Andhra Pradesh.
- The study is related to the responses received through online questionnaire

METHODOLOGY

Keeping in view of the above objectives in mind, a structured online questionnaire was prepared to collect data from the librarians in State Universities in Andhra Pradesh. Online questionnaire contained various questions pertaining to the perception and utilization of digital preservation of data.
Table 1 Response from the Librarians

<table>
<thead>
<tr>
<th>S.No</th>
<th>State Universities</th>
<th>Total</th>
<th>Distributed</th>
<th>%</th>
<th>Received</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Traditional Universities</td>
<td>21</td>
<td>14</td>
<td>70</td>
<td>9</td>
<td>81.82</td>
</tr>
<tr>
<td>2</td>
<td>Medical Universities</td>
<td>3</td>
<td>3</td>
<td>15</td>
<td>1</td>
<td>9.09</td>
</tr>
<tr>
<td>3</td>
<td>Technological Universities</td>
<td>5</td>
<td>1</td>
<td>5</td>
<td>1</td>
<td>9.09</td>
</tr>
<tr>
<td>4</td>
<td>Law Universities</td>
<td>2</td>
<td>1</td>
<td>5</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>32</td>
<td>20</td>
<td>100</td>
<td>11</td>
<td>100</td>
</tr>
</tbody>
</table>

Response Rate: 55%

Fig. 1 University-wise distribution of respondents

For this purpose a total of 20 online questionnaires were distributed through electronic mail among librarians. Out of 20 online questionnaires distributed, 11 (55%) valid online questionnaires were received and then data was analyzed, tabulated, interpreted and presented in form of this paper. Table 1 shows the responses from the Librarians on the digital preservation.
DATA ANALYSIS
The analysis of the data and interpretation is as follows

**Awareness of Digital Preservation**
Table 2 reveals that 11(100%) of the respondents are aware of digital preservation.

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Awareness of digital preservation</th>
<th>No. of Respondents</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Yes</td>
<td>11</td>
<td>100</td>
</tr>
<tr>
<td>2.</td>
<td>No</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>11</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

**Digital Data**
Table 3 presents the Digital Data Status in the Universities, majority of the Libraries are having, Below 1 Terabyte(45.45%), following that Between1 to 50 Terabyte (18.18%), and only 9.09% is having Between 101-150 Terabyte, Between 151-200 Terabyte, and Above 200 Terabyte.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Digital Data</th>
<th>No. of Respondents</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Below 1 Terabyte</td>
<td>5</td>
<td>45.45</td>
</tr>
<tr>
<td>2</td>
<td>Between1 to 50 Terabyte</td>
<td>2</td>
<td>18.18</td>
</tr>
<tr>
<td>3</td>
<td>Between 51-100 Terabyte</td>
<td>1</td>
<td>9.09</td>
</tr>
<tr>
<td>4</td>
<td>Between 101-150 Terabyte</td>
<td>1</td>
<td>9.09</td>
</tr>
<tr>
<td>5</td>
<td>Between 151-200 Terabyte</td>
<td>1</td>
<td>9.09</td>
</tr>
<tr>
<td>6</td>
<td>Above 200 Terabyte</td>
<td>1</td>
<td>9.09</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>11</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

**Digital Information Types**
Table 4 explains availability of the Digital Information types in the Universities. Majority (90.91%) are having Document, E-Books, E-Journals, and CD/DVD following that Images (81.82%) and only 9.09% having the Scientific Data.
### Table 4 Digital Information Types

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Digital Information Types</th>
<th>No. of Respondents</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Documents</td>
<td>10</td>
<td>90.91</td>
</tr>
<tr>
<td>2</td>
<td>Images</td>
<td>9</td>
<td>81.82</td>
</tr>
<tr>
<td>3</td>
<td>Databases</td>
<td>4</td>
<td>36.36</td>
</tr>
<tr>
<td>4</td>
<td>Audio</td>
<td>5</td>
<td>45.45</td>
</tr>
<tr>
<td>5</td>
<td>Websites</td>
<td>7</td>
<td>63.64</td>
</tr>
<tr>
<td>6</td>
<td>Video</td>
<td>3</td>
<td>27.27</td>
</tr>
<tr>
<td>7</td>
<td>Electronic Mails</td>
<td>7</td>
<td>63.64</td>
</tr>
<tr>
<td>8</td>
<td>Scientific Data</td>
<td>1</td>
<td>9.09</td>
</tr>
<tr>
<td>9</td>
<td>Software</td>
<td>7</td>
<td>63.64</td>
</tr>
<tr>
<td>10</td>
<td>Electronic Books</td>
<td>10</td>
<td>90.91</td>
</tr>
<tr>
<td>11</td>
<td>Electronic Journals</td>
<td>10</td>
<td>90.91</td>
</tr>
<tr>
<td>12</td>
<td>CD/DVD</td>
<td>10</td>
<td>90.91</td>
</tr>
</tbody>
</table>

N = 11

### Source Systems

Table 5 presents the availability of the Source Systems in the Universities. Majority (27.27%) are having Document Scanning Programs, following that File Systems, Internet and Digitization Programs (18.18%) equally and only 9.09% having the Electronic Document Management Systems and Computer Assisted Design equally.

### Table 5 Availability of Source Systems

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Source Systems</th>
<th>No. of Respondents</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>File Systems</td>
<td>2</td>
<td>18.18</td>
</tr>
<tr>
<td>2</td>
<td>Document Scanning Programs</td>
<td>3</td>
<td>27.27</td>
</tr>
<tr>
<td>3</td>
<td>Internet</td>
<td>2</td>
<td>18.18</td>
</tr>
<tr>
<td>4</td>
<td>Electronic Document Management Systems</td>
<td>1</td>
<td>9.09</td>
</tr>
<tr>
<td>5</td>
<td>Digitization Programs</td>
<td>2</td>
<td>18.18</td>
</tr>
<tr>
<td>6</td>
<td>Computer Assisted Design</td>
<td>1</td>
<td>9.09</td>
</tr>
</tbody>
</table>

Total 11 100
Preservation Policies

Table 6 reveals the Preservation Policies in the Universities. Majority (36.36%) are having Archives, following that Libraries, Government Departments, and Suppliers and Vendors (18.18%) equally and only 9.09% having the Commercial Organization. The diagrammatic representation is given the Figure 2.

<table>
<thead>
<tr>
<th>SL.No.</th>
<th>Preservation Policies</th>
<th>No. of Respondents</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Archives</td>
<td>4</td>
<td>36.36</td>
</tr>
<tr>
<td>2</td>
<td>Libraries</td>
<td>2</td>
<td>18.18</td>
</tr>
<tr>
<td>3</td>
<td>Government Departments</td>
<td>2</td>
<td>18.18</td>
</tr>
<tr>
<td>4</td>
<td>Commercial Organization</td>
<td>1</td>
<td>9.09</td>
</tr>
<tr>
<td>5</td>
<td>Suppliers and Vendors</td>
<td>2</td>
<td>18.18</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>11</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Fig. 2 Preservation Policy

Separate Budget for Digital Preservation

Table 7 explains the Opinion on the Allocation of Budget for Digital Preservation in the Universities. Majority (63.64%) responded as sufficient and only 36.36% responded as insufficient.
Table 7 Budget for Digital Preservation

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Budget</th>
<th>No. of Respondents</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Sufficient</td>
<td>7</td>
<td>63.64</td>
</tr>
<tr>
<td>2</td>
<td>Insufficient</td>
<td>4</td>
<td>36.36</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>11</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Essential of Digital Collection

Table 8 reveals that the Opinion on the Essentials of Digital Collection in the Universities. Majority (63.64%) Check Records have not been damaged, and only (27.27%) Ensures records are accessible for up 25 years and Integrates with content delivery systems equally.

Table 8 Essential for Digital Collection

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Essential for Digital Collection</th>
<th>No. of Respondents</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Maintains Authenticity</td>
<td>6</td>
<td>54.55</td>
</tr>
<tr>
<td>2</td>
<td>Check Records have not been damaged</td>
<td>7</td>
<td>63.64</td>
</tr>
<tr>
<td>3</td>
<td>Digital Information Management</td>
<td>4</td>
<td>36.36</td>
</tr>
<tr>
<td>4</td>
<td>Content to deal with technical obsolescence</td>
<td>4</td>
<td>36.36</td>
</tr>
<tr>
<td>5</td>
<td>Ensures records are accessible for up 25 years</td>
<td>3</td>
<td>27.27</td>
</tr>
<tr>
<td>6</td>
<td>Is able to store many different types of content</td>
<td>4</td>
<td>36.36</td>
</tr>
<tr>
<td>7</td>
<td>Handles a wide variety of file formats</td>
<td>7</td>
<td>63.64</td>
</tr>
<tr>
<td>8</td>
<td>metadata standards</td>
<td>5</td>
<td>45.45</td>
</tr>
<tr>
<td>9</td>
<td>Retrieves content using full text</td>
<td>6</td>
<td>54.55</td>
</tr>
<tr>
<td>10</td>
<td>Check for duplicate items</td>
<td>4</td>
<td>36.36</td>
</tr>
<tr>
<td>11</td>
<td>Integrates with content delivery systems</td>
<td>3</td>
<td>27.27</td>
</tr>
<tr>
<td>12</td>
<td>Support emulation to deal with technical obsolescence</td>
<td>5</td>
<td>45.45</td>
</tr>
</tbody>
</table>

N = 11

Using Metadata Standards

Table 9 presents that the majority (63.64%) are using the Dublin Core Metadata and only 18.18% using METS and MARC equally. Other Standards are not used.
### Table 9 Using Metadata Standards

<table>
<thead>
<tr>
<th>SL.No.</th>
<th>Metadata Standards</th>
<th>No. of Respondents</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Dublin Core</td>
<td>7</td>
<td>63.64</td>
</tr>
<tr>
<td>2</td>
<td>METS</td>
<td>2</td>
<td>18.18</td>
</tr>
<tr>
<td>3</td>
<td>MARC</td>
<td>2</td>
<td>18.18</td>
</tr>
<tr>
<td>4</td>
<td>EAD</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>5</td>
<td>PREMIS</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>6</td>
<td>MODS</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>7</td>
<td>TEI</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>8</td>
<td>DDI</td>
<td>0</td>
<td>0.00</td>
</tr>
</tbody>
</table>

N = 11

### Constraints of Digital Preservation

Table 10 describes that the majority (63.64%) are having Backup, Authentication, equally of the constraints in Digital Preservation following that Duplication (54.55%), Internet (45.45%) and only 27.27% is having the constraints on the power and Legal Issues.

### Table 10 Constraints of Digital Preservation

<table>
<thead>
<tr>
<th>SL.No.</th>
<th>Constraints</th>
<th>No. of Respondents</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Backup</td>
<td>7</td>
<td>63.64</td>
</tr>
<tr>
<td>2</td>
<td>Power</td>
<td>3</td>
<td>27.27</td>
</tr>
<tr>
<td>3</td>
<td>Duplication</td>
<td>6</td>
<td>54.55</td>
</tr>
<tr>
<td>4</td>
<td>Authentication</td>
<td>7</td>
<td>63.64</td>
</tr>
<tr>
<td>5</td>
<td>Internet</td>
<td>5</td>
<td>45.45</td>
</tr>
<tr>
<td>6</td>
<td>Legal Issues</td>
<td>3</td>
<td>27.27</td>
</tr>
</tbody>
</table>

N = 11

### List of Digital Preservation

Table 11 presents some of the institutions preserving the digital information in India.

### Table 11 List of Digital Preservation

<table>
<thead>
<tr>
<th>Sl.No</th>
<th>Institutions</th>
<th>Websites</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Digital Archive of National Institute of Technology Rourkela</td>
<td><a href="http://dspace.nitrkl.ac.in/dspace/">http://dspace.nitrkl.ac.in/dspace/</a></td>
</tr>
<tr>
<td>2</td>
<td>Electronic Theses and Dissertations of Indian Institute of Science</td>
<td><a href="http://etd.ncsi.iisc.ernet.in">http://etd.ncsi.iisc.ernet.in</a></td>
</tr>
<tr>
<td>3</td>
<td>Open Access Repository of IISc Research Publications</td>
<td><a href="http://eprints.iisc.ernet.in/">http://eprints.iisc.ernet.in/</a></td>
</tr>
<tr>
<td>4</td>
<td>IDRC Digital Library</td>
<td><a href="http://idl-bnc.idrc.ca/">http://idl-bnc.idrc.ca/</a></td>
</tr>
<tr>
<td>5</td>
<td>Digital Repository of IIT Bombay</td>
<td><a href="http://dspace.library.iith.ac.in/dspace/">http://dspace.library.iith.ac.in/dspace/</a></td>
</tr>
<tr>
<td>6</td>
<td>DSpace at National Centre for Radio Astrophysics</td>
<td><a href="http://ncralib.ncra.tifr.res.in:8080/dspace">http://ncralib.ncra.tifr.res.in:8080/dspace</a></td>
</tr>
<tr>
<td>7</td>
<td>Raman Research Institute Digital Repository</td>
<td><a href="http://dspace.rri.res.in:8080/dspace/">http://dspace.rri.res.in:8080/dspace/</a></td>
</tr>
</tbody>
</table>
Table 12 presents the major Digital Preservation Softwares available.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Software Details</th>
<th>GSDL</th>
<th>EPrints-II</th>
<th>DSpace</th>
<th>Fedora</th>
<th>Koha</th>
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<td>Developer</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>New Zealand Digital Library Project at the University of Waikato</td>
<td></td>
<td>School of Electronics and Computer Science, University of Southampton</td>
<td>Massachusetts Institute of Technology (MIT) &amp; Hewlett-Packard Labs</td>
<td>Cornell University</td>
<td>Katipo Communications</td>
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<td>3</td>
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<td>Unices</td>
<td>Unices, Windows</td>
<td>Unices, Windows</td>
<td>Linux Windows</td>
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<td>Apache 1.3/2.0</td>
<td>Tomcat 1.4</td>
<td>Apache (2.0 is preferred)</td>
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<td>J2SDK v.1.4</td>
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<td>PostgreSQL 7.3</td>
<td>MySQL v.0.94 (uses by default) MySQL/Oracle 9i (optional)</td>
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<td>CNRI Handles</td>
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<td>identifiers (PID)</td>
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CONCLUSION

Digital preservation is achievable in a country where policy frameworks, institutional frameworks, information infrastructure, trained manpower, and financial resources are adequately available. Such systems are likely to be componentized⁴, mix-and-match solutions. They will need to be scalable, particularly to handle the predicted large volumes of content, and also to handle high ingest rates. In addition, they will need to handle a wide range of formats from a variety of sources, and preserve the information...
contained therein for up to 50 years. For universities without a digital preservation policy, it is expected that the predicted increases in volume of digital information, and the range of formats needing to be preserved, will provide the impetus to focus on digital preservation and take practical steps to address its challenges.

REFERENCES
INFORMATION RETRIEVAL SYSTEM: A BRIEF SKETCH

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INTRODUCTION
Information retrieval system is composed of a set of interacting components each of which is designed to serve a specific function for a specific purpose, and all these components are interrelated to achieve a goal i.e., to retrieve information in a narrow sense and to increase the level of knowledge of the users in a broader sense. According to Lancaster “An Information Retrieval System does not inform (i.e. change the knowledge of) the user on the subject of his inquiry. It merely informs on the existence (or non-existence) and whereabouts of documents relating to his request.

The major task of an information retrieval system is analysis of documents and organization of information (creation of a document database) analysis of user queries, preparation of a strategy to search the database, actual searching or matching of the user queries with the database and finally retrieving items which fully or partially match with the search statement.

FUNCTIONS
- To identify the source of information relevant to the areas of interest of the target user community.
- To analyze the contents of the source
- To represent the contents of the analyzed source in a way that will be suitable for matching with the users queries.
- To analyze user’s queries and representation of the query in a form that will be suitable for matching with database.
- To match the search statement with the stored database.
- To retrieve information items that are relevant.
- To make necessary adjustments in the system based on feedback.

Sub systems of Information Retrieval
According to Lancaster there are 6 subsystems in information retrieval system
- Document Selection
- The Indexing
- The Vocabulary
• The Searching
• The user-System
• The matching

**STEPS IN MANUAL INDEXING**
1. Analysis of subject
2. Identification of keywords.
3. Standardization of keywords
4. Choice of an index system
5. Filing of entries

**Disadvantages**
1. Too much professional time and intellect are wasted in cataloguing and indexing
2. No consistency

**Automatic Indexing**

**Advantages**
1. Level of consistency in indexing can be maintained.
2. Index entries can be produced at a lower cost in the long run.
3. Indexing time can be reduced.
4. Better retrieval effectiveness can be achieved.
5. Automatic indexing mainly based on statistical or probabilistic calculations of term occurrences. Many automatic information retrieval systems are experimental.

**Subject Analysis**

Subject analysis means the analysis of the thought content embodied in a document. A broad definition of subject analysis is that the presence, identification and expression of subject matter in document texts, databases, controlled and natural languages, information requests and search strategies.

**Indexing**

The process of constructing document surrogates by assigning identifiers to text terms is known as indexing. The task of indexing is based on the conceptual analysis of the subject of the documents. An Indexing language is the language used to describe documents and requests. The elements of the index language are index terms, which may be derived from the text of the document to be described or may be arrived at independent. The indexing language may be available in a prepared form for adoption or
the language may be specially designed for a system. A scheme of classification can be considered as ready made indexing language. Similarly, a thesaurus is also a ready made language. Vocabulary of an indexing language has to be very precise and exact. The development of a thesaurus is a tool for controlling indexing language. The Indexing system is classified broadly as pre coordinate and post coordinate systems.

**Precoordinate System** as the name implied keywords chosen through the subject analysis stage are coordinated at the stage of indexing and thus each entry represents the full content of the document concerned ex. PRECIS, POPSI, Chain procedure.

**Post Coordinate system:** One entry is prepared for each keyword selected for representing the subject of a given document, and all the entries are organized in a file. When the user puts forward a query, it is analysed and some keywords are selected which are representative of user’s query. These query terms are then matched against the file of index terms and relevant documents are retrieved, Ex. Uniterm

The effectiveness of an indexing system is controlled by two parameters i.e., indexing exhaustivity and term specificity. A high level of exhaustivity of indexing leads to high recall and low precision. Conversely, a low level of exhaustivity leads to low recall and high precision. It would seem, therefore, that there is an optimum level of indexing exhaustivity and specificity for a given user population.

Recall is measured

\[
\text{Recall} = \left( \frac{\text{No. of relevant documents retrieved}}{\text{No. of relevant documents in the collection}} \right) \times 100
\]

Precision measured

\[
\text{Precision} = \left( \frac{\text{No. of relevant documents retrieved}}{\text{Total no. of documents retrieved}} \right) \times 100
\]

**Probabilistic Indexing**

A quantitative model of automatic indexing based on some statistical assumptions about the distribution of words in text this has been worked out by Boosstein, Swanson ans Harter. The difference between terms *word-type* and *word-taken* is crucial to the understanding of their model.

**Automatic Classification**

The basic assumption in retrieval system is that documents relevant to a request are separate from those which are not relevant, i.e. that the relevant documents are more like one another than they are like non-relevant documents.
EVALUATION

Evaluation studies investigate the degree to which the stated goals or expectations have been achieved or the degree to which these can be achieved. Lancaster identifies five major steps involved in the evaluation.

1. Designing the scope of evaluation: Preparation of a set of objectives. The purpose and scope of the whole evaluation, what level will it be evaluated, i.e. macro evaluation or micro evaluation, the probable constraints in terms of cost, manpower etc.,

2. Designing the evaluation program: The determination of the parameters on which data is to be collected and also proposes the methodology.

3. Execution of the evaluation: There should be communication between the evaluator and the designer at this stage so that to communicate any interesting observation which may call for redesign of the evaluation programme.

4. Analysis and interpretation of the result: Once the data has been manipulated in a suitable way, the evaluator gets a set of objectives.

5. Modifying the system in the light of the evaluation results

Search Strategy

Search Strategy provides the facility to select the optimum path for searching a file or a database. Meadow identifies three modes of search.

1. High recall search – when the user needs only relevant items on the stated topic

2. High precision search – when the user needs only relevant items i.e. as less no. of non-relevant items as possible.

3. Brief search – when the user wants only a few relevant items as opposed to relevant items.

Pre-search-interview is a conversation that takes place between a user and an information staff with a view to exchange actual information requirements of the user.

Boolean Search: George Boole he used three operators ‘+’, ‘-‘, ‘*’ John venn later expressed Boolean logic relationship. *logical product ‘AND’ allows the searcher to specify the coincidence of Ex. Computers and IR + logical sum ‘OR’ – allows the searcher to specify alternatives among search terms

Ex. Computers or IR ‘

Logical differeee ‘NOT’ facilities exclude items from a set of items

Ex. IR and not DBMS

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Limitations:

1. Users are not able to formulate exact search statement by the combination of and, or, not.
2. Number of retrieved items – users cannot predict exactly how many terms are to be retrieved to satisfy the query – broad retrieved items more narrow retrieved items less.
3. Identification of an item as relevant by finding out whether a given query term is present or not in a given record.

Best match searching or Ranked output searching or nearest neighbor

Designed to produce ranked output. A best match search matches a set of query words against the set of words corresponding to each item in the database. Calculate a measure of similarity between the query and the item, and then sorts the retrieved item in order of decreasing similarity with the query. Best match searching involves some quantitative measure of similarity between the query and each of the items in the file and the ranking is formed on the basis of their similarities.

Advantages:

1. No need to represent terms with the help of operators
2. Query in sentence like form
3. No worry about no. of retrieved items. The retrieved items placed in a ranked list of decreasing relevance.

Limitations: Multifaceted queries to overcome this hybrid system developed. It is the combination of Boolean and best match.

Online Searching and retrieval

It means a search of a remotely located database through interactive communication with the help of computer and communication channel. Armstrong mentions that online searching is 1. When two or more concepts must be incorporated 2. When new concepts are involved which may not have been incorporated in the indexing of printed sources, but can be found in online – free text searching. 3. Retrospective search also be carried out.

INTERNET
The internet has become a new communication medium and an indispensable tool for dissemination of information. Among different internet tools the world wide web is the fastest growing and the most powerful mechanism for collecting and dissemination of information. The abundance of data however makes information retrieval a challenge for the user. Moreover, most software application designed for personal computers and the internet do not incorporate extended search features to improve efficiency of the data retrieval. They need to integrate searching capabilities of desktop, internet and Usenet data into one paradigm. Proving seamless integration of searching all three sources of information.

Search engine is a computer programme which provides interactive access to many million pages of text that are available via the web. They usually comprise two main components – a resource detection programme and a text retrieval programme. The resource detection programme valiantly called as robot, a crawler or a spider is dispatched to every site that it can identify on the web. The programme downloads the pages at the site, and extracts indexing information from them to enable their subsequent retrieval. The indexed data resulted from this operation is stored in the search engine database together with a uniform resource locator (URL) which acts as the primary key for displaying the page when it is retrieved by the search. The retrieval Programme accesses this database which is structured as an inverted file analogous to those vogue with conventional on-line systems, in response to queries submitted from users browsers and then returns matching pages for user inspection. For searching process, search engines simultaneously adopts best match searching as the default mode of operation, with Boolean searching as an alternative and advanced retrieval option.

**Evolution:** Ten criteria for evaluating Internet sources.

1. Authenticity
2. Accessibility
3. Accuracy
4. Copyright
5. Coverage
6. Continuity  
7. Completeness  
8. Connectivity  
9. Compatibility  
10. Style  

CONCLUSIONS  
The ever changing, dynamic and complex information needs of users are challenging the existing IRS in terms of their retrieval efficiency and effectiveness on one hand. On the other hand the problems involved with information world such as overproduction (information explosion) interdisciplinary nature of information, cultural variations, language compatibility are also posing challenges to the designers of IRS.

Because of the above reasons, continuous research is going on in the fields of IRS either to improve the existing IRS or to design new and effective IRS. Information retrieval from www is an area now attracting most of the professionals in the field. Latest techniques and tools are being developed and tested to improve the retrieval efficiently. Data mining or bibliomining are examples of such techniques.

REFERENCES  
1. Chowdhary, G.G. Information retrieval system. IASLIC, Calcutta  
2. Guha, B. Documentation and Information. The word press pvt. Ltd.,  
4. Academic Libraries in Internet area
INFORMATION STORAGE AND RETRIEVAL
IN DIGITAL ERA

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ABSTRACT
Information storage and retrieval is the systematic process of collecting and cataloging data so that it can be located and displayed on request. Computers and data processing techniques have made possible the high-speed, selective retrieval of large amounts of information for government, commercial, and academic purposes. There are several basic types of information-storage-and-retrieval systems. Document-retrieval systems store entire documents, which are usually retrieved by title or by key words associated with the document. In some systems, the text of documents is stored as data. This permits full text searching, enabling retrieval on the basis of any words in the document. In others, a digitized image of the document is stored, usually on a write-once optical disc. Database systems store the information as a series of discrete records that are, in turn, divided into discrete fields (e.g., name, address, and phone number); records can be searched and retrieved on the basis of the content of the fields (e.g., all people who have a particular telephone area code). The data are stored within the computer, either in main storage or auxiliary storage, for ready access. Reference-retrieval systems store references to documents rather than the documents themselves. Such systems, in response to a search request, provide the titles of relevant documents and frequently their physical locations. Such systems are efficient when large amounts of different types of printed data must be stored. They have proven extremely effective in libraries, where material is constantly changing.

Keywords: Web, Information, Retrieval, Knowledge

INTRODUCTION
An organization behaves as an open system that takes in information, material and energy from the external environment, transforms these resources into knowledge, processes, and structures that produce goods or services which are then consumed in the environment. The relationship between organizations and environment is thus both circular and critical. Organizations depend on the environment for resources and for the justification of their
continued existence. The intelligent organization understands that the discovery and use of knowledge can best be achieved through *strategic information partnerships* that combine the skills and expertise of its domain experts, information experts, and IT experts.

**THE INTELLIGENT ORGANIZATION**

The environment is growing in complexity and volatility, continuing to be viable requires organizations to learn enough about the current and likely future conditions of the environment, and to use this knowledge to change their own behavior in a timely way (Choo 1991, Choo and Auster 1993). An organization works with three classes of knowledge: tacit knowledge, rule-based knowledge, and background knowledge (Table 1).

**Tacit knowledge**

It consists of the hands-on skills, special know-how, heuristics, intuitions, and the like that people develop as they immerse in the flow of their work activities. Tacit knowledge is deeply rooted in action and comes from the simultaneous engagement of mind and body in task performance. Tacit knowledge is personal knowledge that is hard to formalize or articulate (Polanyi 1966, 1973). The transfer of tacit knowledge is by tradition and shared experience, through for example, apprenticeship or on-the-job training. Tacit knowledge in an organization ensures task effectiveness which the right things are being done so that the work unit could attain its objectives. It also provides for a kind of creative robustness -- intuition and heuristics can often tackle tough problems that would otherwise be difficult to solve. Whereas tacit knowledge is implicit, rule-based knowledge is explicit knowledge that is used to match actions to situations by invoking appropriate rules.

**Rule-based knowledge**

It guides action by answering three questions: What kind of situation is this? What kind of person am I or what kind of organization is this? and finally, What does a person such as I, or an organization should do in a situation such as this? Rule-based knowledge is used in the design of routines, standard operating procedures, and the structure of data records. Rule-based knowledge enables the organization to enjoy a certain level of operational efficiency and control. It also promotes equable, consistent organizational responses.

**Background knowledge**

This is knowledge that is part of the organizational culture and is communicated through oral and verbal texts such as stories, metaphors, analogies, visions, and mission statements. Background knowledge supplies the mindset or worldview by which people in the organization understand particular events, actions, objects, utterances, or situations
in distinctive ways (Morgan 1986). Background knowledge draws the cognitive context for the construction of reality and endows meaning on the organization’s actions and activities. It promotes commitment through the creation of shared meanings and values.

All three forms of knowledge can be found in any organization. The intelligent organization however, is skilled at continuously expanding, renewing, and refreshing its knowledge in all three categories. The intelligent organization promotes the learning of tacit knowledge to increase the skills and creative capacity of its employees, takes advantage of rule-based knowledge to maximize efficiency and equability, and develops background knowledge to unify purpose and meaning in its community. In effect, the intelligent organization has mastered a fourth class of knowledge - a higher order or meta-knowledge - that it uses to create, integrate, and invigorate all its intellectual resources in order to achieve superior levels of performance.

<table>
<thead>
<tr>
<th>Type</th>
<th>Form</th>
<th>Examples</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tacit Knowledge</td>
<td>Procedural, Embedded in action</td>
<td>Know-how, Heuristics, Intuitions</td>
<td>Ensures task effectiveness</td>
</tr>
<tr>
<td>Rule-based Knowledge</td>
<td>Declarative, Embedded in programs</td>
<td>Routines, Standard operating procedures, Record structures</td>
<td>Promotes operational efficiency and control</td>
</tr>
<tr>
<td>Background Knowledge</td>
<td>Contextual, Expressed in texts</td>
<td>Storytelling, Metaphors, Mindsets, Workviews, Vision scenarios</td>
<td>Inculcates commitment through shared meaning</td>
</tr>
</tbody>
</table>

Examples of intelligent knowledge creation may be found in Japanese companies like Canon, Honda, Matsushita, NEC, and Sharp. These companies are widely admired for their ability to innovate continuously, recognize and respond swiftly to customer needs, dominate technologies while they are still emerging, and bring new high-quality products to market with impressive speed. For example, Canon can claim to be the world’s most consistently creative company - for a fifth of the R&D budget, Canon has obtained about as many patents as IBM. Or consider Honda's history; Honda is one of the best managed companies in the world (Pascale 1990).

An intelligent organization pursues its goals in a changing external environment by adapting its behavior according to knowledge about its external and internal settings. In
other words, an intelligent organization is a learning organization that is skilled at creating, acquiring and transferring knowledge, and at modifying its behavior to reflect the new knowledge and insights (Garvin 1993).

Learning thus begins with new knowledge and ideas which may be created in-house, or may come from external sources, but must be applied to change the organization's goals and behaviors in order for learning to be complete. Much of an organization's learning is from past experience. British Petroleum established a five-person project appraisal unit that reported directly to the board of directors. Every year, the unit reviewed six major investment projects, wrote them up as case studies, and derived lessons to guide future planning. This form of review is now done regularly at the project level. (Gulliver 1987) For the intelligent organization, learning and adaptation are behaviors that must paradoxically embrace their own opposites.

Organizational learning necessarily includes unlearning about the past - the organization should not restrict learning and exploration to its existing markets, products or practices, but should rediscover new goals and responses by stepping out of habitual frames of reference and reexamining norms and assumptions (Hedberg 1981). Similarly, adapting to an environment necessarily includes creating an environment that is advantageous to the organization.

THE ORGANIZATIONAL INTELLIGENCE CYCLE

Learning process is a continuous cycle of activities that include sensing the environment, developing perceptions and generating meaning through interpretation, using memory about past experience to help perception, and taking action based on the interpretations developed (Choo 1995) (Fig. 2).

(a) Sensing is collecting information about the external and internal environment. Because the organization cannot attend to every event or development, it must select areas of priority, filter incoming data according to its interests, and sample events for learning. Memory is derived from the experiences of the organization in interacting with the environment, and is expressed formally (documents, procedures) and informally (beliefs, stories). Experience develops rules that are used to match situations with appropriate responses, and frames that are used to define problems and their salient dimensions.

(b) Perception is the recognition and development of descriptions of external events and entities using the knowledge that is available in memory. Perceptual strategies include developing a representation of an external scene, classifying objects and events according to categories that are known or have been encountered before, and recognizing the identity and main attributes of interested objects. Organizational perception depends heavily on the norms, frames and rules that members use as lenses to view trends and developments.
(c) **Interpretation** is at the centre of the intelligence cycle as it attempts to explain ‘What is really going on here?’ in terms that are meaningful to the organization. Interpretation is hard because it must balance conservatism (to interpret data according to existing beliefs) with entrepreneurism (to interpret data for the exploration of new alternatives). Interpretation leads to understanding and creative insight by which future consequences and opportunities are anticipated and evaluated according to preferences. Ultimately, interpretation is the making of meaning - meaning about where the organization was in the past, what it is today, and where it wants to be in the future. In organizations, finding meaning is a social process, requiring people to socialize and exchange information.

(d) **Adaptive behavior** initiates a new cycle of learning as the organization makes decisions and takes actions that result in effects and outcomes. These are fed back into the loop by modifying sensing strategies (adjusting selection and sampling criteria) and by modifying frames and rules in memory (changing existing beliefs, adding new rules).

INFORMATION MANAGEMENT

The basic goal of information management is to harness the information resources and information capabilities of the organization in order to enable the organization to learn and adapt to its changing environment (Auster and Choo 1995). Information creation, acquisition, storage, analysis and use therefore provide the intellectual work that supports the growth and development of the intelligent organization. The central actors in information management must be the information users themselves, working in partnership with a cast that includes information specialists and information technologists. Information management may be thought of as a set of processes that support and are symmetrical with the organization's learning activities.
Six distinct but related information management processes may be discerned (Fig. 3): identifying information needs, acquiring information, organizing and storing information, developing information products and services, distributing information, and using information (Davenport 1993, McGee and Prusak 1993).

Information Needs

The identification of information needs should be sufficiently rich and complete in representing and elaborating users' true needs. Since information use usually takes place in the context of a task or problem situation, it is helpful to recognize that information needs consist of two inseparable parts (Taylor 1986, 1991)

- Pertaining to the subject matter of the need (what information is needed)
- Arising from the situational requirements of utilizing the information (why is the information needed and how it will be used).

Asking questions such as: Questions will indicate the kinds of information that could be of greatest value to the user. Depending on the information use requirements, information could emphasize hard or soft data, elaborate existing goals or suggest new directions, help define problems or make assumptions explicit, locate historical precedents or provide future forecasts, and so on. Identifying information needs therefore not only involves determining the topics of interest to the user, but also the attributes of the information to be provided that will enhance its value and usefulness.

An accurate description of information requirements is a prerequisite for effective information management. Ironically, systems designers often take this for granted and assume that information requirements can be quickly determined by examining existing paper flows and data flows. Similarly, senior managers believe that it is the information specialist's job to identify their information needs, and do not assume the 'information responsibility' of defining in detail what information they require (Drucker 1994). In reality, particular information needs will have to be elicited from individuals. Unveiling
information needs is a complex, fuzzy communication process. Most people find it difficult to express their information needs to their own satisfaction.

Personal information needs have to be understood by placing them in the real-world context in which the person experiences the need, and to the ways in which the person will use the information to make sense of her environment and so take action.

**Information Acquisition**

Information acquisition has become a critical but increasingly complex function in information management. Information acquisition seeks to balance two opposing demands.

- The organization's information needs are wide-ranging, reflecting the breadth and diversity of its concerns about changes and events in the external environment.
- Human attention and cognitive capacity is limited so that the organization is necessarily selective about the messages it examines.

The first corollary is therefore that the range of sources used to monitor the environment should be sufficiently numerous and varied as to reflect the span and sweep of the organization's interests. While this suggests that the organization would activate the available human, textual, and online sources; in order to avoid information saturation, this information variety must be controlled and managed.

A powerful way of managing information variety is to involve as many persons as possible in the organization in the gathering of information, effectively creating an organization wide information collection network. People, not printed sources or electronic databases, will always be the most valuable information sources in any organization. People read widely; communicate frequently with customers and accumulate specialized knowledge and experience. Unfortunately, information acquisition planning typically does not include human sources. Information acquisition planning should therefore include the creation and coordination of a distributed network for information collection. Complementing the network could be a directory or database of experts: both the business and subject experts who work within the organization, and the external consultants or professional specialists who have worked with the organization. The database may also be used to locate knowledgeable experts who can assist in evaluating current information resources, recommending new materials, assigning priorities, and so on. The selection and use of information sources has to be planned for, and continuously monitored and evaluated just like any other vital resource of the organization. It requires human judgment based on knowledge of the organization's business as well as the strengths and limitations of information resources.

**Information Organization and Storage**

Organizing and storing information may be facilitated with the application of information technology. The operational use of computers generated an abundance of detailed
information, while such systems are tuned to provide high throughput performance; they are inefficient at and sometimes incapable of retrieving the information that decision makers need to have for planning and problem solving. The organization, storage, and retrieval of textual and unstructured information will become a critical component of information management. The learning organization needs to be able to find the specific information that best answer a query, and to collate information that describes the current state and recent history of the organization.

The potentially severe consequences of the loss or inability to find vital documents are driving organizations to seek more versatile information storage and retrieval systems that can capture, store and retrieve text and other unstructured data. Instead of efficiency, the overall system requirement now becomes flexibility -- the system should capture hard and soft information, support multiple user views of the data, link together items that are functionally or logically related, permit users to harvest the knowledge that is buried in these resources, and so on.

Because the same information can be relevant to a range of different problem situations, it becomes necessary to represent and index the unstructured information by several methods. The development of automated indexing systems makes it increasingly feasible to adopt a user-centered approach to indexing, over and above document-oriented indexing that represents the document's content. In the user-centered approach, indexing can be done on two levels:

The first reflects topic and other predetermined features; the second is tailored to situational requirements such as the level of treatment, whether general or specific (Fidel 1994). User-centered indexing may also be request-oriented, in which case the index language is built from an analysis of user requirements and is then used as a checklist to index documents (Soergel 1985). The underlying idea is to anticipate user requests and check each document when it is being indexed against a list of anticipated requests. A combination of document-oriented and user-oriented indexing approaches has the potential to significantly improve information retrieval performance as well as user satisfaction. Given the amount of textual material in any organization, text information management will become as important as database management, and text retrieval applications will one day be as commonplace as word processing or spreadsheets. Today's text retrieval engines allow users to search by querying in natural language, choosing concepts and specific word meanings, and controlling the closeness of match.

**Information Products and Services**

Information products and services should deliver and present information so that their content, format, orientation, and other attributes address the situational requirements which affect the resolution of the problem or class of problems. This represents a value-added approach to the design of information products and services. The potential usefulness of messages is enhanced by increasing their ease of use, reducing noise,
improving data quality, adapting the information to increase its pertinence, and saving the user time and money.

Information services need to be constantly innovating, in a continual effort to move closer to satisfying the many facets of the users' information needs. These products and services should cover a range of time horizons and provide different levels of focus or detail (Fig. 4). Some information products disseminate urgent news that require immediate attention; others report developments that would take time to unfurl over the short term; while others still peer into the more distant future. For each of these time horizons, the information provided may be sharply focused; describing particular events, objects or organizations; or the information may be general and broad, surveying the terrain on which the organization's future will make its course. The guiding principle is that each information product must be of value to the end user. Information products or services should not rely only on information that happens to arrive in 'convenient' packages -- where it adds value to the user, incoming information may have to be reassembled, summarized, cross-referenced, and compared, and so on.
Users want information not just to give answers to questions (‘what is happening here?’) but also to lead to solutions for problems (‘what can we do about this?’). Moving from questions to problems means moving from a subject-based orientation in which knowing is a sufficient end state to an action orientation in which information is being used to formulate decisions and behaviors. To be relevant and consequential, information products and services should therefore be designed to address not only the subject matter of the problem but also the specific contingencies that affect the resolution of each problem or each class of problems.

Information Distribution

The purpose of distributing information is to encourage the sharing of information. A wider distribution of information promotes more widespread and more frequent learning, makes the retrieval of relevant information more likely, and allows new insights to be created by relating disparate items of information. The separation between information provider and information user should be dissolved: both ought to collaborate as partners in the dissemination and value-adding of information to help ensure that the best information is seen by the right persons in the organization. To encourage users to be active participants, it should be made easy for them to comment on, evaluate, and re-direct the information they have received.

How might information distribution be designed to induce the creation of new knowledge? Use net newsgroups on the Internet. In newsgroups, information is posted onto what is essentially an electronic bulletin board that is seen by everyone in the group. After reading, users themselves participate by posting new messages that answer questions, add commentary, and suggest interpretations, and so on. Related messages are sewn together into threads of discussions about particular topics. From time to time, replies and discussion threads may be summarized and then re-posted. It is tempting to consider a similar model for organizational information dissemination. New items are given informative subject titles and broadcast promptly. Users scan, read, and discuss each other’s messages. Multiple perspectives and representations are likely to emerge that reflect users’ different experiences and knowledge. Discussion threads may then be summarized by a user or moderator with special knowledge or interest. Electronic exchanges may occasionally lead to face-to-face focus group discussions or the forming of special interest groups.

The electronic bulletin board serves as the shared collaboration space in which participants actively create shared understandings (Schrage 1990). Unlike meetings and formal gatherings, the electronic collaborative space and its tools are interactive and responsive, many participants have equal and voluntary access, conversations are spontaneous, multiple conversations develop in parallel, and the focus is on the content of the messages on the communal space rather than a competition of personal egos. As a medium for information distribution and sharing, well managed discussion groups of
motivated users seem capable of adding considerable depth to the knowledge base of the organization.

**Information Use**

Information use is a dynamic, interactive social process of inquiry that may result in the making of meaning or the making of decisions. The inquiry cycles between consideration of parts and the whole, and between practical details and general assumptions. Participants clarify and challenge each other's representations and beliefs. As new information is received and as the manager reflects and acts on the problem situation, the perception of the situation changes, giving rise to new uncertainties. The problem situation is redefined, the manager seeks new information, and the cycle iterates until the problem is considered resolved in the manager's mind.

In organizational learning, information is used by individuals to create knowledge, knowledge not just in the sense of data and facts, but knowledge in the form of representations. People in organizations therefore behave as sense makers who use information in action (Weick 1979), and information use becomes a hermeneutic process of inquiry, in which understanding is realized through interpretation and dialogue (Winograd and Flores 1987, Boland et al 1994). The theory of hermeneutics (Gadamer 1975) describes the interpretive process by which an individual gives meaning to organizational experience, while the theory of inquiring systems (Churchman 1971) describes how a community of inquirers builds and test knowledge through dialogue. The hermeneutic interpretive process is interplay of the part and the whole in a hermeneutic circle (Gadamer 1975): we depend on our comprehension of the whole to identify and understand the parts, but at the same time, we depend on our knowledge of the parts to validate our comprehension of the whole (Boland et al 1994). As a result, we continually move back and forth between theory and details, and between vision and specifics, in our attempt to construct interpretations. How is the validity of these interpretations to be judged? Churchman (1971) portrays human inquirers as producers of knowledge who test their interpretations through dialogue and debate. In a community of inquirers, individuals see the same situation through different weltanschauung shaped by their beliefs and values. Inquiry then proceeds by vigorous debate as thesis and antithesis confront each other. The inquiry changes its direction and style frequently as new concepts and elements are introduced from outside the presently accept ways of understanding a situation. Like the hermeneutic circle, there is constant movement between views of a situation that simplify and views that complicate, between close-up examination of details and reflection about general assumptions, categories and concepts (Boland et al 1994).

Information use for the making of meaning and understanding requires information processes and methods that provide for a high degree of flexibility in information representation and that facilitate the vigorous exchange and evaluation of multiple representations among individuals.
Information Partnerships for the Intelligent Organization

Information and information skills have a tendency to become fragmented in the organization as the organization specializes in its functions. The intelligent organization brings together the organization’s capabilities to create and use knowledge, organize knowledge, and build infrastructures that enable the effective management of knowledge. At the heart of the intelligent organization are three groups of experts who need to work together as teams of knowledge partners: the domain experts; the information experts; and the information technology experts (Table 5).

Knowledge Pyramid of the Intelligent Organization

(a) The domain experts are the individuals in the organization who are personally engaged in the act of creating and using knowledge: the operators, professionals, technologists, managers, and many others. The domain experts possess and apply the tacit knowledge, rule-based knowledge and background knowledge in solving problems, and making decisions. Through their knowledge creation and use, the organization learns, makes discoveries, creates innovations, and undergoes adaptation.

(b) The information experts are the individuals in the organization who have the skills, training and know-how to organize knowledge into systems and structures that facilitate the productive use of information and knowledge resources. They include librarians, records managers, archivists, and other information specialists. Their general focus is to enhance the accessibility and quality of information so that the organization will have an enlightened view of itself and its environment.

(c) The information technology experts are the individuals in the organization who have the specialized expertise to fashion the information infrastructure of the
organization. The information technology experts include the system analysts, system designers, software engineers, programmers, data administrators, network managers, and other specialists who develop computer-based information systems and networks. Their general focus is to establish and maintain an information infrastructure that models the flow and transaction of information, and accelerates the processing of data and communication of messages.

### Knowledge Experts in the Intelligent Organization

<table>
<thead>
<tr>
<th>Groups of Experts</th>
<th>Goal</th>
<th>Primary Activity</th>
<th>Focus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domain Experts</td>
<td>Knowledge Creation and Use</td>
<td>To engage in Organizational learning, innovation, and adaptation</td>
<td>Organizational Effectiveness</td>
</tr>
<tr>
<td>Information Experts</td>
<td>Knowledge Organization</td>
<td>To facilitate the productive use of information and knowledge resources.</td>
<td>Enlightenment</td>
</tr>
<tr>
<td>IT Experts</td>
<td>Knowledge Infrastructure Building</td>
<td>To facilitate the accurate, reliable, efficient processing of data and communication of information.</td>
<td>Process Efficiency</td>
</tr>
</tbody>
</table>

In order to work together in teams of domain experts, information experts, and information technology experts, each group will need to re-orientate its traditional mindset. *Users as domain experts* will need to separate the management of information from the management of information technology. Users need to understand that the goals and principles of information management are quite different from the objectives and methods of information technology management. Users could participate fully in these information processes, not just as end-consumers of information products or services, but as active agents in every activity of the information management cycle, especially in clarifying information needs, collecting information, sharing information, and transforming raw data into useable information. The most valuable information sources in the organization are the people themselves, and they should participate actively in an organization for information collection and information sharing network.

**CONCLUSION**

The intelligent organization bridges the knowledge of its domain experts, information content experts, and information technology experts. Probably the least developed of these resources are the information content experts, who have hitherto largely confined themselves to a reactive, supporting role. We believe that the knowledge and skills of these information experts is an indispensable cornerstone of the intelligent organization. However, information experts will have to move from the background to the center of the
organizational stage, to jointly hold the reins of information management with users and the technology experts, to help steer and shape the information policies, structures, processes, and systems that will nurture organizational learning. Several successful organizations have learned to draw upon the skills of the information content experts to extract, filter and disseminate vital external information; to design and develop workgroup application suites that are effectively platforms for information sharing and information management; to work side by side with domain experts in collecting and analyzing strategic intelligence; and to act as trainers and consultants who transfer information gathering and research skills throughout the organization. Much more can be done, and the creation of effective information partnerships will be among the most important steps towards the intelligent organization.

REFERENCES


INFORMATION COMMUNICATION TECHNOLOGIES IN SCIENTIFIC COMMUNICATION: IMPLICATION FOR THIRD WORLD USERS

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ABSTRACT

This paper is a contribution to the assessment of the impact of technological change on scientific communication. It examines changed patterns of access to the basic scientific journal literature by Third World scientists. It is shown that conventional print journals are rapidly being priced out of the reach of Third World users. The technological options are evaluated in relation to the institutional context of a small Third World country and responses to the rapidly changing technological and economic environment are proposed.

INTRODUCTION

Science is inherently social and informal scholarly scientific communication forms the backbone that connects scientists and enables scientific progress. Information and communication technologies have transformed our world in many ways; yet, informal scholarly scientific communication forms a socio-technical interaction network in which communication is influenced by technology but defined by the social structures of scientists and their organizations. An understanding of this interaction of social structure and media effects is important to better support the information seeking and communication of scientists.

The communication of scientific knowledge to the Third World is important to help ameliorate the worst forms of poverty, enhance economic development, increase the
general well-being of the population and bring about greater equity in world affairs. The advances of modern technology are taking place very fast. It is most desirable that developing countries have a stake in these advances and make the best use of new information technologies and so participate in the solution to the world's inequities rather than be part of the problem. The central focus of information technology in developing countries has to be on the many target populations, information to and from the villages, farmers as well as researchers and decision makers. It is important to consider the historical causes of technology transfer because they have a bearing on the present situation.

Historically point out that the developing countries began under a severe handicap giving rise to a growing "technology gap". There are lessons, too, to be learnt from earlier experiences in more technically advanced countries. Apart from some of the obvious difficulties presented by the introduction of new technologies generally and provide an overview of the socio-economic and cultural implications inherent in the current "Information Revolution" and their importance for the communication of scientific knowledge.

Economic Development is basically a learning activity which is successful when a particular country learns to make best use of existing resources, takes those most appropriate from advanced sources and applies them in a manner best suited to the country's own priorities and aspirations. Libraries and information centers cater to every need. Greater access to information for everyone has largely come about by the rapid introduction of new information technologies. Efficient means of information dissemination and communication in turn facilitates growth in other sectors of the economy.

CONTEMPORARY SITUATION

Access to scientific information in poorer countries, sometimes referred to as the South, is limited in contrast to the situation described in the North. The "South" lacks the necessary infrastructure to support the type of services the "North" has come to expect. The new information technology has been developed in response to the demands of industrial society. At present, we are witnessing a growing gap between the North and the South, i.e., those with access to information, versus those who lack it. This is commonly referred to as the "information gap". It is growing at an exponential rate in much the same way as the "literature explosion". Put the two conditions together and we are presented with a situation that is compounding world poverty just as much as another economic factor in the development process. This need not be the case, given some commitment to share in technological developments in the information-communication field in a manner that is more likely to permit more equitable development so that the South will be able to maintain a position in the changing world. The development problem we then face is complex but may be summarized thus:
• How can we provide greater access to scientific information for people in developing countries; and
• How can new information-communication technologies be effectively transferred to developing countries so that they will not be denied partnership in the information revolution?

EXPANSION ISSUES
The development issues facing poorer countries need to be matched by the creation of sound research and development institutions and capacity building. Information infrastructure is basic to this process. The principle that those who create knowledge have a duty to see that it is disseminated should apply. The given fact that socio-economic, cultural, educational, technical and environmental factors are different in each country we need to consider the following basic postulations:

• The poor countries do not have the resources to build independent and comprehensive information systems, services and networks; any attempt to address needs in this respect will have to be based on co-operation;
• To escape the dependency relationship on available information services in the North that is being built up, a developing country will need donor assistance in acquiring the information it needs because it cannot, in the long term, rely on foreign sources to make selections on its behalf;
• The unconnected and independent proliferation of information systems and services can result in duplication and overlap; co-operation and collaboration make for economies of scale, reduce waste and optimize use of indigenous resources; and
• The adoption of new information technologies to be, effective must be appropriate and adaptable to local conditions.

TRANSMIT OF TECHNOLOGY
Sustainability would be difficult but surely, the problems associated with social, economic, cultural and political constraints are not inseparable. The opportunities presented by new information technologies suggest that it is important to look for modifications. On the other hand even with such constraints there are possibilities for successful transfer of technology and there are many other factors that can be accredited to success or failure, such as the existence of good:

• communication
• co-operation
• management
• planning and control
• participation; and other
• control features
It is possible to measure success or failure in quantitative terms using efficiency standards developed by economists for industry or firm levels of aggregation using linear programming and linear regression techniques. For the information industry, efficiency is a relative term since it should be measuring non-allocative efficiencies. Beginning the race under handicap, the backlog of forces have become formidable hurdles to overcome. Current high costs of new technologies are an increasing burden on countries lacking foreign exchange. Many developing countries are conscious of the fact that to introduce technologies and develop their economies investments have to be made in education and advances in general literacy levels.

LACK OF SUPPORT AND TOOLS TO WORK EFFECTIVELY

There is a ready supply of librarians but too few libraries to work in and those available lack the tools to work effectively. It is one thing to train people and another to put trained staff to use. A serious result of this is that those who can leave do. The "brain drain" of educated staff from developing countries to international organizations and to industrial countries is a growing fact. Under this situation, developing countries continue to be consumers of scientific information rather than producers. It is often said that markets in developing countries are too small for effective transfer of new technology. Since no information service is cheap, high costs will accrue to storing and disseminating information to users in developing countries.

New technologies to ease the job will also be very costly. Developing countries are highly susceptible to package deals for purchase of technologies from industrial countries in the form of tied aid, kickbacks and economic promises of various kinds. A shift to basic production would disrupt international commercial operations. Therefore, the dependency relationship is firmly entrenched with modern market forces which have nothing to gain from the transfer of technology to developing countries. The role of donor assistance has to be carefully prioritized and implemented to avoid compounding the dependency relationship. Assistance to information projects will fail if attention is not paid to implementation procedures and sustainability.

A minimum of ten years must be budgeted for to firmly entrench a research and information system in a developing country. One has to consider that start-up costs are necessarily higher than on-going costs. Development best succeeds when society learns to make optimal use of its resources through application of science and technology to improve the living conditions of the population in ways consistent with national needs and priorities new information-communication technologies for developing country use must, therefore, be applied with the ultimate beneficiaries in mind. Otherwise, we run the risk of recreating the dependency relationship at the national level - rural poor dependent on the urban rich. To hinder this situation developing, micro-information environments should be considered at the grass-roots level to ensure the all-important feedback loop is closed. By emphasis on bottom-up development it will, hopefully, encourage the local pressure group for change at the decision-making level to successfully lobby for technical change.
INVENTORY OF TECHNOLOGIES

Each new technology has had profound effects on the society involved in its transfer. It began with our first efforts to record ideas and evidence is found in the earliest civilizations. A partial, though not exhaustive, list of such technologies might include:

- computer assisted software engineering (CASE)
- desk top publishing expert systems geographical information systems (GIS)
- local area networks (LAN)
- machine assisted translation management information systems (MIS)
- optical and computer disks (CD-ROM)
- packet switching remote sensing and satellite imagery telecommunications (FAX, E-Mail, etc.)

Some or all of these technologies are now in widespread use in many industrialized countries. From the developing country point of view, we need to focus on those that are likely to have value, are transferable and can be viable under local conditions. The use of the computer for transmitting information is not new but its rapid application among the general population worldwide places it at the forefront of new information technology. The transfer of this technology is also given a boost through local self-help mechanisms such as user groups and computer clubs. Moreover, it reinforces the invisible college by keeping people working in the same field in closer contact than would be possible by rare face-to-face contact.

PROBLEMS IDENTIFIED IN EMERGENT COUNTRIES

The problems identified in developing countries that have hindered wider application of this medium include:

- Poor local facilities especially telephone links
- Lack of access to reliable equipment
- Need of training and access to training materials
- Poor institutional support.
- Require of a good link locally to the international data transmission networks
- Persistent problem experienced by many similar institutions in other developing countries.

PACKET SATELLITE COMMUNICATION

A further spin-off from space technology has recently become available by use of low-orbiting satellites. A major cost factor in satellite communication has always been in launch costs. Those satellites which go higher into orbit stay up longer and, therefore, have a longer life. Though, they are correspondingly more complex and, therefore, costly.
Recent experiences in some countries with launch capability have shown the cost-attractiveness of satellites put up into lower-orbits. Despite the fact that such satellites drop to earth sooner, they are ideal vehicles for computer-based messaging. This system was designed to improve communications in developing countries using low-cost and simple methods whilst aiming to provide a high volume of information transfer.

EXPERT SYSTEMS
Use of the computer to mimic the mental processes of human beings has provided experts with a fascinating area of research for some time. Originally contemplated as an offshoot of research into artificial intelligence (AI), expert systems are knowledge-based programs capable of using data, a knowledge base and a control mechanism on problems of sufficient difficulty that significant human expertise is necessary for their solution. There are many successful applications in use mainly in the medical and Agricultural field. Current research using expert systems in automatic cataloguing, for instance, has had mixed results. It is a small system built around reference texts likely to contain most of the answers people will be looking for. The system is linked to external programs providing on-line access to data bases of bibliographic citations (AGRICOLA both in BRS and DIALOG) and full text files that can give reasonable answers to basic questions rather than simply referral to set texts.

TRAINING SUPPORT, POLICIES, MEASURES AND COMMITMENT
Understanding the forces of technical change associated with the introduction of new information technologies in developing countries involves different concepts and analysis. Information systems do not lend themselves very easily to conventional analysis, such as cost benefit. The social systems paradigm for information technology has been explored in developed countries and it results in methodologies applicable to different organizations, contexts and cultures. In this sense technology is a neutral tool but application can lead to both positive and negative effects. Exchange of information about adoption time is important to avoid duplicating mistakes.

Activities in this information process at the technical transfer level involve the use of more skills, because not all aspects of new information technologies are easily transferable with any degree of ease. Five criteria can be identified in the transfer process listed in order from the easiest to the most difficult:

1. Equipment
2. Services
3. Skills
4. Motivation
5. Management
Developing countries having the least competence and infrastructures should consider this transfer process in the reverse order to be most successful. There are big differences between countries everywhere when one considers technical capacity. This is demonstrated clearly by the big differences between developed and developing countries investment levels. In order to increase absorptive capacity for efficient transfer of new technology, it is necessary to put in place services and staffs to apply the technology.

ADVANCES IN MODERN COMMUNICATION ARE REVOLUTIONIZING

Twenty years ago, rooting out scientific information was a physical adventure. Nowadays of course nothing is further than the click of a mouse away. And it’s not just journals—the internet is flooded with a wealth of information which is richer than could ever be imagined 20 years ago. Researchers have access to vast arrays of new information in their own field, as well as new findings in other disciplines. The result is a cross-fertilization that is driving the generation of new scientific knowledge and technology innovation at an unprecedented rate. But the same information is also available to non-experts—the “lay public.” Now, anyone can in principle access in-depth information on the latest scientific breakthroughs. As a consequence, science and technology are being democratized. It’s still a relatively select community that is benefiting from this increasing access to information.

ADVANCES IN MODERN COMMUNICATION ARE REVOLUTIONIZING THE EXCHANGE OF IDEAS

Ideas propagate along lines of communication and change individuals and groups who come into contact with them. In the past, geographical and technological barriers have limited the growth and influence of ideas around the world. But with the advent of Web 2.0 and whatever comes next, traditional barriers are being blown away. And as a result, new ideas are spreading and potentially changing how people think and behave faster and more unpredictably than ever before.

This new interconnectedness will have profound implications on global society. Through advances in global communication, individuals and groups will form opinions and ideas on emerging science and technology as new knowledge and abilities are developed. In effect, the old intellectual command and control model is disappearing. And there is no guarantee that the participants will have the same understanding of or respect for hard data as the people generating them.

THE GLOBAL EXCHANGE OF IDEAS

It leads into the third way in which advances in communication will affect science and technology: Decentralization. Advancing communication is empowering citizens to influence the course of science and technology in ways that transcend traditional
boundaries. If a group of people decide they don’t like a new technology, it’s relatively easy for them to mobilize and hinder the progress of that technology. It happened with genetically modified organisms, and there have been concerns that it could happen in other areas like nanotechnology or synthetic biology. And with this increasing decentralized influence, scientists can scream and shout until they are blue in the face about the authority of hard data.

CONCLUSION
The modern information-communication technologies are not different from any other new technology in the economic order. It is appropriate to consider the transfer process from industrial countries in the light of historical experiences. Without access to new information technologies adapted to local needs the developing countries will fall farther and farther behind in world development. Developing countries must create their own programs from mandated national policies closely aligned to a science policy. It is strongly suggested that it is unrealistic for some poorer countries to act independently and build comprehensive information systems. The issue at question is our ability for social creativity, for information sharing and technical collaboration. This requires us to assist, where possible, in the transfer of new information communication technologies to developing countries by first understanding the processes of technical change in the social context thereby avoiding many of the mistakes of the past. In this way, new technologies can be the effective tools they are meant to be when placed correctly into an acceptable infrastructure carefully aligned to local needs and priorities.

REFERENCES


EMERGING INFORMATION COMMUNICATION TECHNOLOGIES IN AGRICULTURAL UNIVERSITY LIBRARIES AND COLLEGE LIBRARIES

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INTRODUCTION
As we are aware a huge amount of information is being published constantly through various applications of information technologies. These advances either provided a capability which was previously unknown or provided great improvement in efficiency of an activity. Information communication technologies provide wide range of tools and service for the development and modernization of libraries in context of acquisition, technical process, storage, retrieval and dissemination of knowledge or information. Library and information science (LIS) profession is one of the most challenging professions in the knowledge society, combining expertise in information management with the Information and Communication Technology (ICT) competencies. ICT has tremendous impact on library operation, resources, services, staff and users. LIS Professionals are confronting challenging dynamic technological environment demanding the extensive and effective utilization of ICT in order to survive and meet the changing complex information needs of user community.

EMERGING INFORMATION COMMUNICATION TECHNOLOGY
Now a days there are several information technologies for various housekeeping, management and administrative functions of the library. Different electronic and digital media, computer aided electronic equipments, networks and internet have significant role in retrieval and dissemination of information and played a vital role for modernization of SAU (State Agricultural Universities) Agricultural University Libraries & College libraries.

WEB TECHNOLOGY
Several State Agricultural University libraries have their own website to provide information regarding library. Website is working as a vibrant communication tool for librarians. Various professional organizations developed website for better
communication. Web technology promotes research and publication process, provide online access to catalogue and database. Web technology enables resource sharing among the libraries and plays a leading role in modernization of libraries.

INTERNET TECHNOLOGY

Internet is a global system of interconnected computer networks that use the standard Internet protocol suite (TCP/IP) to serve billions of users worldwide. It is a network of networks that consists of millions of private, public, academic, business, and government networks, of local to global scope, that are linked by a broad array of electronic, wireless and optical networking technologies. The Internet carries an extensive range of information resources and services. Most traditional communications media including telephone, music, film, and television are reshaped or redefined by the Internet, giving birth to new services such as Voice over Internet Protocol (VoIP) and Internet Protocol Television (IPTV). Internet provides access to graphics, database, documents, software, archives, picture and sounds and enables libraries to worldwide search within a few seconds. Internet supports multimedia information exchange with open standards and few rules connects universities, colleges, and research centre for information sharing and exchange.

NETWORKING TECHNOLOGY

Networking means different things to different people in different context. Martin defines networking as a group of individuals or organizations, which are interconnected to form a system to accomplish some specific goal. Library network is a specialized library co-operation for centralized development of co-operative Program and services. Networking technology uses telephones lines, satellite communication, microwave communication, public switching telephone network and pocket switching data network etc. Networks are categorized into star network, hierarchical network and distributed network LAN (Local Area Network) that helps in library housekeeping and resource sharing WAN (Wide Area Network) that allows electronic communication among remote users DELNET, INDONET, INFLIBNET, MALIBNET, NICNET, ADINET etc are major WAN in India.

Network technology promotes library co-operation, library consortia maximizes the effective uses of library resources, improves efficiency in library operations, increases communication and idea sharing. Network encourages applying systems techniques to all library operations and lead to improved management of library operation and library resources.

LIBRARY AUTOMATION

Automation is the basic need for modernization of any library; library automation is usually distinguished from related fields such as information retrieval, automatic indexing and abstracting, automatic textual analysis. However, now a days clear distinction is not
maintained and library automation may sometime include related fields as well. Although computers have a major role in library automation, telecommunication and reprography technology have equally important role because of the support they offer to library automation for mechanization of library functions. To modernize the library services suitable hardware and software are required including:

**OPTICAL DISC STORAGE TECHNOLOGY**

Optical disc storage technology is among the most recent computer technology to enter the library community viz., e-resources like online journals, e-books, CD-ROM databases, DVD’s, CAB CD Abstract etc… The CD ROM, a laser optical disk storing of 780 MB, has become increasingly important as a medium of storage and dissemination of information. CD ROM has the ability to represent various media such as text, graphics, and animation, video clips and sound files into a digital environment. Digital video disk or digital versatile disk (DVD) is the next generation of CD. The main feature of DVD is the compression technology and storing data on multi layer sides, stores 17 GB data is currently the only credible true multimedia format. CDs and DVDs have become ultimate storage devises due to high density storage, low cost, inexpensive hardware requirement.

**SCANNING TECHNOLOGY**

Scanner is important equipment in modernization of library. It is useful for scanning text, image and content pages of books for display in the OPAC (Online Public Access Catalogue) and also used in optical character (OCR) applications. Scanned document may be circulated and accessed easily. Scanner is providing great help for establishing digital and virtual library.

**BAR-CODING TECHNOLOGY**

Bar-coding is compulsory activity in a modern library. Almost all the library automation software packages are compatible with barcode readers and are capable for generating barcodes for library materials. Using barcode equipments for circulation and stock verification is becoming more common, efficient and time saver.

**VIRTUAL AND DIGITAL LIBRARIES**

The basic concept of virtual and digital libraries is the sharing of information and resources globally for providing right and nascent information to the right user at the right time. It is the computing terminals having linkage to different sources of information in electronic or digital form. Digital library is a collection of information that is both digitalized and organized and which offer capabilities beyond those of the Agricultural and traditional libraries. Larson defined a digital library as a “global virtual library- the library of thousand of networked electronic libraries”. Digital libraries generate new types of information resources, new approaches to acquisition, classification and cataloguing
and ensure intensive use of electronic systems, networks, dramatic shifts in intellectual, organizational and electronic practices. Virtual library is a library with little or no physical collection of books, periodicals, reading space and support staff, but one that disseminates selective information directly to distributed library, usually electronically. The virtual library resources are better than one might find through a regular search engines; we have to come into the virtual library to search research. Virtual and digital library provide a rapid access to electronically stored information that lead the modern library services.

**RADIO FREQUENCY IDENTIFICATION TECHNOLOGY**

A data collection technology that uses electronic tags for storing data. The tag, also known as an "electronic label," "transponder" or "code plate," is made up of an RFID chip attached to an antenna. Tags may be battery-powered or derive their power from the RF waves coming from the reader.

RFID is the latest technology being used in modern library’s theft detection system. Unlike EM (Electro Mechanical) and RF (Radio Frequency) systems which have been used in libraries for decades, RFID – based systems moved beyond security to become tracking system that combines security with more efficient tracking of materials throughout the library, including easier and faster charge and discharge, inventorying and material handling. RFID is a combination of radio frequency based technology and microchip technology. The information contained on microchips in the tag affixed to library materials is read using radio frequency technology regardless of item orientation or alignment and distance from the item is not a critical factor except in the case of extra wide exit gates. The corridors at the building exits can be as wide as four feet because the tag can be read at a distance of up to two feet by each of two parallel exit sensors. The target used in RFID systems can replace both EM or RF theft detection targets and Barcodes. RFID is necessary requirement for modernization of college libraries.

**CONCLUSION**

Application of information communication technologies in the University Library & college libraries are erupting and moving faster than one’s imagination resulting in information explosion crossing geographical boundaries. Information communication technologies will help to remove barriers of distance and time. There will be no limit of variety of ways in which modern technology is applied in speedy retrieval of information most consistently. It is the power and capacity of modern technologies that helps every reader to get the information he or she seeks. University Library is continuously striving to fulfill the needs of its vast campus with its resources, incorporating latest information & communication technology and it is in a major transition period, a transition from an exclusively print environment to a print and digital environment.
REFERENCES


CHANGING ROLE OF TRADITIONAL AND DIGITAL COLLECTIONS’ LIBRARIES: AN EVALUATIVE STUDY

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ABSTRACTS

This paper contains brief digital environment has changed the status and role of traditional libraries description of traditional and digital libraries, advantages and limitations and deals with the methods of the building digital collection, use of traditional and digital libraries and the problems faced by these libraries, its impact on education, libraries and our society.

Keywords: Traditional Libraries, Digital Libraries, Digitization, Digital Information Technology, Building digital collections.

INTRODUCTION

Information technology is one of the major factors causing changes in the traditional and digital collections’ management. Traditional libraries have embraced the new information technology more profoundly than many other fields and most of them are currently using electronic products and services. Changing role of the traditional and digital collection’s management and problems mean a changing role for today’s librarian or library professionals. The networks and the flood of online information and search engines to harness that information are changing the approach of librarians to reference and information service.

TRADITIONAL AND DIGITAL LIBRARIES

McMillan (1999) ‘stated digital libraries and traditional libraries should not be separate, but should co-exist to accomplish more than either can do independently to serve the user community on the highest order. McMillan (2000) later refined her definition of a digital library to one that ‘should be a seamless extension of the library that provides scholars with access to information in any format that has been evaluated, organized, and
preserved’ and that the digital library adds value and saves time while extending the hours of access. In order to reach an understanding of the role of librarians in the virtual library environment, it is worthwhile examining the role of libraries in the past. The libraries and library management of traditional and digital collections are undergoing significant changes today not only on outlook, but also in function, services, methods and techniques for collection development, processing and dissemination of information. Libraries have to keep pace with technological development emerging in management of library collections. Knowledge is becoming multidimensional in the digital age. As such libraries need to reconsolidate their position, redesign their services, incorporate new technologies and upgrade information resources. They should play a proactive role in harnessing the information to satisfy needs of users. These definitions provide an indication of the roles the traditional and digital collections have assumed during the past two decades.

CHANGING NEED FOR TRADITIONAL LIBRARIES TRANSFORMING INTO DIGITAL LIBRARIES

In the modern world, library professionals are increasingly responsive not only to provide traditional library information services but also to deliver online information services according to the user needs.

- All the knowledge cannot be incorporate in a single library; therefore, resource sharing in the digital era receives special attention.
- Digitization helps to gain access to holdings of libraries world-wide through automated Catalogue.
- Library is growing organism, therefore space problem is likely to arise in future, and digitization helps to overcome the space problems.

NEED AND SKILLS REQUIRED FOR PRESENT DAY USERS AND LIBRARY PROFESSIONALS

Most of the current scholarly and commercial information is now going online. Tremendous growth in the number and variety of online digital information resources’ and increasing number of free quality content made the librarians to acquire and maintain digital materials in their library. Outside world for their betterment In the earlier days traditional librarians use to manage printed sources of information and services; now in the changed IT environment, he has to maintain computerized catalogues, library automation and online search CD-ROM database because of digital publishing, internet and intranet and many more in the automated IT environment.
To achieve digital environment in libraries besides the development of good infrastructure, human resources to require to be developed and upgraded to meet the digital challenges; training the professionals in fundamentals of IT database creation, library websites designing, networking etc is to be made mandatory. Since the handling of information in the present era is greatly influenced by IT tools and latest technologies. Continuous training of library professionals in latest developments is very much important at this stage.

NEW CHALLENGES AND SKILLS IN TRADITIONAL LIBRARY FUNCTIONS IN ELECTRONIC ENVIRONMENT

The libraries and information sources of the future are likely to be based entirely in electronic environments. In this environment, it is often questioned, will there be a role for library professionals? Where do they stand in this scenario? Where their profession is headed? It is often argued that there is no longer a need for information professionals such as librarians, in their traditional role of assisting in accessing information Librarians are becoming more important in the information centric universe and are already fulfilling new roles as content providers, search strategists, digital cataloguers knowledge managers, information navigators and cybrarians etc. These roles will grow and opportunities will flourish. Thus there is a need to examine the future role of information professionals in presentation of information, reliable preservation of traditional and digital collection maintaining authenticity and conservation which demands sound grounding in the technological aspects of their profession to transform them into people who design and create ways to access information. Many more service may be discussed demanding new released skills for preserving problems of collections and their solutions.

CHALLENGES OF DIGITAL PRESERVATION

Digital library collection contain fixed permanent document. While current libraries have more dynamic, collection. Digital libraries facilitate quicker handing of information due to irreplaceably of materials as well as the infinite variation in physical condition and storage needs. Special collection presents many challenges to library professionals needs. Special collection also presents many challenges for conservation to library professional for intellectual property right security from theft of database materials, security from virus attack, pressure of parallel satellite networking, lack of knowledge in experienced professionals. Digital preservation is preserving the digital medium that holds the digital information by storing it in the correct environment and following agreed storage and handling procedures. Copying the digital information into newer, fresher media before the old media deteriorates it. Preservation concern includes what to digitized formats for text and images, quality of images and cost. Digital preservation has raised many challenges
of a fundamentally different nature which are divergent compared to the problem of preserving traditionally format materials. Some of them are in the areas of planning, application of preservation method technologies and resource allocation necessary to ensure that digital information of continuing value remains accessible and usable.

CONSERVATION OF INFORMATION

One of the tasks of the archives and libraries is to ensure that the digital information heritage is passed on to coming generations and used by them. But in the electronic environment documents, unlike the fixed texts of print data, are subject to inadvertent destruction of both physical medium on which they exist and the intellectual content of their information. There are many ways to destroy electronic data inadvertently. First, the medium is at risk. Then there is the bigger problem of intellectual preservation. Many types of accidental changes may occur, a document can be damaged as a result of the nature of electronic resource (for example, a dynamic database, by its nature is frequently updated, erasing previous data in the updating etc). Unauthorized tampering, lack of metadata and system documentation, electronic data in forms that cannot be presented, software of hardware become obsolete etc. There are various methods emerging today in the field of electronic data preservation and conservation such as Migration, Bit Stream copying, Emulation, and Encapsulation etc. Information professionals will have to transform their everyday duty to preserve materials from various forms of damage. They need to monitor current and future file formats, and the structural metadata associated with them.

SOME SUGGESTIONS AND OBSERVATIONS

The need of growing electronic resources has developed a vital role in front of traditional libraries and library professionals. Digital technology has great potential and bright future to attract users. It combines all the benefits of the multimedia digital coding and internet. Based on the usability of digital resource, the following suggestions are highlighted for better implementation and fulfillment of digital collections preservation.

- Higher speed Wi-Fi campus needs to be developed within the library campus and in organization, so that faculty / official members can use online resource, traditional transformed record and internet within the campus according to their suitability.
- Infrastructural faculties such as extension of LAN connectivity in universities and other offices with all departments must be developed.
- The speed of internet needs to be increased for quick access to the available digital/E-resources.
• Besides e–journals, e-databases and e-book, the other electronic resource should be acquired by library also for every level of users.

• The library staff should co-operate with the users and help them in overcoming the technical difficulties

• LIS professional of the library have to create more awareness on e-resource information and technology developments.

• Orientation awareness program should be conducted at regular intervals for the use of electronic resources in libraries and organizations for library professionals as well as users also.

CONCLUSION
In India, the libraries are facing many problems in preservation traditional and digital collection due to shortage of fund provided them, intellectual property right issue, less interest of parent institutes and staff. Now the Government and many other institutions are by and by realizing the need of digital preservation as UGC-info net and other likes programmers are the fabulous steps towards the digitization and digital preservation. From the above description, it is clear that the development and management of traditional resource is not a simple task. Digitizing and networking of information resources and services means creating a global community with a vast store house of knowledge and a continuous dialogue among its members to solve various problems related professionals who need to be present atmosphere that may provide easiness to the information user in getting required information in very few time in an organized manner. For fulfill the present and future requirements, the digital library is essential in any new & fast research and development activities. It will also give help to provide global knowledge sharing in very low costing management for library posterity.

REFERENCES


DEVELOPING ETD IN KERALA AGRICULTURAL UNIVERSITY LIBRARY

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INTRODUCTION
The growth of internet, communication channels, information technology and digitization of documents are revolutionizing the traditional concept of library. Digitization is the extended activity of special libraries. All automated libraries have information in digital format to some extent. Actual process of digitization needs skilled manpower, special software and hardware which are costly. Digitization also solves the preservation of rare or archival material and security Problems.

In research and academic institutions, theses, dissertations and research reports play a vital role as primary sources of information. Since they contain information of research value, most of the research scholars refer to these documents regularly and even simultaneously. To ensure easy and wider access to these documents, the digitization of PhD theses was given priority and carried out as the first step towards the digitization of all essential library collection.

DIGITIZATION & DIGITAL LIBRARY DEVELOPMENT
The terms ‘Digitization’ and ‘Digital Library’ have evoked a wide range of responses among the people who have interest in digital information. In the last fifteen years the developments in digital information world, have a significant impact on digital resources. The information world has already switched from the conventional print to the digital information. In developed economies, digital resources determine the information handling activities almost exclusively. In the third world, still information handling is being done largely manually. However, optimists expect a rapid change and impact of the digital information.

DEFINING DIGITIZATION
Digitization refers to the process of translating a piece of information such as a book, sound recording, picture or video into bits, the fundamental units of information in computer systems. Turning information into these binary digits is called digitization. The concepts, processes and technologies connected with digitization are complex. There is a
rudimentary process that involves different sets of hardware and software technologies at each step. Digitization process also involves many other issues such as cost, time, resources etc.

ESTABLISHMENT OF DIGITAL LIBRARY COLLECTION OF THESES

The basic requirement in creating a digital library will be the building the digital library sources. Theses and dissertations are playing a vital role as reference sources in academic and research institutions. Since the Kerala Agricultural University is engaged in education, research and extension activities in the field of agriculture and allied subjects, the theses and dissertations are playing an important role in reference service. It is also observed that a large number of external users also consult these documents frequently.

In the theses and dissertations, the abstract portion is very important since it profiles the brief picture of the whole research work. The research workers are always interested to refer to the abstract part of the theses. So, in view of providing the needed materials in digital format and to complete the digitization task with the limited available financial resources, it has been decided to digitize the abstract part of all the theses and dissertations. The theses which have been awarded for quality research have been selected for full-text digitization in future.

METHODOLOGY INVOLVED

**Scanning**: The fundamental conversion technique is scanning of the document. The abstracting part of all the theses have been fully scanned using scanners. Scanned documents have been subjected for proof reading by spell check facility available in the software.

To ensure easy retrieval of the information it is necessary to provide a user-friendly interface. In this case, the theses and dissertations have been digitalized and a database with all required access points has also been developed. The library user will need an interface to use the digital contents. Therefore a search facility or retrieval facility through all the available fields are made possible.

Content indexing and metadata is the final work in digitization. Indexing should be done for easy retrieval of the information. In indexing work all bibliographical information of the theses to be entered in the concerned field manually. There is facility to enter all possible key words and search terms.

SEARCHING / RETRIEVAL METHODS

**Title Search**: In ‘Title search’ you can search for theses files based on its title. To get titles starting with particular characters, enter it in the field above the ‘Title List’.
The alphabetically sorted list of matching titles will be displayed in the list. The total number of matching records can be seen in the bottom. By clicking a title in the list, the theses details will be displayed. Searching through Research Scholar, Department, College, Guide, Subject Keywords, Accession Number, Call Number, Year, Content Search, Boolean search, Range Search, Proximity Search, Wildcard Search and Location Search hectare available in the Software...

DOWNLOAD
Every search facilitates provision for downloading theses details. To download a particular Theses details, select the item and click the ‘download’ button and specify the destination folder. The ‘Details’ of the file will be downloaded as a text file. The file name will be the Accession Number of the particular Theses.

ABSTRACT
By clicking the ‘Abstract’ button, abstract of the selected Theses can be read in PDF format. There is also facility for printing the file in different ways. To search for a particular word in the open file, press ‘CTRL’ + ‘F’.

PRINT
In every search there is also facility for printing the search results. By pressing the ‘Print’ button you can get the print out of current List with details. To print the List to a PDF file, set the PDF writer as default printer.

OPTIONS
**Indexing:** The new theses documents for the Alligator Retriever are added through ‘indexing’. The theses details are also added in the ‘Indexing’ editing of already existing theses details are also done here

The following are the details to be given to a new theses.

Title, Research Scholar, year, Guide, Department, College, Classification, Subject Keywords Category, Archive File, Accession Number, Call Number, New File Name, Save, Edit, Delete.

APPEND PAGES
In Append pages you can add new pages to an already existing theses file. The following are the details of Append pages:

(a) Archive Files
(b) Page wise
(c) Range Wise.
ADD BOOKMARKS
In ‘Add Bookmarks’ new book marks can be added to theses files. Book marks are links to particular pages in pdf files. Alligator facilities this provision for your theses in a very easy way.

- Accession Number
- Preview
- Bookmark Title
- Page No.
- Add
- Delete
- Save

UTILITIES

Security Manager: This menu specifies the restrictions & permissions granted for any user to access different menus in the software. There is also a provision for deleting & editing existing users.

Back Up: Alligator Retriever provides the facility to backup your valuable data. Specify the drive & folder to which Back Up has to performed. The database & a folder (archives) containing the theses files will be copied to the specified folder.

Shelf Allocation: In Alligator – Retriever Physical Location of the theses documents can be allocated.

DIGITIZATION: PROBLEMS FACED & FUTURE PLAN
The technology behind digitalization is undergoing drastic changes continuously. The computer hardware, software, storage media etc. are undergoing great revolution. The digitalized materials become unreadable if the background devices become obsolete as time passes by which ultimately results in the loss of data. Digital Storage media are always under the threat of many factors. While selecting the Software and Hardware technological obsolescence should be taken into consideration. Very old theses which are typed cannot be recognized by the Adob Acrobat Reader, so these documents were needed manual typing while digitization. KAU is doing digitization work of two KAU Journals.

CONCLUSION
The Digital Library of theses and dissertations established in KAU Central Library has been well received by the library users. The number of persons using the digital library is increasing tremendously. Now, we have insisted the submission of a soft copy (Digital copy) of the theses to the library while submitting the theses to the university. These can
be converted to PDF format using the software ‘Adobe Distiller'. This helps us to avoid the cost of digitization in future. The digital library accelerates the information capabilities, accessibility and utilization. Libraries have benefited from the increased access to resources, the opportunities for communication and the facilitation of new services that were not possible in pre-digital era.

REFERENCES
ELECTRONIC THESES AND DISSERTATIONS (ETD)
INITIATIVES TO PROVIDE OPEN ACCESS TO PUBLIC
FUNDED RESEARCH IN INDIA

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INTRODUCTION
Managing knowledge is one of the most important tasks for modern society. Knowledge Management (KM) deals with organizational processes and strategies to manage this critical asset. Knowledge Management is important for the survival and success of the organizations. The primary difficulties are related to the location of knowledge especially explicit knowledge. These problems have been tremendously simplified with Information Technology (IT).

The purpose of the thesis is to provide an experience in scholarship, which will be of enduring value to the student in understanding how new knowledge is acquired and communicated within the chosen field. Every year, nearly 8000-10000 PhDs are awarded in India. Indian universities play a major role in generation and dissemination of knowledge by research and produce PhD theses as a unique genre of information source. Open Access online PhD theses are highly connected to the purpose of universities and the value of scholarship. It advances the university’s interest and fulfils its mission to share the knowledge it produces.

The volume of theses and dissertations represent the quantity of the intellectual output of the academic and research institutions. It is also considered to be the most important group of information resources in an academic institution. However, in most of the universities and research institutions, theses/dissertations are not accessible to the users since its circulation is restricted to the university community only. Doctoral dissertations are the results of four to five years of intense research work involving huge investment of resources built on public money. A thesis should reflect quality of research work conducted by a student and the ability of an institution to lead and support original work of research in a given discipline.

Electronic Theses and Dissertations (ETD), many a times is a sub set of local institutional digital repositories of documents. It expands the access and visibility of
doctoral research and provides a platform for researchers to both deposit and make their work accessible worldwide. Research scholars can be familiar with the format and structure of the theses thereby producing better theses. Trends in the western countries indicate that the Universities build Digital archives for their growing number of PhD theses dissertations and provide unrestricted web access to the scholarly community. It facilitates the users to access the resources, which were kept as closed access, un-tapped and under utilized assets till now. Thus, Open Access to research maximizes research access and thereby research impact, making research more productive and effective.

According to The Guide for Electronic Theses and Dissertations there are two types of electronic theses and dissertations:

1. **All-electronic documents:** Characteristics of this type are (a) they are prepared using electronic tools (e.g. Microsoft Word, LaTeX), (b) are submitted as digital documents to an online collection, (c) may be converted into an alternate digital format that is easy to preserve and archive, (d) can contain hyperlinks and multimedia components (e) support full-text searching; easy to share and discover research.

2. **Paper documents:** converted to digital documents: Characteristics of this type are (a) digital file is created by scanning in the pages of theses or dissertations (b) need more e-storage space (c) do not easily support full-text searching.

Collection of an ETD can be of Doctoral, MPhil or Masters Dissertation submitted in electronic format. UGC in its regulations in 2005, recommend for submission of metadata and full text of doctoral theses in electronic form to create a National theses database and also to have a bibliographic control of theses and dissertations produced by the universities. Recently UGC issued the gazette notification mandating the Universities to sign MoU with the national agencies or digitizing and keeping their PhD theses content as archives available publicly and also made policies and rules for collecting e-format of PhD theses from the students. National Knowledge Commission (NKC) and other advisory bodies also recommend universities to disseminate Theses and Dissertation through Open Access channels.

In line with the UGC regulations, some of the universities and national institutes initiated a movement towards the creation of ETDs at their own or became the part of National initiatives. Some have already introduced online submission of theses and dissertations of their students and scholars, customized browsing facility etc. However, most of the universities and institutions have not started their Open Access ETDs. Issues relating to ownership, copy right, plagiarism, access limitations, long term preservation, publishers view, cost of hardware, software, infrastructure and maintenance are yet to be streamlined. The yeomen services rendered by these agencies and INFLIBNET have created a trend for national level ETDs at Universities or National Institutions. However, national ETD initiatives are still in developmental stage where more action plans are needed.
OBJECTIVES AND METHODS

Main objectives of the present study are:

- To compare the features of major ETDs available in India
- To investigate the type of resources/collection, coverage and accessibility options of the above ETDs
- To list out the comparative advantages and limitations of other organizational/institutional electronic theses and dissertation databases available in India.

METHODOLOGY

ETD initiatives in India have been identified through literature survey and Internet search using different type of search engines and online information sources. Directory of Open Access Repositories (DOAR) and Registry of Open Access Repositories (ROAR) have also been consulted to identify the ETDs that exist in India. Analysis of web contents of these ETDs and expert’s opinion at universities were also used for the comparison of the databases.
ADVANTAGES OF ETD

- Encourages and supports Open Access
- Helps to prevent plagiarism in Theses submitted to universities.
- Provide easy and faster access to the research output any time, for any user.
- Helps in raising the standard and quality of research
- Ease of accessibility on 24 x 7 basis for any user at anywhere.
- Provide rich interaction with hyperlinks, audio-video multimedia, dynamic pictures, color diagrams, charts, programs and codes etc.
- Reduces the cost of TD submission, which is beneficial to the research worker.
- Enhances the standard and quality of future research works
- Explores the opportunities of electronic publishing trend in academic sector
- Helps to scholars to understand methodology, standards, format etc used in different environments
- Benefits the researchers by enhancing the quality of the research work at initial level and showcase the universities intellectual achievements worldwide.
- Helps university/organization to develop their digital library services
- Great relief to Authors since it involves zero paper cost, and to Libraries since it saves shelf space.

ETD INITIATIVES IN INDIA

Open DOAR is an authoritative directory of academic open access repositories. Directory of Open Access Repositories (DOAR) lists 53 digital repository initiatives from India. Out of 53, only 25 repositories list Theses/Dissertations as content in their repositories. Four are exclusive ETDs. KrishiPrabha of ICAR is not listed in DOAR as on 22 Feb 2012. Registry of Open Access Repositories (ROAR), which aims to promote the development of open access by providing timely information about the growth and status of repositories throughout the world, report 80 Indian digital repository initiatives (as on 22 Feb 2012). The ETD initiatives have been started in India in late nineties.

First ETD repository was created in Kerala Agricultural University in 1998 as part of the KAULIS project. At that time there was no Digital Library software like Greenstone or DSpace available in India. Even the term Digital Library was not coined or normally used. University prepared a database of its dissertations in MS Access. The record contained bibliographical as per Common Communication Format (CCF). Dissertations were digitized and prepared as electronic books using pdf format. Chapter, subheadings,
photographs, illustrations, tables etc were all book marked. The search mechanism took
the user to the concerned page where the information searched for occurred. Even though
database of about 3000 dissertations were prepared only about 500 theses were digitized
and linked to the database. The repository was available in the library site of KAULIS for
a short period. A searchable digital library in CD ROM which can be installed in any
system, consisting about 500 dissertations was also prepared. But the University could
not continue the project for various reasons.

First institutional Repository which also contained ETD was started at IIT, Bombay in
1999[5]. IIT Bombay created their repository with Greenstone digital library software
and now covers all PhD works of the institute in engineering science and has around 3000
full text T/D downloadable in the campus network.

Sheeja and Surendran give 11 institutional and university initiatives as major
repositories of doctoral theses in India. Content-wise, DOAR indicates that there are only
four exclusive ETDs as follows:-

1. University of Mysore-Vidhyanidhi @ http://www.vidhyanidhi.org.in
2. SodhGanga Inflibnet @ http://shodhganga.inflibnet.ac.in/
3. Mahatma Gandhi University, Kottayam @ http://www.mgutheses.org/
4. Indian Institute of Science, Bangalore @ http://etd.ncsi.iisc.ernet.in/

In 2005 UGC enacted Submission of Metadata and Full-text of Doctoral Theses in
Electronic Format Regulations which created awareness on ETDs as well as generated
interest and provided some standards to creation of electronic dissertations in universities.
This is about 10 years after a university in India developing and testing a successful Full
Text Digital Library of Theses, which went without any follow up. Even now that
prototype developed in 1998 can stand with any modern ETD collections. Search efficacy
and standards of that archive is still admirable.

VIDYANIDHI

Vidyanidhi can be considered as the first initiative for creating a national level open
access electronic theses and dissertation in 2000. Vidyanidhi (means ‘Treasure of
Knowledge’ in Sanskrit) is a national repository of electronic theses and dissertation of
Indian research output initiated by the Department of Library and Information Science of
University of Mysore as a sponsored project and supported by Department of Scientific
and Industrial Research (DSIR), NISSAT, GOI, Microsoft India and Ford Foundation. It
aims to develop and build an online repository of doctoral theses and dissertations
submitted to Indian Universities by forming a consortium of select Indian universities.

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Vidyanidhi comprises national repository of full text ETD and bibliographic database of full text theses from various Indian universities. It has partnership with Universities and academic institutions such as NASSDOC, University of Hyderabad and Jamia Islamia for sourcing ETDs. It hosts about 15000 theses in full text and 85000 bibliographic records of theses. Vidyanidhi is a member of the Networked Digital Library of Theses and Dissertations (NDLTD), a global initiative for hosting electronic theses and dissertations with more than 174 members from different countries of the world.

SHODHGANGA

Shodhganga is a portal for the repository of Indian Electronic Theses and Dissertations submitted to various Indian universities. It is to facilitate Open Access to theses throughout the academic community by INFLIBNET (Information and Library Network) Centre Ahmadabad in 2010 using DSpace, an open source digital repository software developed by MIT (Massachusetts Institute of Technology) and Hewlett-Packard (HP). PhD Theses of various departments and schools of universities can be accessed on this network and 45 Universities signed MoU. As on January 2012 47 Universities are contributing for digitization of old theses as well as by hosting their current theses in the repository. Shodhganga received e-INIDA award for the year 2011 under digital learning category. Universities are required to sign a MoU with the INFLIBNET Centre to participate in the Shodhganga project. Member Universities made it mandatory for research scholars to submit theses in electronic format also as they have to be uploaded to Shodhganga. Scholars of the member Universities can submit their theses or dissertation
online/offline (CD/DVD ROM) in electronic format after completing the student’s approval form to add into the repository.

MG UNIVERSITY THESES (NityaD’Arch)
The online theses library programme was started in 2008 by the then University Librarian². It was a project with time limit and 1200 dissertations available at the time in the university were digitized and uploaded in the web in 6 months. It uses software customized for this specific project and the package is multilingual which can handle all Indian languages. ETD of Mahatma Gandhi University provides full text open access to all the doctoral dissertations of the university accepted for awarding research degree since 1983.
It is the first university in India which received the recognition for its digital resource as one of the best web resource for education and research by INTUTE, a European Consortium of Universities funded by Government of UK’s Joint Information Systems Committee (JISC) and the Arts and Humanities Research Council (AHRC). Moreover this is the first ETD archive hosted in an indigenous bibliographic cum full text retrieval software, named Nitya D’Arch and it claims that none of the digital library solutions have the facility for multilingual searching and deep indexing/retrieval of its resources. As majority of ETD initiatives are based on DSpace, which could not address Indian situations earlier, MG University ETD took a unique and different approach which addressed all multilingual and search problems that may occur in different regions of India. ETD home page is inviting, very simple and is exclusive for ETD of the university.

INDIAN INSTITUTE OF SCIENCE BANGALORE (ETD@IISc)

ETD @ IISc is an initiative of Indian Institute of Science, Bangalore and maintained by National Centre for Science Information (NCSI). ETD@IISc is implemented as a production service since February 2005 and facilitates better means to capture, store, process and disseminate the intellectual output of IISc. It holds full text subject collection in Pure and Biological Sciences and Engineering and Technology in electronic form and also contains digitized collection of theses. Online access of IISc theses give improved visibility for IISc research complementing the IISc e-print archive. IISc also provides guidelines for submission, document conversion guidance, theses templates and sets the workflow for online theses submission. Registered users can set up e-mail alerts to notify them of newly added relevant content.

Fig. 5 Home Page of etd@IISc
KRISHIPRABHA – INDIAN AGRICULTURAL DOCTORAL DISSERTATIONS REPOSITORY

KrishiPrabha is a full-text electronic database of Indian Agricultural Doctoral Dissertations submitted by research scholars to the 45 State/Deemed Agricultural Universities during the period from 01 Jan 2000 to 31 Dec 2007. This database, listing about 7500 Doctoral Dissertations with full text of about 6000 Dissertations has been created by Nehru Library, Ch. Charan Singh Haryana Agricultural University, Hissar with financial support from Indian Council of Agricultural Research (ICAR), New Delhi under its National Agricultural Innovation Project.

Fig. 6 Home Page of KrishiPrabha

Several ETD initiatives have been completed in State Agricultural Universities (SAUs) under this project. Digital repositories of Indian Agricultural Research Institute (IARI) and Central Marine Fisheries Research Institute (CMFRI) include ETD as one of the component of E-print repository of these institutes. Agricultural science being an integrated science, theories and practices are drawn from basic science. ETDs in the basic science and social science shall act as a catalytic agent for meaningful research in agricultural sciences.
IIT KANPUR

In 2005, IIT Kanpur started their ETD initiative using the digital library software, DSpace. Now it holds full text PhD works of 9289 records in engineering science. It has all the default browsing options of DSpace such as browse by Communities and Collections, by Authors, by Titles, by Issue Date, by New Collection and Recent Submission and by Subjects. Apart from these default options IITK customized the browse option and upgraded the browsing options with Supervisor/s and Citations and also with the search option Cross collection Search. ETD of IITK also facilitates to find out the Strength/Count of each Browsing element, number of items guided by a person, item created by an author, items related to a particular subject and the number of citations for a particular item. IITK redesigned the software to provide the additional options, i.e. Roll No., Degree and Department in the Registration form. A link to ‘cited thesis/theses’ from the existing IITK theses collection, as mentioned by author in ‘References’ showing citation impact of the theses by the IITK scholars, has been provided as an additional feature. Feedback form has the features like incorporating additional personal details of scholar, i.e. email-id, designation, degree, department, PF No./Roll No. etc and a set of features related to the facilities, and/or description parameters concerning content/metadata and workflow etc to solicit ratings on defined parameters from the scholars submitting theses to the library.

CSIR Explorations – e-theses e-database

Council of Scientific and Industrial Research (CSIR) Explorations is a digital library of electronic dissertations, theses and research reports of the fellowships supported by CSIR. Recently it is initiated under fellowship programme that at the time of submission of PhD thesis to an Indian University, the CSIR Fellow submits an electronic copy on CD-ROM to CSIR’s unit for Research and Development of Information Products (URDIP) along with a descriptive set of metadata for inclusion in the CSIR Explorations. The e-theses database has 659 theses and serves as a valuable source of information about doctoral theses submitted to Indian universities. Currently access is restricted only to metadata level and proposed to scale up with full text of theses.

National Institute of Oceanography (NIO), Goa, the constituent laboratory of CSIR, provides comprehensive ETD on the subject of oceanography. National Chemical Laboratory, (CSIR) Pune ETD@NCL is an institutional initiative in the subject area of Chemistry and Biological sciences to share their PhD resources with all other CSIR labs.

Dyuthi@CUSAT , the repository of the Cochin University of Science and Technology, ETD@ Pondicherry University, Digital Library of the University of Madras, IIT Delhi, IIT Kharagpur, IIAP, Bangalore are the new ETD initiatives in India.

Bibliographic control of theses and dissertations is also now seems possible with ETDs. Delhi Library Network (DELNET) hosts bibliographic records of PhD theses submitted in various universities in India consist of nearly 5000 bibliographic records.
Association of Indian Universities (AIU) publishes list of theses awarded in various universities in its weekly publication ‘University News’. National Social Science Documentation Centre (NASSDOC), wing of ICSSR, hosts a library with PhD theses for providing bibliographic data to the user community. NASSDOC systematically acquires PhD theses in social sciences submitted to the Indian universities. Currently, the NASSDOC has 4924 PhD theses in social sciences in its collection.

INFLIBNET’s National Online Union Catalogue of Doctoral Theses covers the bibliographic Metadata of Doctoral Theses submitted to more than 130 Universities/Institutes in India including Agricultural Universities. Acharya NG Ranga Agricultural University (260), Ch Charan Singh Haryana Agricultural University (1049), Dr. YS Parmar University of Horticulture and Forestry (407), GB Pant University of Agriculture & Technology (621), IARI (1997), Punjab Agricultural University (1746), UAS Bangalore (345) etc are some of the agricultural institutes linked to this Union List (figure in brackets indicate the number of records updated as on 27 Dec 2011). It has over 1,53,206 unique records from all subject areas. This data is contributed by participating Universities under the INFLIBNET programme. Cross Archive Search Service for Indian Repositories (CASSIR) as a part of the project “Development of OAI-Based Institutional Research Repository Services in India” sponsored by Department of Scientific and Industrial Research and being carried out at NCSI and IISc, Bangalore. The service will harvest metadata as per the OAI-PMH protocol from the registered OA repositories in India. It also provides web-based search/browse functionality over the harvested metadata. These are some important services towards bibliographic control of PhD theses in India.

Table 1 Comparative Features of National ETD Initiatives

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<tr>
<th>Characteristics</th>
<th>Vidyani Dhi</th>
<th>Shodhganga</th>
<th>MGUTheSES</th>
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FINDINGS

Users increasingly expect instant access to information resources. ICT enables it. Accordingly, library professionals are trying to make information available to the users in electronic formats to promote education, research and the scholarly publishing. ETD initiatives are being promoted and a number of initiatives are coming up in India in different subject fields/institutions. However, no ETD initiative in India is comprehensive and exhaustive. It is found that the digital archives of these institutions are adapted and models are made according to their own requirement and not by meeting the objectives of ETDs. Analysis shows that institutions prefer to have open source software and DSpace is the widely used software. MG University ETD is found to be outstanding with its powerful search capability, multi lingual support, in-depth information retrieval, open access and very simple home page. MG University ETD is the only digital archives of PhD dissertations of India using a package developed in India.

TRANSPARENCY IN RESEARCH

ETD initiatives promote transparency in research by strongly encouraging authors to include full details in order to facilitate replication studies. Transparency in research aims to make the process of research amply visible to the readers. Peer-review process in research provides scrutiny of research and transparency in research provides readers full access to the data, methodology tools etc used in the study. ETDs make research an open, understandable, and replicable process. Thus, it acts as a public scrutiny for public funds involved in the research.
CONCLUSION

Submission of Theses and Dissertations in electronic format should be made mandatory for both the scholars and the universities. There should be training/orientation programs to make the scholars, faculties and management aware of the importance of ETDs. Creating ETDs for namesake will be a threat for the library systems. Like MG University all universities should establish an official Open Access archive PhD dissertations and ensure that dissertations are online within a specified period after its acceptance by the university. It may also be made compulsory to be in compliant with the national ETD by formulating standards and formats. Such an effort shall enable comprehensive treatment of ETDs and work as a single platform for right access of ETDs in a right manner. A national portal for ETD shall ensure access to authentic sources for research information.

Peter Suber and others commenting on the ETDs of India stated that every university should be capable of hosting an OA archive of its doctoral dissertation and newly accepted should be added to it within a week of its acceptance. Central agency can then make these individual repositories appear as one seamless digital library of dissertations by gathering all the metadata into a central search engine. When a potentially relevant document is found, the user will be redirected to the concerned institutional repository. This approach is supported by the Open Archives Initiative (OAI), which has developed a protocol for exchanging such metadata. Using the OAI’s protocol for Metadata Harvesting (OAI-PMH), individual sites can make their metadata accessible to providers or discovery services, while maintaining complete control over own resources. Such archives will be accessible to public all the hours. This only can make the research accessible to the society, bring them into application and thereby prove its worth. This will put the work of a university into test and will ultimately ensure the quality and relevance of research.

As per the data collected for this study VidyaNidhi covers less than 3 percent of the PhD dissertations produced in India till now. INFLIBNET’s Shodganga also covered nothing more than that. The only official repository of any university existing, MGU theses has covered only 70 percent of its dissertation completed in the first phase. Even though the university committed on uploading dissertations within 14 days of acceptance, not even a single dissertation has been uploaded during the last one year. Of the 450 universities in India, 99 percent has not come forward with an OA archive of their dissertations. Those who have launched such systems, at times turn back, for there will be heavy resistance from the scholars who have plagiarized, for it will bring their copying into public visibility and their Degree may get cancelled if some one challenges the matter. Only if UGC and organizations such as ICAR come with a strong legislation to make all these Open, and accessible and stops research funding to those who are not prepared to do so, our universities will not make their research transparent. It is not because of lack of fund or technology but the resistance from academic community, not sincere to research, and preventing transparency in research.
REFERENCES


5. Ibid

6. Ibid


8. UGC (Submission of Metadata and Full-text of Doctoral Theses in Electronic Format) Regulations, 2005. http:www.ugc.ac.in


10. Op Cit. 5


12. P. Jobish, Hemanta Kumar Biswal, Filbert Minj, T.B Rajashekar and S. Venkadesan, etd@IISc. A DSpace- based ETD-MS and OAI Compliant Theses Repository Service of Indian Institute of Science

13. http://etd.ncsi.iisc.ernet.in


15. OpCit. 6


17. http://indcat.inflibnet.ac.in/indcat/thesis.jsp

DIGITAL COLLECTION AND PRESERVATION

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ABSTRACT
This paper focuses on Digital collection and preservation. Libraries are developing digital collection and preservations from different sources using different methods. ICT is used as a tool for accessing the digital content with the advantage of affordability. The present paper shows the concept, needs, objective, policy, benefit, and standard by document type like Text, images, numeric data and video and audio are briefly discussed about digital collection and preservations.

Keywords: Digital Collection, Digital Preservation, Digital Document and Preservation of Library Document

INTRODUCTION
Digital Collection and Preservation refers to the management of digital information over time. Digital Collection and Preservation of digital information is widely considered to require more constant input of effort, time and money. Rapid technological and organizational advances are considered the main stumbling block for preserving digital information.

Digital Collection and Preservation of digital information has become a major challenge for society. Digital Collection and Preservation is rapidly becoming a principal medium to create, distribute and store content, from text to motion pictures to recorded sound. Increasingly, digital information embodies much of the nation’s intellectual, social and history.

Digital Collection and Preservation of digital information is not so much about protecting physical objects as about specifying the creation and maintenance of tangible electronic files whose intellectual integrity is their primary characteristic.

DEVELOPING DIGITAL COLLECTION
The following methods are used for developing a digital collection

- By digitizing
• Directly creating
• Procuring- e-journals, e-books etc
• Downloading through internet using popular websites, databases, etc
• Through consortia based subscriptions
• Subscribing CD / DVD collections

Types of Digital Collection
Common types of digital collections observed are
• E-journals
• E-books
• Aggregated resources
• CD- ROMs/ Diskettes / Other media
• Databases & Web sites

Digital Collection Policy
The digital collection policies are derived from the policies set down from the traditional environment. The digital collection policy describes in detail about the library’s goal based on the back ground of the following points.
• Which content and what type would need to be digitized. What standards and formats need to be followed
• Selections and appropriate storage media
• How long the digital collection needs to preserved
• Availability of the OCR for the language collection

Selection Criteria of Digital Collection
The selection of digital collection of any library is based on the following issues:
• Support the academic, research needs of the clientele
• Subject within the scope of the organization’s interested fields
• Available Funds
• Cost per anticipated use-one time and ongoing costs
• Anticipated or demonstrated demand
• Publisher / vendor reputation
• Accuracy, completeness, currency and uniqueness of the content
• Indexed by major indexing, abstracting services

Digital Collection Storage
The storage method can be identifying various storage media and select best one which can support both management and preservation over a long term. The best storage method
is to understand and address the obsoleteness of the storage media. The mainly used storage media are magnetic disks, magnetic tapes, cartridges and optical disks (CD/DVD) and now a days online.

**WHAT IS DIGITAL PRESERVATION?**

Unlike the preservation of paper or microfilm, the preservation of digital information demands ongoing attention. This constant input of effort, time and money to handle rapid technological and organizational advancement is considered as main obstacle for preserving digital information beyond a couple of years. Digital Preservation is defined as long-term, error-free storage of digital information, with means for retrieval and interpretation, for the entire time span that the information is required for. “Retrieval” means obtaining needed digital files from the long-term, error-free digital storage, without possibility of corrupting the continued error-free storage of the digital files. “Interpretation” means that the retrieved digital files that are of texts, charts, images or sounds, decoded and transformed into usable representations. This is often interpreted as ‘rendering’, i.e. making available to a human to access. However, in many cases it will able to be processed by computational means.

**Concept of Digital Preservation**

- Problems of physical preservation are compounded by the obsolescence of computer equipment, software, and storage media. These problems also refers to the practice of digitizing materials originally produced in non digital formats (print, films, etc.) to prevent permanent loss due to deterioration of the physical medium. Digital preservation is a process by which digital data is preserved in digital form in order to ensure the usability, durability and integrity of the information contained there in. The main purpose is to ensure protection of information of enduring value for access by present and future generations.

**Need for Digital Preservation**

- **Users Perspective**
  User’s expectations are always changing. Yet, research scholars need both traditional documents and electronic documents or old information.

- **Institution responsibility**
  Libraries, archives and other custodians have responsibilities of their intellectual properties.

- **Storage Media**
  Storage media is having different formats such as text, data graphics, video, sound, different storage capacity like floppy disk, CD-Rom, VCD, etc, of varied durability.
Objective of Digital Preservation

- **To protect originals:** General application of digital technologies in an archive or library is that digital copies can be used for ready reference instead of casual browsing through the original sources.
- **To Present originals:** To represent the detailed information content of the original sources.
- **To transcend originals:** Digital imaging holds the promise of generating a product that can be used for purposes that are impossible to achieve with the original source.

Benefits of Digital Preservation

- **Legal**
  National legal frameworks often require organizations to provide adequate records of business process, communication and many other types of data for many years after creation.
- **Accountability and protection from litigation**
  Recent legal cases have shown the importance of being able to search and recover archived emails quickly and in a legally admissible manner.
- **Protecting the long term view**
  Access to digital data is critical to ensure business continuity and to support decision making with a long term view.
- **Protecting Investment**
  The valuable intellectual assets data represents both intellectual property and a considerable investment of time, effort and money. It would therefore be foolish not to protect and preserve these assets adequately.
- **Reuse**
  Effective and affordable digital preservation solutions are essential to transfer digital data into valuable assets for business.
- **Preservation of library documents**
  There are many document types or genres that are important in scientific communication. These include journal articles, books, theses and dissertation, conference proceedings and papers, and project documentation. These document types may be presented as Web sites and they may also qualify as electronic records. These genres may include multiple format types. For example, electronic journals may include supplemental files such as spreadsheets, videos, or software.
- **Standards by Document type**
  The best format for long term preservation remains elusive, perhaps because there is no single answer to the question. Instead, it depends on the format type of the
original object, the characteristics of the original that the preserving organization considers to be most important to preserve, and the expected use / re-use of the object in the future. Most experts agree that the best format for preservation is that which is least proprietary while conveying significant aspects of the original.

CONCLUSION

Preservation of digital information has to deal not only with maintenance of the files themselves but also with ways of keeping them accessible. This means that either the programmers’ have to be preserved as well and some how kept running on new platforms, or the files have to be converted to another format that can be interpreted by new programmers. As the digital world moves all the time, this is a continuous process. In many cases this will result in loss of information functionality and / or appearance, especially and applications.

REFERENCES

PRESERVATION AND CONSERVATION OF PAMPHLET LITERATURE IN THE KNOWLEDGE SOCIETY: A CASE STUDY OF MADRAS UNIVERSITY LIBRARY

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ABSTRACT
In today’s world, many of the finest traditional literature are neglected in the dominance of digital world, one among them is pamphlet collections. These information sources are very popular because of the simplicity in publication and superiority in delivering the nascent information to the readers and researchers. This paper focuses on the importance of this literature and traces the historical account of the collection of pamphlets made by the Madras University Library. This paper also deals the pros and cons of the preservation and conservation of these literatures that are treasures for the researcher who are pursuing research on historical aspects of social science domain.

INTRODUCTION
According to Encyclopedia Americana “Pamphlet is a short document or treatise that generally aims to influence opinion in regard to current controversial topic, particularly religious and political dispute”. ALA Glossary states that “Pamphlet in a restricted sense, an independent publication consisting of few leaves of printed matter stitched together but not bound; usually enclosed in paper covers” Further it states that pamphlet is complete in itself, it is a common custom to issue pamphlets in series, usually numbered consecutively. Some of the important features of these rare collections are as follows:

1. Pamphlets are an excellent condensed resource for quick reference
2. Pamphlets are an independent entity not being a serial,
3. Pamphlet may be one of a series of publications having a similar format or subject matter.
4. Pamphlet has rich value of contents of various subject matters pertaining to various disciplines

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5. Pamphlets are cost wise cheap. They can be passed on to others after a casual reading, hence it is used as a tool for exchange of information among various group of readers.

6. Pamphlets are most preferred material since it helps to know certain aspects of subject matters more interesting to readers.

HISTORICAL REVIEW OF PAMPHLETS
While tracing of history of pamphlets and its usage it is noticed that only after invention of printing technology and the greater need for spreading of information to wide public in a cheaper and quick method so as to reach the users what they want it. One of the oldest pamphlet chapbook, which was printed and distributed to users during the 15th century to 18th century only to entertain rather than to persuade. The widespread use of pamphlet was a direct result of the religious strife caused by the Reformation in England, France and Germany during 16th century. It is interesting to record that in 1558, John Knox issued a pamphlet against the catholic Queen who ruled Scotland England.

The pamphlet was popular in Elizabethan age, being used not only for religious controversy but also by such men as Thomas Dekker, Thomas Nashe, and Robert Greene for romantic fiction, autobiography, scurrilous personal abuse, and social and literary criticism.

In 19th Century in England the pamphlet played a part in all political movements. Most notable were pamphlets of Chartism, Irish Home Rule, and the Oxford Movement. At the turn of the century, Fabian Society member George Bernard Shaw, Beatrice Webb, and Graham Wallas propagated political doctrine in series of pamphlets. The Revolution also occasioned one of the most outstanding English Pamphlets, Edmund Burke’s Reflections on the Revolution in France (1790). It provoked many replies, the most famous of which is Thomas Paine’s Rights of Man (1791-92).¹²

PAMPHLETS IN INDIA
In India there is no clear evidence regarding the use of pamphlets as media for expression of opinions during 16th to 18th century. However during the 19th century and 20th century pamphlets were used a effective information channel to spread the message in political, cultural and social emancipation of individuals. Pamphlets played a great role in spreading the information during the India’s Freedom struggle. However, it is observed that only in 20th century the pamphlet has more often been used for information than for controversy, chiefly by government departments and learned societies. It was due to rise of newspapers and magazines, the pamphleteering used as media for dissemination of information against rulers slowly declined and it was used as resource media for disseminating of educational information for general upliftment of society in social, educational, scientific and cultural modernization.
GROWTH OF PAMPHLET LITERATURE

The pamphlets literature reached peak upto 19th century and slowly declined during 20th century. However there is no clear cut information regarding the availability of collection of pamphlets in all over the world. According to Proquest information and Learning, there are more than 15000 titles of pamphlet collections drawn from various period of United States history and all of them of have been converted into unique microfiche form for research purpose. In India, there is no significant attachment given to pamphlet collections in most of libraries. However Dr. S. R. Ranganathan, has cited in his book that pamphlets are to be treated as rare and special collection material and it should be grouped separately as a closed sequence collection. Pamphlet collections are to be provided with some special identification marks for easy retrieval purpose. Dr. S. R. Ranganathan treated the pamphlets on par with book.

NEED AND SCOPE OF THE STUDY

Madras University Library was used by Dr. S. R. Ranganathan as a laboratory for his research in Library and Information Science field. He concentrated on each and every material received at the library and grouped them as a total knowledge base. This study aims to assess the value and usage point of pamphlets collections with particular reference to Madras University Library and its users. At this critical juncture the scope of this study pertaining to pamphlet collections in the Madras University Library during 1900-1969 will help to find out the solution for the effective preservation of such valuable documents with affordable easy way is to digitise them.

Objectives of the study

- To study the importance of Pamphlet literature
- To Scale the subject growth with help of pamphlet literature
- To identify the importance of Pamphlet literature as an information channel
- To find out the publishing potential of pamphlet literature.
- To propose a cost effective digital pamphlets literature model.
- To propose a future course of study and literature.

MADRAS UNIVERSITY LIBRARY SYSTEM: A MONUMENT IN THE HISTORY OF MANKIND

For nearly fifty years since the inception of the University of Madras, there was no organized library for the University. The University then was functioning only as an administrative body not much involved in teaching and research. An unorganized collection of government publications, reports, manuals etc. was available for use. The Library was established in the year 1907. The Madras University Library system has
undergone a tremendous change in the context of collection building activities and application of Information Technology (IT) and innovative new services such as CD-ROM search, Subscription to e-journals, digitization of rare and special collection materials, etc. The Library has automated all its activities ranging from OPAC to Circulation Control. The Library has already been established with LAN connection. Online Library Information Zone (OLIZ) which is exclusively used for the purpose of research activities. It receives grant from UGC under the Scheme University with Potential for Excellence (UPE) - Library Modernization Programme. The programme was designed for four years period starting from 2003-2004 to 2006-2008. Under the UPE Programme University Library has established electronic library concept in a phased manner. As part of this programme it has been proposed to allocate certain amount for digitizing some of the rare and special collection materials. The Library has completed its theses digital collections and now taken up the job of digitizing rare books and pamphlets collections. Further, the Library has been identified by INFLIBNET as one of the major centre for Retrospective Conversion of Manual catalogue into machine readable form (RECON Project). So far the Library computerized about 120,000 documents in computerised form and supplied the same to UGC-INFLIBNET for merging with books databases created by the INFLIBNET Centre. As a part of its development activities, the Madras University Library has plan to network all its campus libraries situated in different parts of Chennai city.

ORGANISATION OF PAMPHLET COLLECTIONS IN MADRAS UNIVERSITY LIBRARY

There are about 50000 collection of Rare and Special works and Theses at Madras University Library. Out of this, pamphlets collections are estimated to 10,000 in various subject matters available in the Library (1900-2003). The collections have been arranged in subject wise manner for easy retrieval. Since, these pamphlets are collected from 1900 onwards, it has been accessioned and classified according to their subjects. These pamphlet collections contain nascent information for R&D people of Social Sciences and even for Science researchers. These are often intensively used, which results in wear and tear. There is urgent need for preservation and conservation. For this purpose immediate digitization of them is imperative.

Evaluation of Pamphlets in Madras University Library

The Pamphlet collections during the period of 1900-1969 has been analysed and evaluated on the basis of three aspects

General Analysis and Evaluation

This evaluation is based on grouping under broad subjects like Humanities and Social Science, Sciences, Library Science and Other subjects.
Table 1: BROAD SUBJECTWISE DISTRIBUTION OF PAMPHLETS

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Subjects</th>
<th>No. of Pamphlets</th>
<th>Percentage of Pamphlets</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Library Science</td>
<td>147</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>Humanities and Social Science</td>
<td>4952</td>
<td>67</td>
</tr>
<tr>
<td>3</td>
<td>Science</td>
<td>1926</td>
<td>26</td>
</tr>
<tr>
<td>4</td>
<td>Other Subjects</td>
<td>378</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>7403</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Table 1 reveals that Madras University Library consists of 7403 on various subjects ranging from Social Sciences to Engineering and Technology. The Table presents that 67 percent of pamphlets collections are Humanities and Social Sciences and next majority of the pamphlet collection is related to the Pure Natural and Physical sciences. They constituted nearly 26 percent of pamphlets collections. It is also seen that 2 percent of the collection are related to Library and Information Science subject. The remaining 5 percent belongs to the other subjects like Spiritualism, Mysticism and Fine Arts, etc. It is also seen that in general, the explosion of pamphlet literature is more in Social Sciences in Madras University Library during the period of 1900-1969 when compared to other subjects.

Table 2: RANKING OF SUBJECTWISE DISTRIBUTION OF PAMPHLETS

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Main Subject</th>
<th>No of documents</th>
<th>Percentage of documents</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Economics</td>
<td>900</td>
<td>12.15</td>
</tr>
<tr>
<td>2</td>
<td>Literature</td>
<td>806</td>
<td>10.88</td>
</tr>
<tr>
<td>3</td>
<td>History</td>
<td>715</td>
<td>9.65</td>
</tr>
<tr>
<td>4</td>
<td>Education</td>
<td>586</td>
<td>7.91</td>
</tr>
<tr>
<td>5</td>
<td>Religion</td>
<td>509</td>
<td>6.87</td>
</tr>
<tr>
<td>6</td>
<td>Medicine</td>
<td>420</td>
<td>5.60</td>
</tr>
<tr>
<td>7</td>
<td>Agriculture</td>
<td>357</td>
<td>4.82</td>
</tr>
<tr>
<td>8</td>
<td>Philosophy</td>
<td>347</td>
<td>4.68</td>
</tr>
<tr>
<td>9</td>
<td>Sociology</td>
<td>309</td>
<td>4.43</td>
</tr>
<tr>
<td>10</td>
<td>Useful arts</td>
<td>263</td>
<td>3.55</td>
</tr>
<tr>
<td>11</td>
<td>Engineering</td>
<td>258</td>
<td>3.48</td>
</tr>
<tr>
<td>12</td>
<td>Mathematics</td>
<td>251</td>
<td>3.39</td>
</tr>
<tr>
<td>13</td>
<td>Linguistics</td>
<td>239</td>
<td>3.22</td>
</tr>
<tr>
<td>14</td>
<td>Fine arts</td>
<td>150</td>
<td>2.02</td>
</tr>
</tbody>
</table>
Table 2. Subject wise distribution of Pamphlets in Cc Order and Ranking

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Subject</th>
<th>No. of Pamphlets</th>
<th>Percentage of Pamphlets</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>Library sciences</td>
<td>147</td>
<td>1.98</td>
</tr>
<tr>
<td>16</td>
<td>Geography</td>
<td>147</td>
<td>1.98</td>
</tr>
<tr>
<td>17</td>
<td>Zoology</td>
<td>120</td>
<td>1.62</td>
</tr>
<tr>
<td>18</td>
<td>Physics</td>
<td>119</td>
<td>1.60</td>
</tr>
<tr>
<td>19</td>
<td>Mysticism</td>
<td>115</td>
<td>1.55</td>
</tr>
<tr>
<td>20</td>
<td>Politics</td>
<td>113</td>
<td>1.52</td>
</tr>
<tr>
<td>21</td>
<td>Geology</td>
<td>103</td>
<td>1.39</td>
</tr>
<tr>
<td>22</td>
<td>Botany</td>
<td>85</td>
<td>1.10</td>
</tr>
<tr>
<td>23</td>
<td>Law</td>
<td>77</td>
<td>1.04</td>
</tr>
<tr>
<td>24</td>
<td>Chemistry</td>
<td>74</td>
<td>0.99</td>
</tr>
<tr>
<td>25</td>
<td>Technology</td>
<td>64</td>
<td>0.86</td>
</tr>
<tr>
<td>26</td>
<td>Psychology</td>
<td>54</td>
<td>0.72</td>
</tr>
<tr>
<td>27</td>
<td>Biology</td>
<td>47</td>
<td>0.63</td>
</tr>
<tr>
<td>28</td>
<td>Natural science</td>
<td>28</td>
<td>0.37</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>7403</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Table 3 YEARWISE PUBLICATION OF PAMPHLETS IN LIBRARY SCIENCE

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Year</th>
<th>No. of Pamphlets</th>
<th>Percentage of Pamphlets</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>1900-09</td>
<td>2</td>
<td>1.36</td>
</tr>
<tr>
<td>02</td>
<td>1910-19</td>
<td>2</td>
<td>1.36</td>
</tr>
<tr>
<td>03</td>
<td>1920-29</td>
<td>53</td>
<td>36.05</td>
</tr>
<tr>
<td>04</td>
<td>1930-39</td>
<td>36</td>
<td>24.49</td>
</tr>
<tr>
<td>05</td>
<td>1940-49</td>
<td>18</td>
<td>12.25</td>
</tr>
<tr>
<td>06</td>
<td>1950-59</td>
<td>30</td>
<td>20.41</td>
</tr>
<tr>
<td>07</td>
<td>1960-69</td>
<td>6</td>
<td>4.08</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>147</td>
<td>100.00</td>
</tr>
</tbody>
</table>
The Table 3 presents the year wise availability of the library science pamphlets. It is seen from the Table that most of the pamphlets are acquired during 1930 – 1969 by the library

MAJOR FINDINGS
In our findings, the pamphlet collections are well known document channel of information in the field of Social Science and Humanities since. The output of literature in these discipline nearly constitute greater number than that of other discipline.

Pamphlet literature have not been used frequently by users since it comes under Special Collection Unit of the Library Service. Only restricted users are allowed to use the materials due to its physical specialty.

For the preservation of cultural heritage lying in the contents of such old and rare scholarly pamphlet collections only solution is to digitise the pamphlet materials. Before initiating the digitization some theoretical and practical issues involved in it are to be studied thoroughly.

DIGITISATION EFFORTS AT MADRAS UNIVERSITY LIBRARY: SOME ISSUES
A Plan for digital conservation of pamphlets
Technological advances in Computers, Telecommunications, Optical Technology and Storage Devices have brought about a new era in the information age resulting both in the emergence of network of networks to facilitate the world wide transfer of electronic information and the proliferation of digital data for easy access and transfer.

Digitization involves a huge investment which most of the Library and Information Centres in India may not be able to afford, but there are good number of ongoing efforts to make available cultural and heritage resources to educators at all levels. The proper costing analysis of digitization projects has to be made and issues such as potentiality of cost savings, generation of revenue, and fund mobilization have to be taken care. There are three issues involved in this 1) Manpower costs 2) Process Costs (including equipments) 3) Overheads. This library is struggling to get rid of these issues but the time has come to speed up the preservation activities of the rare collections that are considered as knowledge bas for mankind.

PRESERVATION OF DIGITISED MATERIALS
Digitisation can be a reliable option once we adopt a sustainable approach towards it and it should be treated as a one time job. If a digital resource cannot be sustained, then all the effort/work/time/money invested to create it will be of no use. This is why sustainability must be planned for as early as possible. If a digital resource is to be sustainable, a sound
digital preservation strategy need to be in place. This preservation strategy is required because rapid advances in technology can lead to digital information becoming obsolete very quickly. The preservation strategy depends upon the technical strategies which involves the following approaches:

- Technology of preservation,
- Technology emulation,
- Data Migration and
- Data Refreshing

For successful completion of digitization process, if monitored and executed properly on the above said lines, it will prove to be a boon for the research community and users of future generation.

**PRESERVATION OF PAMPHLETS AT MADRAS UNIVERSITY LIBRARY**

Madras University Library (MUL) has good collection of rare pamphlets in the subject areas of Humanities and Social Sciences, Sciences, Fine Arts, Library Science are available for the user community particularly research scholars of Madras University and other universities. Considering nature of pamphlets and its importance like not being procured directly from the market, and also due to natural hazards, biological agents it has become very important to preserve and conserve them.

The different alternative suggested for preserving pamphlets are:

1. Efforts were made to reproduce the pamphlets by photocopying the material before the microfilming came into general use.
2. To preserve the original pamphlets by not using frequently, Xerox copy of the materials are to be given to the users instead of the original one.
3. Microfilming is also preferred method for long time storage. It retains beauty of texts and pictures. However having microfilm laboratory is a costly affair.
4. Digitisation of pamphlets is the best method now adopted elsewhere. It is transforming input data any physical form into digital form of computer processing. It also solves space problem. Computer has become digital imaging because it is more efficient and effective to create images on computer that to use traditional methods.

It is easier to get perfect, digital images and integrate them with text. Scanned images are better than digital. Scanned images can be indexed, stored, linked, retrieved globally.

This digitization work can be done in two modes of operation

1. Establishing a digital library system at MUL, which require manpower cost, equipment and over head cost to be worked in details.
2. Simply, the required digitization may be assigned to a outside agency. This work may simplify our efforts in getting the pamphlets digitized by outsourcing and we get the digital source as a product, which can be stored into our server for multiple distribution use.

CONCLUSION

1. After the study it is observed that the Pamphlets as a vehicle of information is playing an important and vital role as a resource of research information.

2. After analysing and evaluating the pamphlets at Madras University Library based on subject scattering it is very clear that the pamphlet publication was a general practice in every field subject for disseminating the crux of subject knowledge. It is more so in the field of Social Sciences, Humanities and Sciences the Scientist expresses their views in condensed manner more explicitly.

3. Also Pamphlets were continuously used by all researchers as their printed information channel for getting relevant information in their area of research topic in a condensed manner for furtherance of their research.

After the detailed study of the Pamphlet Collections and its usage at Madras University Library, it impresses and also there exists a need that a modern method of preservation of pamphlet which can help distributed dissemination of pamphlet information to multi-core users. This can be highly achieved by digitising the full text of the available pamphlet literature using modern technology.

REFERENCES


AGRICULTURE, VETERINARY AND FOOD SCIENCES RELATED OPEN ACCESS INSTITUTIONAL REPOSITORIES (OAIR): A STUDY BASED ON OpenDOAR

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ABSTRACT

Open Access Institutional Repositories (OAIR) enable institutions and faculty to offer long-term access to digital objects that have persistent value. They also extend the core missions of libraries into the digital environment by providing reliable, scalable, comprehensible, and free access to libraries' holdings for the world as a whole. A study has been undertaken to identify the number of OAIRs related to Agriculture, Veterinary and Food Sciences using OpenDOAR, an authoritative directory of academic open access repositories. The study revealed that there were about 400 OAIRs in 2006 covering all disciplines and the number started increasing steadily and at present there are about 2171 OAIRs as on 28th February 2012. Out of the 2171 OAIRs, 72 are related with Agriculture, Food and Veterinary Science. This paper attempts to give a profile of Agriculture, Veterinary and Food Sciences related OAIRs based on OpenDOAR.

Keywords: Agriculture, Veterinary Science, Animal Husbandry, Food Science, Open Access Institutional Repository, OpenDOAR

INTRODUCTION

Open access (OA) literature is nothing but digital, online, free of charge, and free of most copyright and licensing restrictions. What makes it possible is the internet and the consent of the author or copyright-holder. The seed for open access was sown at Budapest and it is widely known as ‘Budapest Open Access Initiative’, a great revolution taken place in the field of scholarly publications across the globe.
Budapest Open Access Initiative (BOAI) 2002

An old tradition and a new technology have converged to make possible an unprecedented public good. The old tradition is the willingness of scientists and scholars to publish the fruits of their research in scholarly journals without payment, for the sake of inquiry and knowledge. The new technology is the internet. The public good they make possible is the world-wide electronic distribution of the peer-reviewed journal literature and completely free and unrestricted access to it by all scientists, scholars, teachers, students, and other curious minds. Removing access barriers to this literature will accelerate research, enrich education, share the learning of the rich with the poor and the poor with the rich, make this literature as useful as it can be, and lay the foundation for uniting humanity in a common intellectual conversation and quest for knowledge. This kind of free and unrestricted online availability was termed as ‘Open Access’ by BOAI.

Primary Vehicles of Open Access

Open access to literature is delivered by two primary vehicles viz.,

1. Open Access Journals (also known as ‘gold OA’); and
2. Open Access Repositories (also known as ‘green OA’)

The chief difference between them is that OA journals conduct peer review and OA repositories do not. This difference explains many of the other differences between them, especially the costs of launching and operating them. Though there are other OA vehicles such as personal web sites, e-books, discussion fora, e-mail lists, blogs, wikis, and other kind of online networks are also available, the open access journals and open access repositories are the two primary vehicles for delivering OA to research literature.

OPEN ACCESS REPOSITORIES (GREEN OA)

Open access repositories have fuelled a revolution in disseminating knowledge, bypassing the toll gates that publishers have set up to take unjustified profits from the public world of research. OA repository can be defined as ‘an online database that makes the full-text of items or complete files it contains freely and immediately available without any access restrictions’.

OA repositories may be established by discipline or institution based. When universities and research institutes host OA repositories, they usually take steps to ensure long-term preservation of contents in addition to OA. Open Access Repositories may include journal articles, theses, dissertations, course materials, departmental databases, data files, audio and video files, institutional records, seminar papers, lecture notes, conference proceedings, or digitized special collections from the library.
FEATURES OF OA REPOSITORIES
The following are some of the important features of OA repositories.

Open Access Repositories
- can contain preprints (any version prior to peer review and publication, usually the version submitted to a journal), postprints (any version approved by peer review) or both.
- do not perform peer review themselves.
- provide open access by default to all their contents.
- authors need no permission for preprint archiving.
- comply with the Open Archives Initiatives (OAI) protocol for metadata harvesting, which makes them interoperable.
- economically sustainable because they are so inexpensive.
- give authors a worldwide audience
- give readers barrier-free access to the literature need for research
- put rich and poor teachers and students on an equal footing
- help libraries by solving the pricing crisis for scholarly journals
- help the universities by increasing the visibility of their faculty and research
- help the journals and publishers by making their articles more visible, discoverable, retrievable and useful
- help the citizens by giving them access to peer-reviewed research

OpenDOAR
OpenDOAR (Open Directory of Open Access Repositories) is an authoritative directory of academic open access repositories. Each OpenDOAR repository has been visited by project staff to check the information that is recorded here. This in-depth approach does not rely on automated analysis and gives a quality-controlled list of repositories. It is not only providing a simple repository list but help us search for repositories or search repository contents. Additionally, it provides tools and support to both repository administrators and service providers in sharing best practice and improving the quality of the repository infrastructure. The OpenDOAR service provides a quality-assured listing of open access repositories around the world. OpenDOAR staff harvest and assign metadata to allow categorisation and analysis to assist the wider use and exploitation of repositories. Each of the repositories has been visited by OpenDOAR staff to ensure a high degree of quality and consistency in the information provided: OpenDOAR is maintained by SHERPA Services, based at the Centre for Research Communications at the University of Nottingham.
NEED FOR THE STUDY

It is estimated that there are about 3,000 OA repositories around the world and over the past three years the number has been growing steadily and the future growth is very promising. Since the number of OA repositories is growing, it is the need of the hour to identify the OA repositories based on discipline. Since the authors are serving in a University which is functioning for the development of academic, research and extension in the fields of veterinary science, animal science and food sciences, this paper attempts to profile the OA repositories related to the above disciplines including Agriculture, as it is the mother of all these disciplines. It is hoped that this study will help the students, research scholars, faculty and scientists working in the disciplines to easily identify the OA repositories which will help them to cater to their scholarly literature requirements.

METHODOLOGY

To explore OA repositories in the selected disciplines, OpenDOAR has been searched by the name of the disciplines which listed all the OA repositories dealing with Agriculture, Veterinary and Food Sciences. The details have been stored into another file and a database has been designed using Microsoft Excel 2007.

DATA ANALYSIS AND INTERPRETATION

Types of OAIR in Agriculture, Veterinary and Food Sciences

As per OpenDOAR there are 2171 OAIRs available at present and out of the 2171 OAIRs, 72 are related with Agriculture, Food and Veterinary Science. The 72 OAIRs are of various types viz., Institutional (51), Government (2), Disciplinary (15) and Aggregating (4) which is depicted in Figure-1.

Fig. 1 Types of OAIR
Ranking of Countries

The 72 OAIRs in Agriculture, Veterinary and Food Sciences are being maintained by various countries. European countries maintain the highest number of OA repositories (43%) followed by Asia (26.38%), North America (15.28%), Africa (6.94%), South America (4.17%), Australasia (2.78%) and Central America (1.39%). The details are illustrated in Fig-2.

![Fig. 2 Ranking of Countries](image)

Ranking of Languages

The majority of the OAIRs are available in multi-lingual format and there are 76.39% OAIRs in English followed by Spanish with 12.50%, Chinese with 9.72% and other with 1.39%. The same are depicted in Figure-3.

![Fig. 3 Ranking of Languages](image)
Ranking of Software used

The study revealed that Dspace is the software used by the majority of OAIRs (47.22%) followed by EPrints (20.83%), Green Stone (6.94%), Presto (1.39%) and dLibra (1.39%). However the type of software used by 16 OAIRs are not traceable using OpenDOAR. The details are depicted in Figure-4.

Fig. 4 Software Used

Ranking of Asian Countries

The study revealed that 26.39 % of OAIR in Agriculture, Veterinary and Food Sciences are maintained by Asian countries. Among Asian countries, India and China are in top with four OAIRs (21.05%) respectively, followed by Taiwan (15.79%), Japan (10.53%) and Indonesia (10.53%) respectively. It is noted that none of other Asian countries are maintaining any OAIR in respect of Agriculture, Veterinary and Food Sciences as reflected in OpenDOAR. The details are furnished in Figure-5.

Fig. 5 Ranking of Asian Countries
INDIAN SCENARIO

The four OAIR in Agriculture, Veterinary and Food Sciences maintained from India are maintained by IARI, New Delhi (Eprints@IARI), IIT, Kanpur (OpenAgri), University of Kashmir (KNoor) and CMFRI (Eprints@CMFRI). The URLs of the four OAIRs are furnished in Table-1.

Table 1 URLs of Indian OAIRs

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Name of OAIR</th>
<th>URL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Eprints@IARI Maintained by the IAR, New Delhi</td>
<td><a href="http://eprints.iari.res.in/">http://eprints.iari.res.in/</a></td>
</tr>
<tr>
<td>2</td>
<td>OpenAgri Maintained by IIT, Kanpur</td>
<td><a href="http://agropedia.iitk.ac.in/openaccess/">http://agropedia.iitk.ac.in/openaccess/</a></td>
</tr>
<tr>
<td>3</td>
<td>Knowledge Repository Open Network (KNoor) by University of Kashmir &amp; SKUAST</td>
<td><a href="http://dspaces.uok.edu.in:8080/dspace">http://dspaces.uok.edu.in:8080/dspace</a></td>
</tr>
<tr>
<td>4</td>
<td>EPrint@CMFRI Maintained by Central Marine Fisheries Research Institute, Kochi</td>
<td><a href="http://eprints.cmfri.org.in">http://eprints.cmfri.org.in</a></td>
</tr>
</tbody>
</table>

Eprints@IARI

The OAIR provides access to the research output of the Indian Agricultural Research Institute (IARI), New Delhi. The interface is in English. Users may set up Atom and RSS feeds to be alerted to new content. The subjects covered include Agriculture, Food and Veterinary and Animal Sciences. The contents include articles, conference papers, theses and other unpublished documents. The screen shot of EPrints @IARI is depicted in Figure-6.

Fig. 6 EPrints@IARI
OpenAgri
This OAIR is maintained by Indian Institute of Technology, Kanpur under Agropedia project. It provides access to agricultural research from around the globe. The interface is in English. The contents include articles, conference papers and e-books.

Knowledge Repository Open Network (KNoor)
It is an ‘Open Access Repository’ of contributions emanating presently from three premier academic and research institutes of the Jammu and Kashmir viz. S.K Institute of Medical Sciences, S.K University of Agricultural Science & Technology and University of Kashmir, to harvest voluntarily research papers, ETD and conference proceedings of their faculty, scientists and scholars and aggregate them in the Repository for making them visible to interested scholarly community at global level. This is particularly addressed to open access contributions at full text level and other licenced items at the abstract level. This will help to add to transparency, creditability besides archiving electronically the valuable contributions for the posterity. The repository is being developed, maintained and regulated by Department of Library & Information Science (University of Kashmir) on behalf of all the participating institutions in collaboration with Directorate of IT&SS (University of Kashmir). At present about 450 items are available and the contents are available in English, Hindi, Arabic, Persian and Kashmiri languages.

Eprints@CMFRI
It is the Open Access Institutional Repository of Central Marine Fisheries Research Institute (CMFRI), Kochi. Research outputs of CMFRI - journal papers, conference papers, reports, theses, patents etc. - are uploaded/self-archived by CMFRI scientists who do research on fisheries and related areas. Interested users can freely download and use documents as most of them are directly accessible and full-text downloadable. ‘Request Copy’ forms can be used for documents to which direct full-text download is restricted due to publisher embargo. About 3600+ items in English language are available and the number of items is increasing steadily.

ICAR INITIATIVES
Realising the need and importance of OA to scholarly literature of NARS, the Indian Council of Agricultural Research (ICAR) takes a lot of initiatives. The first initiative was started publishing its journals as open access journals. The important initiative of ICAR in respect of OAIR is the implementation of a Network Project on ‘Strengthening of Digital Library and Information Management under NARS (e-Granth)’ with select twelve State Agricultural Universities and ICAR institutes under Word Bank funding.

Under e-Granth project, all the librarians and project staff are being given periodical training in using Dspace software which helps them to get hands-on experience in installing and using Dspace software. This effort will definitely help the participating libraries to create Open Access Institutional Repositories in their respective universities / institutes.
CONCLUSION

Though there are about 50 State Agricultural Universities and hundreds of Agriculture, Veterinary and Food Science colleges in our country, still the number of OAIR in the disciplines of Agriculture, Veterinary and Food Sciences is scanty. Compared to the number of institutes and research output from these institutes, there is an urgent need to increase the number of OAIRs in the disciplines to ensure open access to the research outputs from the public funded research. To ensure establishment of OAIRs of all State Agricultural Universities and ICAR institutes, the e-Granth project may be extended to next phases and opportunities may be given to other SAUs and ICAR Institutes so that capacity building of librarians can be done which is necessary for the sustainable development of OAIRs in NARS. Further, the ICAR may also consider allotment of sufficient and specific funding support to all SAUs and ICAR institutes under ICAR development grant for establishment of Open Access Institutional Repositories in all the SAUs and ICAR Institutes in a phased manner. The best OAIR of SAUs/ICAR Institutes may also be motivated by awards.

REFERENCES

2. EPrint@CMFRI available at http://eprints.cmfri.org.in
3. EPrints@IARI available at http://eprints.iari.res.in
8. Open Agri available at http://agropedia.iitk.ac.in/openaccess/
OPEN SOURCE SOFTWARE FOR LIBRARIES: A STUDY

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ABSTRACT
Open Source Software (OSS) discussed in the present study, comes to the rescue of less-privileged libraries to deal with the increasing demands for use of technology. OSS enables democratization of technology. OSS has definite advantages over proprietary systems in the total cost of ownership (TCO), since it is available free for download on the Internet. Thus OSS bears great importance to the libraries in developing countries like India. The objective of the present study is to look into the technologies and tools available in the open source world that can be used in improving the services within the libraries. The study is based on the available Open Source Software (OSS) useful to libraries in general. It includes integrated library systems (ILS), cataloguing tools, resource sharing tools, digital library tools, and other information service tools useful in day-to-day functioning of the libraries.

Keywords: Open Source Software, Library, and Integrated Library system.

INTRODUCTION
Open source is a software development model as well as a software distribution model. In this model the source code of programs is made freely available with the software itself so that anyone can see, change, and distribute it provided they abide by the accompanying license. In this sense, Open Source is similar to peer review, which is used to strengthen the progress of scholarly communication. The open source software differs from the closed source or proprietary software which may only be obtained by some form of payment, either by purchase or by leasing. The primary difference between the two is the freedom to modify the software. An open system is a design philosophy antithetical to solutions designed to be proprietary. The idea behind it is that institutions, such as libraries, can build a combination of components and deliver services that include several vendors’ offerings. Thus, for instance, a library might use an integrated library system from one of the major vendors in combination with an open source product developed by another library or by itself in order to meet better its internal users’ requirements.
Developments in electronic and communication technology have affected every profession in the past decades and libraries are no exception. Libraries of all types are challenged to provide greater information access and improved levels of service, while coping with the pace of technological change and ever-increasing budget pressure. Use of software applications in libraries has become essential due to a number of factors.

DEFINITION

According to Open Source Initiative (http://www.opensource.org/): "Open source promotes software reliability and quality by supporting independent peer review and rapid evolution of source code. To be certified as open source, the license of a program must guarantee the right to read, redistribute, modify, and use it freely."

Open source means several things (Chudnov, 1999):

- Open source software is typically created and maintained by developers crossing institutional and national boundaries, collaborating by using internet-based communications and development tools;
- Products are typically a certain kind of "free", often through a license that specifies that applications and source code (the programming instructions written to create the applications) are free to use, modify, and redistribute as long as all uses, modifications, and redistributions are similarly licensed;
- Successful applications tend to be developed more quickly and with better responsiveness to the needs of users who can readily use and evaluate open source applications because they are free;
- Quality, not profit, drives open source developers who take personal pride in seeing their working solutions adopted;
- Intellectual property rights to open source software belong to everyone who helps build it or simply uses it, not just the vendor or institution who created or sold the software.

THE TEN COMMANDMENTS

The Open Source Initiative (OSI) identified ten criteria for a software product to be called open source. The OSI certifies a software license as an ‘OSI Certified License’ on the basis of the following ‘Ten Commandments.’

1. **Free Redistribution:** The license shall not restrict any party from selling or giving away the software as a component of an aggregate software distribution containing programs from several different sources. The license shall not require a royalty or other fee for such sale.
2. **Source Code:** The program must include source code, and must allow distribution in source code as well as compiled form. Where some form of a product is not distributed with source code, there must be a well-publicized means of obtaining the source code for no more than a reasonable reproduction cost—preferably, downloading via the Internet without charge.

3. **Derived Works:** The license must allow modifications and derived works, and must allow them to be distributed under the same terms as the license of the original software.

4. **Integrity of the Author’s Source Code:** The license may restrict source code from being distributed in modified form only if the license allows the distribution of “patch files” with the source code for the purpose of modifying the program at build time. The license must explicitly permit distribution of software built from modified source code.

5. **No Discrimination Against Persons or Groups:** The license must not discriminate against any person or group of persons.

6. **No Discrimination Against Fields of Endeavor:** The license must not restrict anyone from making use of the program in a specific field of endeavor.

7. **Distribution of License:** The rights attached to the program must apply to all to whom the program is redistributed without the need for execution of an additional license by those parties.

8. **License Must not be Specific to a Product:** The rights attached to the program must not depend on the program's being part of a particular software distribution.

9. **The License Must not Restrict Other Software:** The license must not place restrictions on other software that is distributed along with the licensed software. For example, the license must not insist that all other programs distributed on the same medium must be open-source software.

10. **The License must be Technology-Neutral:** No provision of the license may be predicated on any individual technology or style of interface.

**SOFTWARE NEEDS FOR AUTOMATION**

Before we look into the needs of software let us see what are the activities in a library that can be automated. There are basically two kinds of activities in a library, viz., visible and background. The activities like circulation, reference services, which are visible to the users are of the first kind. The activities such as ordering, accessioning, cataloguing, etc. can be referred to as the background activities in a library. The libraries also need to interact with other libraries to share resources. So the third type of activity would be resource sharing with other libraries. Each of these three kinds of activities is mostly still done manually in the traditional libraries.
Housekeeping activities

The housekeeping activities are essential for the day-to-day functioning of the library. These include:

1. **Acquisitions**: tracking the purchase of materials through ordering, claiming, receiving, invoicing, and processing.
2. **Cataloging**: creating catalogue records.
3. **Serials**: automating ordering, receipt, routing, and renewals of all serial subscriptions.
4. **Reminders**: for library patrons as well as vendors of books and periodicals

**Services to users**

1. **Online Public Access Catalog (OPAC)**: an electronic record of holding, bibliographic, and item information.
2. **Circulation**: allowing librarians to check materials in and out, place renewals or holds, and enter payments.
3. **Reference Services**: to the users and other communities.

**Resource Sharing**

1. **ILL**: for sharing resources.
2. **Cooperative Cataloguing**: for sharing the cataloguing work among a group of libraries.
3. **Union Catalogue**: to enable easy identification of a resource in the holdings of a group of libraries.

**WHY ADOPT OSS IN LIBRARIES?**

The range and quality of software available for libraries is small compared to other industrial applications. According to David Chudnov (1999) it is not surprising: “The library community is largely made up of not-for-profit, publicly funded agencies which hardly command a major voice in today's high tech information industry. As such, there is not an enormous market niche for software vendors to fill our small demand for systems. Indeed the 1997 estimated library systems revenue was only $470 million, with the largest vendor earning $60 million. Because even the most successful vendors are very small relative to the Microsofts of this world (and because libraries cannot compete against industry salary levels), there are relatively few software developers available to build library applications, and therefore a relatively small community pool of software talent.”

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According to Chudnov (1999) there are three factors pushing the use of OSS in libraries:

1. OSS licenses allow libraries to cut budget on software and use it to other issues needing more funds.
2. OSS product is not locked into a single vendor. Thus even if a library buys an open source system from one vendor, it might choose to buy technical support from another company or get it from in-house experts.
3. The entire library community might share the responsibility of solving information systems accessibility issues.

**OSS SOFTWARES**

Integrated Library Systems (ILS) is the current wave in the field of library automation. An ILS combines several activities of the library into one integrated system, allowing the library staff to perform all their functions online. These activities include simple housekeeping activities like acquisition, cataloguing to user services, and inter-library loan activities. In the last few years we have seen the development of a number of ILS products in the open source world. One important trend in these kind of products is the use of web-based client/server architecture. Listed below are some of the well-known ILS products or Library softwares.

**Koha: The First Open Source Integrated Library System**

**Description:** Koha is the first open source fully featured integrated library system (ILS) used by a considerable number of libraries in USA, New Zealand, and Europe. The Koha ILS includes catalogue, OPAC, circulation, member management, and acquisitions package. Koha is used by public libraries, private collectors, not-profit organizations, churches, schools, and corporates.

**Special Features:** Some of the key features are

- Simple clear interface for librarians and members (patrons) to search right from the front page.
- Customizable search - you choose which fields you want on your search forms when you set it up
- Reading lists for members - now you can find the name of that great book you read last year.
- Full acquisitions including budgets and pricing information (including supplier and currency conversion), being kept so that you can see what you've ordered and received - so handy at end of year and audit time.
- Simple acquisitions for the smaller library
- Able to catalogue websites as items, or have them as links to existing records.
History
Koha was developed in 1999 and the first library went live in January of 2000. Koha's code has been in production since then and is continuing to move towards higher levels of functionality and standards compliance, including embracing the international records and cataloging standards viz., MARC and Z39.50.

Project Sponsors/Administrators: Katipo Communications and funding by Horowhenua Library Trust and other libraries. Current project leader is Patrick Eyler.

Dependency: Apache, Perl, MySQL (or any RDBMS)

Supported Platforms: Windows (without Z39.50 support), Linux, and UNIX

License: GNU General Public License


Further Information:
1. Project Homepage: http://www.koha.org/

PhpMyLibrary
Description: PhpMyLibrary is a web-based library automation application meant for smaller libraries. The system consists of cataloguing, circulation, and the OPAC module. The system also has an import export feature. It strictly follows the USMARC standard for adding materials.

Special Features: The salient features are:
- Fully compatible with the Postnutek Content Management System enabling easy integration with the Postnutek-based portal
- Online reservation system for library patron with their own login
- Supports import from ISIS database with an ISIS2MARC program

History: Unknown

Project Sponsors/Administrators: Polerio Babao III, and Paolo Alexis Falcone

Dependency: Apache, PHP, MySQL, Python

Supported Platforms: Platform Independent

License: GNU General Public License

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Availability: http://sourceforge.net/projects/phpmylibrary/

Further Information: Project Homepage: http://phpmylibrary.sourceforge.net/

OpenBiblio: A Library System That’s Free

Description: OpenBiblio is an easy to use, open source, automated library system written in PHP containing OPAC, circulation, cataloging, and staff administration functionality. The purpose of this project is to provide a cost effective library automation solution for private collections, clubs, churches, schools, or public libraries.

Special Features: The goals of the project has been to achieve the following
- Intuitive and easy to use
- Well documented
- Easy to install with minimal expertise
- Designed with common library features to work with most library workflows
- It is fully compatible with the Postnuke Content Management System.

History: Unknown

Project Sponsors/Administrators: Dave Stevens

Dependency: Apache, PHP, MySQL

Supported Platforms: Platform Independent

License: GNU General Public License

Availability: http://sourceforge.net/project/showfiles.php?group_id=50071

Further Information: Project Home Page: http://obiblio.sourceforge.net/

GNU Library Management System (GLIBMS)

Description: Glibms is Library management software developed using PHP and PostgreSQL to automate the different activities carried out in the library. The project is currently inactive at Sourceforge. It is renamed as Karuna and hosted at sarovar.org.

Special Features: Unknown

History: Unknown

Project Sponsors/Administrators: Sharmad Naik, Gaurav Priyolkar

Dependency: Apache, PHP, Perl, PostgreSQL

Supported Platforms: Linux, UNIX

License: GNU General Public License
**Availability:** http://sourceforge.net/projects/glibs/

**Further Information:** Project Home Page: http://sourceforge.net/projects/glibs/

**Avanti: An Open Source Library Computing System**

**Description:** Avanti MicroLCS is an open source general purpose library computing system that is small, simple, and easy to install and use. Written in Java, it is platform independent and can run on any system that supports a Java runtime environment. Although it targets small libraries, it has a powerful and very flexible architecture that allows it to be adapted for use in libraries of any type.

**Special Features:** Some key objectives of the project are:

- Keep it as small, simple and extendable as possible, using a well considered, clean design.
- Implementation neutral: Base the design on a purely abstract model of library systems. Avoid designing for a literal library. This makes the core system very portable and adaptable to the needs of libraries of all types.
- Platform independent: 100% pure Java.
- It should be easy to install and use. Unlike most other open source solutions, it should not require the skills of a system administrator to install and maintain.
- User interfaces should be modeless, flat and simple.
- Keep the memory and resource footprint very small. Avanti is anticipated being used in a variety of forms including that of a library automation server appliance.
- Incorporate standards such as MARC and Z39.50 as modules and interfaces, but do not allow them to become part of the underlying design.

**History**

Avanti is an effort, begun in 1998 by Peter Schlumpf, to develop a simple, flexible, and open source solution to automating small and medium-sized libraries of various types that requires a minimum of technical expertise to install and use.

**Project Sponsors/Administrators:** Peter Schlumpf

**Dependency:** Java Virtual Machine

**Supported Platforms:** Platform Independent

**License:** Unknown

**Availability:** http://home.earthlink.net/~schlumpf/avanti/downloads.html

**Further Information:** Project Home Page:
http://home.earthlink.net/~schlumpf/avanti/index.html

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PhpMyBibli: A Free Solution for the Media Library

**Description:** PhpMyBibli is a web-based library automation for French libraries.

**Special Features:** Some of the features are:
- A simplified administration being able to be ensured by the personnel of the library
- Support of format UNIMARC
- Management of the authorities (responsible, editors, collections, matters...)
- Management of the loan, the reservations, the borrowers...
- Support for cataloguing electronic resources
- The management of the periodicals

**History:** Unknown

**Project Sponsors/Administrators:** Francois Lemarchand

**Dependency:** Apache, PHP, MySQL

**Supported Platforms:** Platform Independent

**License:** GNU General Public License

**Availability:** [http://sourceforge.net/project/showfiles.php?group_id=64869](http://sourceforge.net/project/showfiles.php?group_id=64869)

**Further Information:** Project Home Page: [http://phpmybibli.sourceforge.net/](http://phpmybibli.sourceforge.net/)

Karuna

**Description:** This project is a library management system designed to automate a library. Taken into consideration all the aspects of a library like search, issue/retrieval, acquisition and other aspects of a library.

**Special Features:** Unknown

**History**

It is another version of the GNU Library Management System (GNU LMS). According the author of Karuna (who was also one of the developer for GNU LMS) the original GNU LMS is no more supported.

**Project Sponsors/Administrators:** Sharmad Naik

**Dependency:** Apache, PHP, PostgreSQL

**Supported Platforms:** Linux, UNIX

**License:** GNU GPL

**Availability:** [http://sarovar.org/project/showfiles.php?group_id=34](http://sarovar.org/project/showfiles.php?group_id=34)

**Further Information:** Project Home Page: [http://sarovar.org/projects/karuna/](http://sarovar.org/projects/karuna/)
CONCLUSION

Open Source essentially empowers less privileged communities though it does not follow that it is meant only for them. There is no denying the fact that OSS enables bridging the digital divide in more ways than one. Libraries in the developing countries are able to support electronic access, digital libraries, and resource sharing because they are able to use OSS. Even libraries in well-developed countries are becoming more inclined towards OSS to improve their services.

REFERENCES


FREE OPEN SOURCE SOFTWARE (FOSS) AND THEIR USE IN THE LIBRARY AND INFORMATION MANAGEMENT

Bindeshwari Pratap Singh
Technical Officer (Library)
National Library in Dairying, NDRI
Karnal (Haryana)

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INTRODUCTION
In the current era digitalized databases are being compiled in majority of the library services, which are based on information technology as well as resources available in electronic formats. In order to manage all kinds of resources and information, libraries require high quality integrated software, along with cutting edge retrieval tools. However, the high price of such software prevents most of the libraries from using them. So as to deal with this issue, and for the benefit of research scholars and the user communities of libraries, different NGOs, organizations and individuals have developed software, which are distributed free of cost. Known as free/open source software, these are extensively available on the internet and can be downloaded, installed and distributed.

DEFINITIONS
Open source promotes software reliability and quality by supporting independent peer review and rapid evolution of source code. To be certified as open source, the license of a program must guarantee the right to read, redistribute, modify, and use it freely."(Rich Christie, 1999)

Open Source Software is computer software whose source code is available under a license (or arrangement such as the public domain) that permits users to use, change, and improve the software, and to redistribute it in modified or unmodified form. It is often developed in a public, collaborative manner. It is the most prominent example of open source development and often compared to user generated content. (Wikipedia)
ADVANTAGE OF FREE/OPEN SOURCE SOFTWARES

1. Core software is free
2. Free/Open Source software projects can have huge communities of programmers involved, allowing for the rapid implementation of new features and security fixes
3. Encourages hands-on experience
4. Not tied to a single vendor
5. Setting up a digital library by using ‘D-Space’ or any other free software. Documents can be collected for the benefit of students and faculty members using this facility
6. Some of the documents can be made available in the digital library include research papers of faculty members, seminar and project reports and contents of various journals

REASONS FOR THE SUCCESS OF OPEN SOURCE SOFTWARES

Openness: The generally open conducted development corresponds to the academic tradition to directly exchange results of (scientific) work, provide research data etc. So far, that “rule” attaches itself to the experiences of many people, uses established communication channels and co-operation methods.

Flexibility: Many OSS projects integrate a large number of developers with very different emphasis and background. This facilitates the understanding for special requirements and, at the same time, offers the potential to quickly implement needed adjustments.

Speed: The speed by which there is reaction to problems, errors or security leaks of the software is legendary. A large group of people that want to make a product successful immediately undertake the tasks and test new versions, is significantly faster and more successful than the proprietary competitors.

Motivation: OSS developers are (experience themselves) part of a community that works on a collaborative success (-product). Often they are, by the way, no part-time hobby developers but professional developers that create OSS full-time. Also, the standard for governmental financed projects to provide the resulting software cost-free for others (that doesn’t necessarily mean OSS or free software), supports the motivation.

OPEN SOURCE SOFTWARE VS FREE SOFTWARE

The terms open source software and free software typically describe the same. The two terms are generally used interchangeably, but “Free software often differs from open source software as the free software might have been created by one or some people. Free software is generally closed-source, although the source is sometimes available. The
distinction is indicated, as even if the source is available, it is still maintained by a closed group. Whereas anyone can join in open source software group if one can prove contribution of anything to use to the project (Kumar, 2008).

However, recent events have emphasized that there is actually a very practical difference between the two concepts. In open source software, which are free software, however, free does not necessarily have to be open source software, because all the free software can’t customized as open source software.

FREE/ OPEN SOURCE SOFTWARE IN THE FIELD OF LIBRARY AND INFORMATION MANAGEMENT

In comparison to other sectors, the emergence of ‘Free/Open Source Software’ in the field of library and information management are more viable option as the cooperation and coordination are the key issues in library services. Library professionals have always focused on cooperation, resource sharing, consortia and on open access, standards, archive initiatives; and so on in order to help each other in collection development and implementation of tools and technologies, among others. This attitude and the prevalent economic situations have facilitated the development of Free/Open Source Software in the field of library and information management.

In the initial stage, due to lack of awareness on technical aspects, right of use, sustainability, and so on, there has been a lot of confusion among librarians about ‘Free/Open Source Software’. For instance, several arguments have been put forward that free software, by its very nature, is not well supported, and can only be installed and made ready to use by computer experts. This misconception prevents non-computer professional librarian to for this type of software, who prefer the easy to use commercial software that have user-friendly interface.

SOME IMPORTANT FREE/OPEN SOURCE SOFTWARES

Major softwares developed and available are described briefly along with their special features and uses.

KOHA

KOHA has the distinction of being the first open source integrated library management system, which includes all the main functions related to library management. It is web-based open source software distributed under the general public license. Koha supports windows as well as Linux platform. The first version of it was released in year 2000. The ‘KOHA Development Team’ offers to host the website for KOHA library system on its server. KOHA also has the capacity to manage digital libraries and online and offline electronic resources.
Features
Koha is web-based Integrated Library Management System (ILS), with a SQL database (MySql preferred) backend with cataloguing data stored in MARC and accessible via Z39.50. The user interface is very configurable and adaptable and has been translated into many languages. Koha has most of the features that would be expected in an ILS, including:

- Simple, clear interface for librarians and members (patrons)
- Various Web 2.0 facilities like tagging and RSS feeds
- Union catalog facility
- Customizable search
- Circulation and borrower management
- Full acquisitions system including budgets and pricing information (including supplier and currency conversion)
- Simple acquisitions system for the smaller library
- Ability to cope with any number of branches, patron categories, item categories, currencies and other data
- Serials system for magazines or newspapers
- Reading lists for members
- Easy barcode printing etc.

ABCD
ABCD represents the “Automation of libraries and Centres of Documentation”. The name itself expresses the ambition of the software suite to provide not only automation functions for traditional libraries but also other information providers such as documentation centers. It has been developed by BIREME (WHO, Brazil) in collaboration with the Flemish Interuniversity Council, Belgium, and using UNESCO’s ISIS database technology. This software provides flexibility and versatility. The bibliographic structures, including all types of digital resources, can be managed by this software and created along with non-bibliographic structures (Dhamdhere, 2011). The first version of ABCD (v1.0) was released on 5th December 2009. ABCD has been built up with technologies such as ISIS database, ISIS formatting language, CISIS, ISIS Script, ISIS NBP, Java Script, Groovy and Jetty, PHP, MySQL, Apache, and YAZ.

Features
- The software is fully web-based, so can be used and managed from any current web-browser
- All main functions of the library management are integrated using the same interface and databases
• Bibliographic records can be imported from external library catalogs / servers through Z39.50 facilities
• Full MARC 21 compatibility with fields, indicators, and subfields defined by Library of Congress
• OPAC with simple Google-like search as well as advanced search with Boolean operators, truncation, and field-limitation for all kinds of databases, locally created or external
• Access to both physical and electronic documents (local or on the internet) with the same interface
• Library staff can define copy or edit any new database structure with existing ISIS-applications such as MARC, CEPAL, UNIMARC, and Dublin Core
• Available in many languages like English, French, Spanish, Portuguese while more language versions are on the way
• Contents and bibliographic resources, both local and external, can be added easily without HTML-programming.
• Excellent serials management with a fully implementation of the ISSN standard and union catalog function.
• Statistical report generation with graphical presentation of any defined set of variables in the databases.
• Freedom of database structure

NEWGENLIB
NewGenLib (New Generation Library) is an integrated library management system developed by Versus Solutions Pvt. Ltd. Domain expertise is provided by Kesavan Institute of Information and Knowledge Management (KIIKM) in Hyderabad, India. NewGenLib version 1.0 was released in March 2005. On 9 January 2008, NewGenLib was declared Open Source Software under GNU General Public License (GPL) License by Versus Solutions. Currently NewGenLib 3.0.3 U2 is the latest version running. Presently about 2,500 libraries and information centres are using NewGenLib across the world.

Features
• Functional modules are completely web based. Uses Java Web Start™ Technology
• Compatibility - Complies with international metadata and interoperability standards: MARC-21, MARC-XML, z39.50, SRU/W, OAI-PMH
• Scalable, manageable and efficient
• OS independent - Windows and Linux flavors available
• Unicode 4.0 complaint
• Easily extensible to support other languages
• Data entry, storage, retrieval in any (Unicode 3.0) language
• Networking – Hierarchical and Distributed networks
• Automated email/instant messaging integrated into different functions of the software
• Form letters are configurable and use XML-based Open Office templates
• Supports multi-user and multiple security levels
• Allows digital attachments to metadata

D-SPACE

D-Space is an open source software package that provides the tools for management of digital assets, and is commonly used as the basis for an institutional repository. It supports a wide variety of data, including books, theses, and 3D digital scans of objects, photographs, film, video, research data sets and other forms of content. The data is arranged as community collections of items, which bundle bit streams together.

D-Space is also intended as a platform for digital preservation activities. D-Space was released by HP-MIT Alliance in 2002 and since its release is very popular open source software. It has been installed and successfully working extensively and widely in universities, higher education colleges, cultural organizations, and research centers etc. It is shared under a Berkeley Software Distribution license, which enables users to customize or extend the software as needed.

Features

• D-Space is written in Java
• It uses a relational database, and supports the use of Postgre SQL and Oracle
• It currently support two primary web interfaces—a classic one (JSPUI) which uses JSP and the Java Servlet API, and a newer interface (XMLUI) based on Apache Cocoon and using XML and XSLT technologies
• D-Space holdings are made available primarily via a web interface, but it also supports the OAI-PMH v2.0, and is capable of exporting METS (Metadata Encoding and Transmission Standard) packages
• Future versions are likely to see increasing use of web services, and changes to the user interface layer
• The system is organized into communities, sub-communities, and collections
- Supported all type of digital formats, including books, theses, datasets, computer programmes, bibliographic datasets, Images, audio files, video files, learning objects web pages and so on
- Access control over items in repository at collection and individual item levels
- Allows easy migration of items in the system across newer versions
- Able to interoperate other systems in the organizations
- Allows customization of subsystems as per requirement
- D-Space can be used for self archiving by institutions and faculties. It provides long-term physical storage and management of digital items in a repository

**GREENSTONE**

The Greenstone Digital Library Software (GSDL) is a top of the line and internationally renowned ‘Open Source Software’ system for developing digital libraries, promoted by the New Zealand Digital Library project research group at the University of Waikato and is sponsored by the UNESCO. The software is issued under the terms of GNU General Public License. Greenstone provides a way of building, maintaining and distributing digital library collections, opening up new possibilities for organizing information and making it available over the Internet or on CD-ROM.

**Features**

- Greenstone builds collections using almost popular and standard digital formats such as HTML, XML, Word, Post Script, PDF, RTF, and many other formats which include audio as well as video
- It is provided with effective full-text searching and metadata-based browsing facilities that are attractive and easy to use
- It runs on a wide variety of platforms such as Windows, Unix/Linux, Apple Mac etc. and provides full-text mirroring, indexing, searching, browsing and metadata extraction
- UNICODE based multi-lingual capabilities and a user-friendly multimedia interfacing
- Customization of various features fulfilling specific user requirements
- Browser based access
- Use of Dublin Core and other metadata scheme
- Use of plug-in for converting the file format into standard XML-based internal format for indexing purposes
- Administrative features that support access control and user activity logs
Different interfaces for user choice for collection-building like command mode, web, and Java-based GUI interface

Multilingual interface available in English, Arabic, Chinese, Dutch, French, German, Maori, Portuguese, and Spanish etc.

Z39.50 client available on Linux systems

EVERGREEN
Evergreen is an open source Integrated Library System (ILS), initially developed by the Georgia Public Library Service (2006), Public Information Network for Electronic Services (PINES) and the Evergreen Community. It is distributed under the GNU General Public License. Evergreen has been written primarily in Perl and Postgre SQL, with a few optimized sections rewritten in C. The catalog interface is primarily JavaScript with XHTML, and the staff client user interface is written in Mozilla's XUL (XML + JavaScript). The user interface for most new staff client functionality is being built with the Dojo Toolkit JavaScript framework. Python is used for the internationalization built infrastructure. EDI functionality for the acquisitions system depends upon Ruby support.

Features
- Search/Retrieve via URL and Z39.50 servers
- Flexible, powerful reporting for retrieval of any statistical information stored in the database.
- Online Public Access Catalogue (OPAC)
- Customization of various features fulfilling specific user requirement.

CONCLUSION
Libraries with small budgets always consider automation of housekeeping operations as a financial burden due to the high cost of commercial software. However, development of Open Source Software is an effective way to automate library operations without undertaking substantial financial investment. Libraries are taking up Open Source Software as a way to reduce the costs of expensive commercial products and as a viable alternative to the often expensive proprietary library automation systems. “The benefits of Open Source Software can potentially reduce costs; give users more control and increase software performance” (Courant and Griffiths, 2006).

Librarians need to understand open source license for promotion the use of Open Source Software. This is the only way to face the challenges posed by commercial software in the market. It will also increase the autonomy and control of the professional over software solutions. In conclusion, the advent of open source library software have
ushered in a revolution in the field of library and information resources management, and have become a popular choice for most library and information professionals because of their numerous benefits and useful features.

REFERENCES


OPEN SOURCE SOFTWARE FOR LIBRARIES WITH SPECIAL REFERENCE TO INDIA

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ABSTRACT
The open source software has an increasingly high profile in the library and information management. The open source softwares would provide more flexibility and better match to library requirements. Open source library related applications include not only integrated library management system but also range innovative functionality. A number of library softwares are freely available on the net. The present paper enumerates the important characteristics of the OSS and the criterion for selection of OSS as per the individual requirements. It highlights on open source software for libraries with special reference to India.

INTRODUCTION
The term open source refers to software in which the source code is freely available for others to view, amend, and adapt. In this sense; open source is similar to peer-review, which is used to strengthen the progress of scholarly communication. Open source promotes software reliability and rapid evolution of source code. To be certified as open source, the license of a program must guarantee the right to read, redistribute, modify, and use it freely. Open source digital library software differs from commercial and proprietary software. Open source software includes the original code for the program, whatever language it is written and that it also may be subsequently redistributed for free. Using of open source software to provide core functionality, such as library management system, might be seen as too risky, while open source software that provides stand-alone functionality that complements current systems might be acceptable.

OPEN SOURCE SOFTWARE MOVEMENT
The history of open source software began with the early stages of computer and software development. At that time programmers and developers frequently shared their software freely. Advent of companies in software development with the aim of profit making
restricted the culture of sharing source code of software. Milestones in the history of open source software are:

1983- Richard Stallman formed GNU project.
1985- Creation Of Free Software Foundation.
1991- Development of Linux kernel by Linux Torvalds.
1998- Open source initiative (OSI) formed by Eric Raymond.

The two terms, “free” and “open source” are used synonymous for free distribution of softwares. Popular licenses used for this purpose are the GNU General Public License (GPL), BSD license, GNU Lesser General Public License, MIT License, Mozilla Public License and Apache License. All these licenses have some differences in their terms and conditions; they ensure users freedom to use, copying, distribution and improvement of software. Fundamentals of these licenses are similar to the philosophy of Free Software Foundation, “Free software is matters of the user’s freedom to run, copy, distributes, study, change and improve the software”.

DEFINITION OF OPEN SOURCE SOFTWARE
A key definition for OSS is access to the actual source code, often available under GNU public license, which allows programmers to alter the software and redistribute it, with the requirement that they make these changes available to other developers. The licenses associated with OSS prevent commercial entities from making these products proprietary.

The Open Source Initiative (OSI) maintains the following elements
(a) The software must able to be freely distributed, without requiring or fee for sale.
(b) Source code for the program must be available, and, if not included in a distribution, must easily available (for example, downloadable from a web page) in a form, which allows a programmer to modify the program.
(c) Modifications and derive works must be allowed and these must be able to be redistributed under the same terms as the original software.
(d) The integrity of the original source code must able to be maintained, either by requiring modifications to be distributed as “Patch files” or by requiring modified versions to have a different name or version number.
(e) There must be no discrimination against persons or groups.
(f) There must be no discrimination against any field of endeavor.
CHARACTERISTICS OF OPEN SOURCE SOFTWARE

OSS has many characteristics, the important ones are:

(i) It is generally acquired freely
(ii) Manufacturer or developer has no right to claim royalties on the distribution or use
(iii) Source code is accessible to the user and distributed with the software
(iv) No denial to an individual or to a group to access source code of the software
(v) It has provision of modifications and derivations under the programme’s original name
(vi) Rights of facilities attached to the programme must not depend on the programme’s being part of a particular software distribution.

REASONS FOR CHOOSING OPEN SOURCE SOFTWARE

Price of the library software is very high; most of the libraries are not in a position to buy high priced commercial software due to severe budget constraints. Biswas et al. (2008) has mentioned various advantages of open source like unrestricted use; free of cost; community involvement in development and maintenance of software; competence compared to other commercial software’s; and the issues of copyright etc. The obvious reason for the organizations like libraries to choose open source software for automation purposes is ‘no cost’. There is no restriction anyone can use, study, modify and distribute the open source software, regardless of a person’s position, wealth, social conditions etc. The social aspects of the open source software are tremendous. The development and maintenance of this type of software can be contributing to the social group engaged in its development. Open source software project encourage innovation and collaboration of community members. Peer group members are very much involved in these activities.

ADVANTAGES OF OPEN SOURCE SOFTWARE

(i) The main benefit of OSS is that the growth and adaptability of OSS is faster than that of conventional software development because programmers are able to “read, redistribute, and modify the source code for piece of software”.

(ii) Software reliability quality by supporting independent peer review. The peer review processes regarding the source code “bestows a degree of validity upon the quality” of the product.
(iii) Community creates an opportunity for extensive and speedy collaboration on development projects.

(iv) Most programs distributed as “open source“ are obviously, a compelling alternative to program that cost money if they equally requisite performance parameters.

(v) The broad license grant, which allows licensees to use, modify and redistribute open source programs, is a major advantage of the typical open source license.

DISADVANTAGE OF OPEN SOURCES SOFTWARE

(i) The decentralized distribution of open source software process is a disadvantage in some contexts, particularly for fixing bugs and problems which are the responsibility of user, if the open source software community does not mobilize the problems. Lack of central controlling hand in open source software development also means that process can be undirected.

(ii) It not always easy to get open source software to work with other applications. More and more institutions are requiring nonprofit to use databases to track information and those database must operate with the standards set by the institution.

SOME OF THE POPULAR OSS FOR LIBRARY AND INFORMATION MANAGEMENT WITH SPECIAL REFERENCE TO INDIA

*Koha:* It is the first open source integrated library management system and is in use worldwide. Its development is steered by a growing community of libraries collaborating to achieve their library automation goals. Its important features meet the user needs including simple, clear interface for librarians and members, customizable search, circulation and borrower management, cataloguing module with integrated z39.50 client, web 2.0 full acquisitions system including budgets and pricing information, ability to cope with any number of branches, patrons, patron categories, item categories, currencies and other data, serials system for magazines or newspapers, reading lists for members, etc. its new features include a new user interface design, more advanced search functions, better multi branch capability, user tagging and many generic enhancements.

*New Gen Lib:* It is an integrated library management system, now freely available as an open source under the most widely used free software license, GNU General Public License (GNU GPL). Before becoming as open source product at the end of 2007, it was already in use in 122 libraries, mainly in India but also including installations in Syria,
Sudan, Cambodia, etc. Its important features include: completely web based, complies with international metadata and interoperability standards: MARC-21, MARC-XML, z39.50, SRU/W, OAI-PMH, uses chiefly open source components-scalable, manageable and efficient, OS independent-windows and Linux flavors available, z39.50 client for federated searching, internationalized application (118N)-Unicode 3.0 compliant, easily extensible to support other languages, data entry, storage, retrieval in any (Unicode 3.0) language, RFID integration, networking, automated email/instant messaging integrated into different functions of the software, from letters are configurable and use XML-based open office templates, extensive use of set up parameters enabling easy configuration of the software to suit specific needs.

**Greenstone:** It is a suite of software/ tool for creating, building, managing and distributing digital library collections. It provides a new way of organizing information and publishing it on the internet, means to easily create searchable and browsable interfaces of digital library collections via the web, etc. it is open source multilingual software, issued under terms of the GNU General Public License. It knows how to create collections form “standard” file formats such as HTML files, email messages, PDF documents, JPEG and GIF images, word documents as well as plain text files. If the set of files are well structured, then the software will creates things like A-Z list of resources and field searchable interfaces. It builds collections with effective full text searching and metadata-based browsing facilities that are attractive and easy to use.

**Dspace:** Dspace is one of the first OSS platforms to store, manage and distribute the collections in digital format. Dspace is the choicest software for academic, non-profit and commercial organizations, building open digital repositories. Dspace preserves and enables easy and open access to all types of digital contents including text, images, moving images, MPEGs, data sets, etc. and with an ever-growing community of developers, committed to continuously expanding and improving the software. Each new Dspace installation benefits from the previous. It is a ground breaking digital repository system that captures, stores, indexes, and preserves and distributes digital research materials. As much of the world’s contents are now being developed and disseminated in digital format, the software supports next generation digital archiving which is more permanent sharable then current analog archives.

**Fedora:** The Fedora is based on the Flexible Extensible Digital Objects and Repository Architecture (FEDORA). It can be used to develop institutional repositories and other interoperable web-based digital libraries and the system implements the Fedora architecture, adding utilities that facilities repository management. It has been developed by the University of Virginia and Cornell University.

**Eprints:** The Eprints software has the largest and most broadly distributed installed base of any of the repository software systems described here. It is generic achieving software
developed under university of Southampton. It is intended to create a highly configurable web-based archive and is a platform for building repositories of research literature, scientific data, student theses, project reports, multimedia artefacts, teaching materials, scholarly collections, digitized records, images, audio, exhibitions and performances, anything that can be stored digitally, and offers integrating advance search, extended metadata and other features such as archive documents, multimedia and data.

**Ganesha:** Ganesha Digital Library (GDL) enables institutions or persons to share their knowledge as well as simultaneously access and utilize knowledge. GDL is a tool for managing and distributing digital collection using web-based technology. GDL utilize Indonesia DLN metadata standard that is based on Dublin Core metadata standard. It opens possibilities of information exchange with other systems on the internet that also utilize Dublin core. Data transaction between client and server within GDL network using XML format is allowed. It makes possible for further development of GDL to become more extensive web-based networking application in the future.

**CERN:** CERN document server software (CDSWare) is an integrated digital library management system which provides the frame work and tools for building and managing an autonomous digital library server. It covers all aspect of digital library management and complies with the open Initiative Metadata Harvesting protocol (OAI-PMH) and uses MARC-21. Its flexibility and performance make it a compressive solution for the management of document repositories of moderate to large size libraries.

**CDS/ISIS for WINDOWS:** This is the most widely used software for Indian libraries available freely from the UNESCO website. It has all the features of a complete integrated Library Management Software and the support for this software is available locally as well as a number of professionals are trained in its use. It also has a very strong base for international discussion forum. Truly speaking, most of the libraries in India started computerizing their cataloguing activities with this software only and later on shifted to other commercially available softwares and OSS.

**CONCLUSION**

The open source software is playing a vital role in library automation. Digitization softwares such as KOHA integrated system software and NewGenlib are being used by most of the Indian and Western libraries free of cost as advanced modules and user friendly, multilingual effective futures available. Softwares like Greenstone, Dspace, Eprints, Fedora, Ganesha are also playing a key role in the field of library and information science. Academic, public, special and R & D libraries are using these softwares for their institutions. The open source software and open access both are key factors in the information society.
REFERENCES

1. www.koha.org
2. www.greenstone.org
3. http://gdl.itb.ac.id/
OPEN SOURCE SOFTWARE: A COMPARATIVE STUDY

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ABSTRACT

Open source digital library packages are gaining popularity nowadays. To build a digital library under economical conditions open source software is preferable. Many open source software packages are available for organizations and individuals to create digital libraries (DLs). However, a simple to use instrument to evaluate these DL software packages does not exist. This paper tries to make out the comparison, features, functions and usability of open source software like Dspace, Greenstone Digital Library and EPrints.

Keywords: Digital Library, Open Source Software, Dspace, Greenstone (GSDL), EPrints.

INTRODUCTION

Digital libraries (DLs) facilitate creation, organization and management of multimedia digital content and provide search, retrieval and other information services over computer networks and other electronic media. Developments in DL technologies have changed the way people access and interact with information, and have also extended the concept of libraries far beyond physical boundaries. Digital library systems have the potential to empower users, not just librarians, to conceive, assemble, build and disseminate new information collections (Bainbridge et al., 2003). Therefore, one of the key functionalities of a digital library should be the matching of user work patterns. To achieve this, a thorough understanding of the users of libraries and the system itself should be obtained. Apart from the need for deeper understanding of users, the relation between the tools used to establish the DL and the necessary requirements has to be ascertained.
DIGITAL LIBRARY
Digital libraries enable the creation, organization, maintenance, management, access, sharing and preservation of digital document collections. Digital libraries are being created today for diverse communities and in different fields: such as education, science, culture, development, health, governance and so on. It may be also to accumulate locally produced collections of information or to build a repository of the scholarship of an organization. Digital libraries may differ from organization to organization that implements them. It may be dissemination of information, preservation and propagation of indigenous culture like virtual museums.

OPEN SOURCE SOFTWARE
Although Open Source software has existed since the 1960’s (Weber, 2004), only in the last few years it has got much attention. In 1983 the Free Software Foundation was founded by Richard Stallman (Hars and Ou, 2002) and the term ‘Open Source’ was introduced in 1998 (Raymond, 1998). Since then more and more companies have taken great interest in Open Source software. Recently Novell acquired Suse Linux, one of the distributions of the Linux operating systems, taking their embrace of Open Source a step further (Novell, 2003), and with this it also expanded the enterprise market for Linux. Linux and Open Source are often linked in Open Source literature, and it may seem that Linux and its added software is all there in the Open Source market. However, Open Source software is much more than Linux and Linux-compatible software (O’Reilly, 1999). Many more examples of Open Source software exist, such as the Apache web server, with a market share of almost 70% (Netcraft, 2005), the web language PHP, the database server MySQL, the office suite OpenOffice.org and a very large number of web applications (Wheeler, 2004). The instructions that make up the ‘recipe’ for a software package are called as “source code” in the case of Open Source software, this source code is freely available (Weber, 2004). The term Open Source is defined by the Open Source Initiative (OSI) in the Open Source Definition (OSI, 2002) It can be summarized as: · the software must be freely distributable
- The source code must be included in the distribution or there is a wellpublicized method of obtaining the source code
- Derived works and modifications are allowed
- The license must not be specific to a product, not restrict other software and be technology-neutral

Open Source software development
Open Source software offers the source code along with the software, at no charge. This enables the user to change the instructions of the software, changing its behaviour, adding functionality, and so on. It gives anyone the opportunity to participate in the development of the software project (Wheeler, 2005). Open Source projects are, in most cases, run on
the Internet. (Weber, 2004). Open Source projects’ websites carry much information: discussions, documentation, bug databases, and so on. This information is very valuable for the evaluation of Open Source software. Most Open Source projects encourage users to participate in the project in any way they can, from filing bug reports to the development of the source code. When the user wants something changed or added to the software, he is at liberty to do it himself, but by working together with the project community and contribute the changes in source code back to the project, the code will be a part of the software for everyone, which will keep it maintained and avoid problems when upgrading the software. If the user keeps the code to him, he will have to find a way to integrate any updates to the software with his changes (Glass, 2003). Open Source software developers work together voluntarily to create and improve a product they want to use. They also get a certain satisfaction from being part of the project.

DIGITAL LIBRARY SOFTWARE PACKAGES

For the construction and administration of a digital library one needs digital library software. Many commercial digital library software packages are available today. But they are too costly to be afforded by average libraries. These proprietary software packages also require high installation costs followed by recurring annual maintenance costs (AMC) and/or updating costs. A remedy for this situation is the adoption of open source software for digital library purposes. With the recent availability of several open source digital library software packages, the creation and sharing of information through digital library collections has now become an attractive and feasible proposition for library and information professionals around the world. To build a digital library under economical conditions open source software is preferable. An attempt has been made here to discuss and compare three major open source digital library software, namely, Dspace, Greenstone and EPrints.

DSPACE

MIT (Massachusetts Institute of Technology) and HP (Hewlett-Packard) have created Dspace software as digital repository to manage intellectual output of multidisciplinary Research and Development organizations. Dspace supports digital preservations, planning and managing institutional repository in a large institution. Dspace allows workflow and customization. It supports community/collection based content and submission by different user community (http://www.Dspace.org).

GREENSTONE

This software is for building and distributing digital library collection. New Zealand Digital Library Project at the University of Waikato has developed and distributed this in cooperation with UNESCO and the Human Info NGO. This open source software can handle multilingual documents, with search and browse facility under GNU General Public License (http://www.greenstone.org).
E-PRINTS
Is the largest and widely distributed and installed digital library software developed by University of Southampton, with minimum technical expertise. The software can be installed by any institution world over. By its integrated advanced search, extended metadata and other features, the software can be customized to local requirements (http://www.eprints.org).

PARAMETERS FOR COMPARISON
The criteria for the Open Source software evaluation model were established using Open Source literature on the subject of evaluation of software. Because scientific literature is still somewhat scarce on the subject, authors had to make intensive web searches to find the required resources helpful for making a meaningful comparison. The web searches were done to find the most prominent articles on Open Source maturity models, Open Source success factors and Open Source software evaluation. Two Open Source maturity models were found, as well as three articles giving advice on selecting Open Source software and one research article that investigated Open Source success factors. In order to identify the criterion that gives a good general idea of the Open Source software that needs to be evaluated, all criteria were listed and the terms covering the same areas were grouped together. These nine criteria are applicable to almost any type of Open Source software and give a good general indication of the software.

<table>
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<tr>
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<th>GSDL</th>
<th>EPrints</th>
</tr>
</thead>
<tbody>
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<td>Apache/IIS</td>
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</table>

Table Contd…
FINDINGS

This comparison of three major open source software based on certain parameters mentioned above has resulted into the following findings.

- **Dspace** is the most popular among the digital library solutions available in the open source domain and Dspace is functionally richer and supports a wide range of object types, including text, sound, images and video. It provides detailed implementation guidelines.

- **GSDL and EPrints** are also widely used and is a low cost option for a repository primarily aimed at open access to article pre-prints and post-prints, including digital theses. A range of object types can be uploaded, including video, audio, images and zip files. Educational institutions dominate in the use of these packages.

- Institutions for which E-Prints is not quite suitable may find Dspace and Greenstone more closely meets their needs, without being unnecessarily complex.

- India is benefiting well from the open source movement.

- **Dspace** supports community based content policies and submission process and accommodates various kinds of digital document formats.

- **E-Prints** is a useful Digital Library system with large user community. But when there is a need for technical support and training in using the software, Dspace was found suitable.

- Though many libraries are using Greenstone and E-Prints but the majority of the libraries prefer Dspace as it has got several advantages and can support numerous forms and formats. It was also noted that by using Dspace, there is a possibility of interacting with other libraries in the city for technical support. Moreover it is open source software and can be customized as per the institutional requirement.

CONCLUSION

The Open Archives Initiative has gained momentum since last few years. Open source software incorporates an interface that makes it easy for people to create their own library collections. From the results of the comparison/evaluation, it is observed that current open source DL software still lacks certain functionalities perceived to be important, as
gathered from the literature. However, among the three, Dspace and Greenstone were able to fulfill most of all the vital indicators because of its strong support for end-user functionality. E-Prints was yet another strong contender, which has the capacity to get better when it adds a usage monitoring and reporting feature in the next release.

E-Prints did not fare well in the evaluation because it lacked strong support in certain areas, especially in the search category. However, it must be noted that each software package has individual strengths and weaknesses that will appeal to different organizations and stakeholders with different needs. But when there is a need for technical support and training in using the software, Dspace was found suitable with numerous discussion groups to its credit. Though considerable number of libraries is using Greenstone and E-Prints, the majority still continues using Dspace for obvious benefits discussed above.

REFERENCES
# OPEN SOURCE SOFTWARE AND BUILDING DIGITAL LIBRARY

<table>
<thead>
<tr>
<th>Ramnivas Sharma</th>
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<th>Nidhi S.Tiwari</th>
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<tr>
<td>Assistant Librarian</td>
<td>Librarian</td>
<td>Head</td>
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<td>Department of Library and Information Science, Rajiv Academy for Technology &amp; Management, Mathura (U.P.)</td>
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<td>Krishi Vishwa Vidyalaya, Gwalior (M.P.)</td>
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## INTRODUCTION

Now-a-days Information Technology (IT) has become an indispensable concern of developing countries like India. One of the vital components of IT is software. Presently the developing countries are fully confronted by the copyright and illegal copying of software, which widely affect on the prospect of very high and recurrent software cost. Commercial software companies distribute their software in compiled form. Once software has been compiled into a computer readable form, it is practically impossible to understand the internal functioning of the software, and it cannot be modified. By doing so, the software companies gain monopoly on improving their software by adding features or fixing bugs and this is how the software becomes expensive. By following this practice the software companies have gained a monopolistic market this has given rise to an unhealthy dependence on proprietary software, huge expenditure on licensing fee, growth of gray market in pirated software, troublesome environment in local software industries and most importantly discouraged innovation in the software industry at global level. In this background a development, which is attracting the interest, is the freedom of research and development offered by Open Source Software (OSS). In OSS the source code (human readable set of instructions, which makes a software) is distributed along with the executable form (the computer readable set of instruction, which makes a software, also known as compiled form of a computer software).

In an article by D. Chudnov the founder of the Open Source Systems for Libraries project, three pilot library related open source software projects were mentioned. The first component is a traditional service such as acquisitions (i.e., ordering, receiving of materials), cataloging (i.e., classifying and indexing of materials), circulation (i.e., lending and receiving of materials) and serials management (i.e., managing magazine and newspaper information. The second component is an interlibrary loan management system. The last component is a system to manage electronic materials and digital media. In addition to these three main components, a library management system software package must contain a commonly shared components such as a user account management feature, a security component, an alert system feature, an accounting system for billing and producing statistical reports or other administrative decision support
Thus, the overview picture of the four main components of a library management system software package is presented in Figure.

<table>
<thead>
<tr>
<th>Interlibrary Loan (ILL)</th>
<th>E-document management</th>
<th>Traditional Services</th>
</tr>
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</table>

Common support components

- User account management
- Security
- Accounting system
- Alert system

OPEN SOURCE SOFTWARE (OSS)

Open source generally refers to a program where source code is available to the general public for their use and/or modification from its original design without paying any charge for that. Open source code is typically created as a collaborative effort in which programmers improve upon the code and share the changes within the community. Open source software (OSS) helps programmers on the Internet to read, redistribute and modify the source code, forcing an expedient evolution of the product. The process of eliminating bugs and improving the software happens at a much quicker rate than the traditional development process of commercial software as the information is shared throughout the open source community. Uses of OSS in various applications have increased at a very high rate. The application field of library and information science has no exception of it.

Open Source Library Software Currently available Open Source library-related applications, which include not only integrated library management systems but also a range of innovative functionality, such as:

- DSpace - A digital library system to capture, store, index, preserve, and redistribute the intellectual output of a university’s research faculty in digital formats.
- MOSST - Modular Online Software for Self-paced Tutorials, to create web-based tutorials.
- OSCR - Open Source Course Reserve, to manage electronic course reserve material, either in PDF or URLs.
- RAKIM - A web-based real-time virtual reference environment.
- Greenstone – Provides facilities of browser-based access, full-text and field-specific searching, use of Dublin Core and other metadata schema, advanced data compression techniques that lower response times when searching large collections, a customizable interface based on a configuration file, multilingual interface,
extensive use of plug-ins to convert documents in different formats such as MS Word, PDF, HTML, or email, administrative features that support access control and user activity logs etc.

- **FEDORA**—A software used for general-purpose repository system, gives organizations a flexible service oriented architecture for managing and developing their digital content. Some of the other popular library Open Source Software has already been identified as: a) Koha, b) MyLibrary, c) Avanti, d) Eprints, etc.

### DIGITAL LIBRARIES

In the present day context due to the wide use of information technology and digital/electronic storage media, it becomes a challenge to the library professionals how to acquire, organize, store and retrieve various information available in digital form. This has initiated the concept of creation of ‘digital library’. Digital library has a number of machine readable study materials as well as other publications such as text, images, sound, videos, and any combination of text, images, sound, videos etc. in digital form and facilitates remote access to several databases. The basic concept behind a digital library is to exploit the facilities of information technology with a mission of sharing resources available globally for providing nascent information to the users’ community at right time. Hence, a typical digital library has a media server connected to high speed networks, and we also call it ‘Virtual Library’. Unlike a conventional library where users are provided with physical materials from many sources, a digital library is a group of attributed repositories that users see as single repository in a digital form. The functioning of a digital library is controlled by machines with minimum human interventions.

### TRADITIONAL SERVICES

Traditional library management system services are circulation, cataloging, OPAC, acquisitions and serials management. According to the results, only Koha, PMB and NewGenLib provide a strong support for all traditional services. On the other hand, Invenio, Dspace, Greenstone, iVia and Eprints are lack of such supports because they are mainly designed for managing digital contents.

### ELECTRONIC DOCUMENT MANAGEMENT

‘Fully support’ is selected when the software package can fully manage electronic document such as searching, retrieving and delivering the document. ‘Partially support’ is selected when the software package can somehow be developed to support an electronic document in its collection. Or, the software package is currently supporting a collection of some electronic document types. Otherwise, the software package will be listed as ‘Not support’. The list of software packages includes DSPACE, GREENSTONE, EPRINTS and FEDORA.
INTERLIBRARY LOAN MANAGEMENT
Since Z39.50 protocol can make several interlibrary loan services, importing/exporting records, saving results or periodic queries possible Machine-Readable Cataloging (MARC) is a standard for bibliographic descriptions which allows libraries to exchange or share their information. Therefore, the ability to support MARC and Z39.50 is a good indication of the ability to support interlibrary loan management systems.

COMMON AND ADDITIONAL SERVICES
Common library management system services focused in this section include user/patron management, security, statistical report generation and barcode management support. While additional services include remote access capability, alert system, RFID support, multiple language support and onetime on-budget cost for support. Dspace is focusing on managing digital repository supported variety of digital documents such as articles, books, theses, multimedia files and bibliographic. It supports multiple languages. Greenstone provides documentation in several languages such as Kazakh, Vietnamese, Arabic, Spanish, French, Russian and English. It supports multimedia and multilingual documents. iVia is a virtual library software developed at University of California at Riverside. It has ability to run on a single machine scale or a distributed machine scale by distributing its components and using a shared database.

ENVIRONMENT, DEVELOPMENTS AND SUPPORTS
'OS independent' means that the software can be operated on Windows, Mac OS and Unix-like operating systems. Having a supporting documentation and an active community are the top two important factors when one selects an open source software package.

CONCLUSION
In this paper, several open source software packages related to library management systems are reviewed. The review is focusing on four main components in a library management system including traditional services, electronic document management, interlibrary loan support and common services such as user management, security and statistical report generation ability. In addition to these four main components, features such as RFID support, alert system, multiple language support and remote access capability are also mentioned. To organize the technical compatibility of each software package, the supported environment, programming language requirement, basic requirement, active software support forums or companies and the availability of online documents are also reviewed. The Open Archives Initiative (OAI) has gained momentum since eprints.org was released in 2000. OSS incorporates an interface that makes it easy for people to create their own library collections. Collections may be built and served locally from the user’s own web server, or remotely on a shared digital library host. End
users can easily build new collections styled after existing ones from material on the web or from their local files (or both), and collections can be updated and new ones brought on-line at any time. OSS has much potential for libraries and information centers, and there are a number of projects, including Greenstone, DSpace, and Ganesha that demonstrate its viability in this context. It gives library staff an option to be actively involved in development projects, and this involvement can take many forms, such as reporting bugs, suggesting enhancements, and testing new versions. Currently available OSS projects cover application areas ranging from the traditional library management systems to innovations like Greenstone and DSpace, which complement traditional systems. Benefits include lower costs, greater accessibility, and better prospects for long-term preservation of scholarly works.

REFERENCES
EVALUATION OF OPEN SOURCE SOFTWARE/
FREE SOURCE SOFTWARE IN THE INDIAN CONCERN:
AN OVERVIEW

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ABSTRACT
With the emerging of the Internet and its WWW, the trend towards use of Information technology in the libraries has seen tremendous growth. The reducing costs of computer hardware also has paved the way for integration of computers in libraries; however, because of the heavy dependence on proprietary/commercially available high cost software and their licensing, many educational institutions in developing countries are not in a position to harness the potentials of Information Technology. This paper discusses the alternatives to high price software for academic library purpose and makes a case for using Open Source Software in library.

Keywords: Open Source Software, Free Open Source Software

INTRODUCTION
Programmer writes software code using programming languages. The source codes are compiled and saved in an executable file, which cannot be” read” by human eye who has no access to the source code. Most of the softwares that we purchase in the market are available in the binary form, and it is a very effective way for proprietary software producers to control their intellectual property and sell the software products under different license conditions. On the other hand, Open Source is “an approach to software development and intellectual property in which program code is available to all participants and can be modified by any of them”(Warger, 2002). We can say that “Open Source Software is Software which can be used, modified and improved by anyone and can be redistributed freely”. When we refer to open source software as “Free” software we do not mean the free trials or free cut-down versions of proprietary software you may be familiar with, nor software which is supplied free of charge (known as “Free Ware”)- although in practice most open source software is free in this sense as well.
BRIEF HISTORY

Open Source Software (OSS) and Free Software (FS) programs have existed since digital computers were invented, but beginning from the 1980s, people began to try capturing the concept in words.

DEFINITIONS

The two main definitions used are the “Free Software Definition” (For Free Software) and the “Open Source definitions” (for open Source software) The open Source movement has long history, but it received a major boost with the establishment of the Free Software Foundation (FSF) (http://www.gnu.org/) in 1985 by Richard M. Stallman. Here is the key text of the definition:-

“Free Software “is a matter of liberty, not price. To understand the concept, you should think of “Free” as in “Free speech”, not as in “free Beer”. Free software is a matter of the user’s freedom to run, copy, distributes, study, change, and improves the software. More precisely, it refer to following kinds of freedoms for the users of the software;-  

1. The freedom to run the programs for any purpose.  
2. The freedom to study how the programs works, and adapt it to your needs. Access to the source code is a precondition for this.  
3. The freedom to redistribute copies so you can help your neighbour.  
4. The freedom to improve the program, and replace your improvements to the public.
So that the whole community benefits. Access to the source code is a precondition for this.

Open sources don’t just mean access to the source code. The distribution terms of open source software must comply with the following criteria;-  

- Distribution of license.  
- No discrimination against field or endeavor.  
- No discrimination against persons or groups.  
- Derived works  
- Source code  
- Free redistribution  
- License must not be specific to a product.  
- The license must not restrict of the software.  
- No provision of the license may be predicated on any individual’s’ technology or style of interface.
EVALUATION OF OPEN SOURCE SOFTWARE
As open source gains prominence and new programs are released, it becomes necessary to evaluate them before they are used in any educational institution.

Wheeler (2003) recommends four steps approach to evaluate Open Source Programs. The steps are:

1. Identify the query
2. Read existing review.
3. Briefly compare the attributes of the learning programs vis-à-vis your needs.
4. Prepare an-depth in analysis of the top query.

Therefore, to identify suitable software, one of the best ways is to consult co-librarians and friends who have experience is using the Open Source. However, use of a search engine like Google (http://www.google.com) is very effective in finding the Open Source Software.

Before use the Open Source Software some of the following criteria should be checked.

1. Availability of support
2. Market share
3. Performance
4. Scalability
5. Usability
6. Security
7. Flexibility
8. License issued
9. Maintenance requirements
10. Reliability of the program

After comparison, an in-depth analysis is done for the top software with reference to software security and adding new functionality as per requirements in future.

The process of software evaluation is a specialized task. Therefore, it should be done by software testing experts only.

OPEN SOURCE SOFTWARE vs FREE SOFTWARE
There have definitely been benefits to this approach: the open source camp attracted many new users to come and try free software such as GNU/LINUX, open office, and fire
The program is that many of these new users never realize that it was someone refusing to give RMS a copy of a printer’s source code-failing to share as was the norm in the programming world at the time – that started this whole community; with Microsoft’s new DRM riddled operating system just around the corner and various media groups attempting to restrict our right to use, enjoy and share content a belief that sort of attitude is basically a good thing is more important then ever.

Free software is the other extreme; while providing us with the legal and moral basis to help us keep developing, enjoying and sharing brilliant software applications, I believe it’s also quite likely that it has put off its fair share of users. Free software, just like open source software, has weakened our ability to share our outlook with others-both now and in the future-by reducing the number of people who are going to really listen to us!

**OPEN SOURCE AVAILABLE**

Although the OSI definition of ‘Open Source Software’s widely accepted, a small number of people and organizations use the term to order to software where the source is available for viewing, but which may not legally be modified or redistributed. Such software is more often referred to as source –available, or as shared source term coined by Microsoft.

**PROBLEMS IN ADOPTION OF FREE SOFTWARE / OPEN SOURCE SOFTWARE**

Adoption of new technologies can often be easier when older technologies are not present, removing the need to account for sunk costs in old systems, retrain and ‘Unlearn” skills applicable to old systems, and so on. Adoption of free software in developing countries should not pose many practical problems that are not faced in any case in the adoption of Information Technology per se – hardware, training basic infrastructure such as electricity and telecoms.

**OVERALL OPEN SOURCE SOFTWARE: AN INDIAN EXPERIENCE**

As Indian consumers and enterprises evaluated the option of upgrading to Microsoft’s much-touted operating system (OS) Windows-7, officially launched on October 22, 2010, the free and open source software (FOSS) community have fired yet another solve at proprietary software in the year 2010. If FOSS is adopted at 50% levels across the economy, India can save around $2 billion (around Rs.9800 Corer), this was suggested a study conducted by the Indian Institute of Management Bangalore. Even a very conservative estimate, notes the study, pegs the cost saving for use of FOSS on servers as an operating system or as an application at Rs.138 cores in 2010.
CONCLUSION
Finally, the debate, conclude analysis, appears to be a proxy for product competition in the market place. It would be wrong to imply that open source is set to replace proprietary vendors, but today the issue is more whether open source can provide a viable alternative.

REFERENCES
5. http://portfolio.umain.edu/hort/05%in%2nd (accesses on 2011/10/8)
INTRODUCTION
The influence of ICT in developing countries makes more demand for web based and up-to-date information. Application of ICT and web hosting in academic and library environment has increased gradually in the recent decades. In addition to traditional services, now library users are expecting and demanding more ICT based services such as Online Databases, Web-OPACs, Web Browsing and so on. Enormous money is invested in computing equipments, servers, networks, broadband connection and so on. On the other hand the security aspect of those is seldom considered as significant. Library products and services are consumed by multiple users and their need also varies from person to person. Hence libraries need to have information security policies, protection measures and trained staff in place in order to safeguard the investments in computer and computer-related technologies, personnel and services.

OVERVIEW OF INFORMATION SECURITY
The term “information security” means protecting information and information systems from unauthorized access, use, disclosure, disruption, modification, or destruction in order to provide

![Components of Information Security](image)

Fig. 1.1 Components of Information Security

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Confidentiality - ensuring that information is accessible only to those authorized to have access;

Integrity - safeguarding the accuracy and completeness of information and processing methods;

Availability - ensuring that authorized users have access to information and associated assets when required.

Information security is not simply computer security. Whereas computer security relates to securing computing systems against unwanted access and use, information security also includes issues such as information management, information privacy and data integrity. Information security in a library would include personnel security and policies, steps taken for effective backups, and the physical integrity of computing facilities.

NEED FOR SECURING INFORMATION

There are many reasons why the information needs to be protected in the computer[2], the following are some of the important needs:

- Ensuring that the information remains confidential and only those who should access that information can get the privilege
- Knowing that no one has been able to change the information, so that it can be relied on (information integrity)
- Making sure that the information is available when it is required (by making back-up copies and, if appropriate, storing the back-up copies off-site)

TYPES OF DATA

In general, data is any information used electronically. So it can be:

- Stored – Disk, Thumb drive, CD, DVD, Mobile, PC, Tape
- Shared – Social Networking and other online media
- Transferred
- Printed
- Copied
- Emailed
- Faxed

SECURITY MEASURES

In order to safeguard different type of data, the library and information professionals have to take different kinds of security measures, such as physical security, desktop security,
printer security and so on. To safeguard information from breaches ranging from user error to enterprise wide threats, natural disasters, hackers, sabotage, theft, invasion of privacy, and viruses the following are some of the important guidelines to avoid everyday information security related issues.

**Physical Security - General Library / Office Access**

- All the users should enter the library only by producing ID card or Membership card
- Users should not use another person's ID card
- Visitors should not be allowed inside without proper security authorisation
- All the users should access the computers or terminals by using respective user ID and Password only
- If there is an “emergency” or “loss” event, there should be a tracking mechanism to find out who used that terminal at the time of the event
- The staff or co-workers should be aware that, they should challenge any unknown person found in the sensitive area

**Desktop Security – Office**

Due to the advent of ICT, computing environment offers access to powerful applications and downloads, which can introduce new security challenges for the library and its parent organization. Hence adhering to information security guidelines will help the librarians and information professionals to safeguard libraries’ computer equipment. The following are some of the important guidelines related to desktop security.

- Keep the computer patches up to date.
- Install anti-virus and anti-spyware software and keep it up to date
- Comply with software license agreements when using copyright- software
- Avoid unnecessary downloads from the Internet
- Refrain from installing or downloading software from external sources, to avoid virus infection.
- Always scan the portable storage devices before use
- Remove all services from the computer which is not required.
- Ensure that any desktop, peripheral, User-id, password, key lock device or any other device issued for accessing company resources remains confidential and under control
- Access only authorized information
- Use only authorized connections to organization networks and computers.
- Collect print outs from the printer immediately
• Use paper shredder to destroy unwanted print outs
• Back up computer EVERY DAY.

Clear Desk & Clear Screen
The following are some of the important guidelines related to working desk and PC
screen security.
• Ensure the desks are clean when the day is over
• Protect the system with password protected screen saver with wait time
• Lock the system when not in use
• Switch off the systems when the day is over
• Do not leave any confidential material on the desks
• Use Paper Shredder to destroy confidential documents

Printing Security
• Overwrite the hard disk at the end of life
• Print from memory
• Secure print, with passwords, cards, biometrics etc.
• Time out the user
• Turn off the reprint command
• Time out on secure print jobs
• Secure mailbox print
• Use tracking and activity logs
• Have virus protection

USB Devices security
The following are some of the important safety measures to avoid removable media
malware.
• Disable auto run
• Implement restrictive removable media policy
• Check all removable media on a secure system before use
• Choose to ban all removable media
• In case of official usage, connecting to these devices should need password,
biometric authentication
• Also, it is a good practice to do periodical “malware” scan
Email
The influence of ICT made email as ultimate mode of communication among computer literates, hence email related information security became need of hour. The following are the guidelines related to emails

- Avoid opening mails sent by unknown person, because it could be a Spam
- Do not click on links in the suspicious emails
- Use official mail ID for official or confidential purpose. Avoid official mail ID for personal usage
- Do not send confidential documents in emails, if unavoidable send it with password protection
- Send the password in a separate mail or hardcopy or secret code known to the receiver only
- Never reply to spam mails

Password Security
Since the respective individual is responsible for all activities performed using the user ID and password, they should aware of the following password guidelines.

- Passwords should be at least nine characters long and a combination of special characters, numerals, uppercase & lowercase letters
- Use strong passwords for all the accounts
- Choose passwords intelligently so that it cannot be easily guessed
- Even in the case of a valid business reason, do not share the passwords with anyone
- Do not write down the passwords
- Change the password regularly
- Change the passwords immediately if there is a suspicion that, the password is known to someone

Online Transaction
Now online transaction is common among people with ICT facility, to buy books reserve tickets and so on. However, it requires some knowledge and experience to do online transaction and inexperienced people may end up in monetary loss. Hence it is very essential to understand the risk involved in the online transaction. The following are some of the basic guidelines related online transaction security.

- Avoid online transactions using credit or debit card, especially in unknown web sites
- In case if there need to use, understand how to use it securely
- Change your password frequently and keep it strong
• Never reveal the CVV (Card Verification Value) to strangers and remove it from credit or debit card
• Utilize the 3D secure method verification in the credit card, if available.
• Utilize the grid method verification in the credit card, if available
• Analyse your statement regularly and report immediately if there is any mismatch

Online Media Security
In social networking media such as Facebook, Twitter, YouTube, Google, the need for security or privacy is very important. The following are some of the important personal information that should not be shared or posted in the social networks as some of these information is used in call centers of banks, credit cards, insurance and so on to unlock or reset the password, know your bank balance and other financial details.
• Your birth date and place
• Your mother’s maiden name
• Your home address
• Your long trips away from home
• Your short trips away from home
• Your inappropriate photos
• Confessionals
• Your phone number
• Your vacation countdown
• Your child’s name
• Your ‘risky’ behavior
• The layout of your home
• Your profile on public search

Others
The following are some of the other guidelines to avoid unnecessary information security related issues.
• Do not give out personal information on the phone, through the mail, or over the Internet unless it is necessary
• Never leave sensitive hardcopy material exposed; make a habit of turning documents facedown, and put unnecessary documents away
• Keep the personal information in a secure place at home, office etc.
• Ensure the environment is physically secure.
It is also important to keep the PC at home and its data securely, since many have the habit doing office work at home and vice versa. Sometimes it is unavoidable to copy the work from home PC in the external devices and connect it in the office or vice versa. Hence, it is mandatory to have the PC at home without any worms and other information security related issues. The following are some of the important guidelines related to Home PC.

- Home PC also should have ID and password for individual family members
- Keep all the important data separately
- Do back up for all the important data, using DVD, external hard disc and so on
- Do regular checkup for operating system software updates and patches
- Keep up-to-date Anti-Virus; Anti-Malware; Anti-Spyware; Anti-Spam etc
- Do not install pirated software, application, tools etc
- Avoid downloading software, movies and games from Internet

**AWARE OF DIFFERENT TYPE OF SOCIAL ENGINEERING**

In addition to the above, awareness about the below social engineering information security will help the individuals to safe guard the information. Social engineering is the name given to a category of security attacks in which someone manipulates others into revealing information that can be used to steal, data, access to systems, access to cellular phones, money or even a person’s identity. Such attacks can be very simple or very complex. The following are some of social engineering methods.

<table>
<thead>
<tr>
<th>Psychological subversion</th>
<th>establishing a relationship with an insider to gain a continuing stream of information</th>
</tr>
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<tbody>
<tr>
<td>Masquerading</td>
<td>impersonating people with legitimate access or a need to know to gain access and/or information</td>
</tr>
<tr>
<td>Shoulder surfing</td>
<td>stealing information by watching a legitimate user type in a password</td>
</tr>
<tr>
<td>Tail gating</td>
<td>entering secure locations by following behind someone with legitimate access</td>
</tr>
<tr>
<td>Dumpster diving</td>
<td>Finding information from discarded media/paper</td>
</tr>
</tbody>
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**CONCLUSION**

An information system should have good physical security, to prevent unauthorised access by either casual or planned attempt. Also need protection by which the system will not be vulnerable to attack from outside, loss of data, theft and other unwanted information security related issues. On the other hand, data backup and backup policies are also mandatory for any data collection system, and it should be in place for all PCs, Servers, Database and related systems. In the case of online library services, the Internet is the greatest source of risk to information security. This is simply because there are
numerous potential intruders on the Internet, than within the library. Hence it becomes inevitable for the information professionals to get trained in the information security governance and develop security standards and policies with proper procedures and guidelines related to library.

In addition, both information professionals and the library users should aware that they have to promptly report any concerns about security exposures or possible violations to the security personnel or other designated personnel. It is also important to cooperate with authorised persons while conducting audits or investigations covered in the information security policy and comply with the guidelines. As the saying goes “Prevention is better than cure”.

Reference
2. Why You Need to Secure Your Information.
   http://irt.stanford.edu/security/information.html
3. Information Security: Key Points to ponder.
SECURITY CONTROLS IN DIGITAL ERA AT MAHATMA PHULE AGRICULTURAL UNIVERSITY LIBRARY: AN OVERVIEW

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ABSTRACT
Managerial security control, technical security control, and physical security control are three types of security controls. To have balanced security, all three security controls must be considered. Without balanced and ordered security controls, libraries may not be fully protected. This study investigates security studies for libraries and a library security status to recommend library security guidelines to secure physical and electronic library collection, patrons, and physical building.

Keywords: Library Security, Managerial Security Control, Physical Security Control, Technical Security Control, Security Guidelines for Library

INTRODUCTION
There are three types of security controls: managerial, technical, and physical security. Ten security domains belong to three security controls, respectively. Business continuity and disaster recovery planning, legal, regulations, investigations and compliance, and information security governance and risk management all belong to managerial security control (ISC2 2010). Security architecture and design, access control, application development security, cryptography, operations security, and telecommunications and network security all belong to technical security controls (ISC2 2010). Physical security is a type of physical security control (ISC2 2010). All of these security domains must be considered in the right order to have balanced security and to protect organizations, including libraries. However, research on security for libraries has focused heavily on
physical security controls. Even though current libraries provide huge amounts of digital resources, libraries mainly emphasize the physical security controls. Archivists and library staff have generally thought of security as the physical protection of records (Cox et al. 2009). This trend focuses on physical security controls such as security cameras, radio frequency ID (RFID), and others. Some libraries have adopted technical security control; however, the systems are not fully operated or managed due to lack of balanced security controls.

This article discusses studies related to library security and provides library security control guidelines for balanced security for twenty-first-century libraries.

LIBRARIES IN TRANSITION

In general, security is defined as “the quality or state of being secure—to be free from danger” (Whitman and Mattord 2004). Twenty years ago, information security mainly dealt with physical security, such as information on paper, lock and key, personnel screening, and auditing (Krisnamurthy, Clifton, and Bishop 2004). Information security today is concerned with the emergence of the Internet and distributed systems; the security of digital information to guard against financial losses; the reputation of an organization; and national defense. Today’s dangers include interruption, delay, denial of receipt or denial of service; interception or snooping; modification or alteration; fabrication, masquerade, or spoofing; and repudiation of origin (Krause and Tipton 1997). Since the first use of the term digital library in 1988 (Kahn and Cerf 1988), libraries have changed significantly. Many resources in libraries are now offered in electronic forms. Arcand (2000) mentioned that libraries hold information that is housed on external sites and that the information is no longer bound by restrictions that characterize physical material. Digital libraries have initiated various changes in traditional libraries (Rusch-Feja 2001). Current libraries serve as physical spaces; they have physical resources, electronic resources, and spaces wherein patrons interact with these resources. The value and the services of current libraries are very different from those of traditional libraries. Current libraries serve as community gathering places rather than as information repositories (Trapskin 2008). Surfing the Internet and playing games in the library are very common among patrons. Accessing electronic resources via the library is increasing more than ever (ALA 2010). The 2010 ALA report about US public libraries shows that close to half of all public libraries reported increased use of their electronic resources. Therefore, libraries should consider all three security controls to protect various resources and maximize library value and services.
REVIEW OF LITERATURE

Carey’s (2008) study addressed that library security is for protection of the building, its patrons, and its collections. However, most studies have focused on physical security that protects physical property such as buildings. Many studies point out the necessity of one or another security control in the library, but few studies recommend all three security controls. Bike lock programs and a sophisticated closed-circuit television (CCTV) system are examples of physical security in the library (Trapskin 2008). The technical aspects of CCTV and integrated Internet protocol (IP) camera surveillance systems are recommended for the library’s physical security (Westenkirchner 2008).

The Molnar and Wagner (2004) study addresses the issues of RFID. A library needs to protect its network resources because many resources in the library can be accessed electronically from on and off campus. The Kuzma (2010) study runs a Web vulnerability testing tool to investigate security vulnerabilities of 80 European library sites in four countries. This study shows that libraries have serious security flaws. Library staff have not implemented appropriate measures to secure their library resources. This study pointed out that the lack of security awareness and securing systems could lead to vulnerabilities in the patrons’ personal data and systems. The advent of digital libraries made library resources accessible anywhere and anytime. In digital library infrastructure, the data can be stolen or breached. A recent study (Cunsolo et al. 2009) deployed a data security module into grid file access library (GFAL) to protect data from unauthorized users. This study found that the data security module protected the file system structure and overcame the problem of file rewriting in GFAL systems. Many security incidents have happened at libraries. A possible unauthorized user from another country downloaded 50,000 journal articles via accessing JSTOR’s (Journal Storage) digital libraries (Cain 2003).

Managerial security is critical because we have to have policy in place for patrons and to educate students, staff, and faculty members. Without managerial security in place, many library systems adopt technical security systems but do not fully understand those (Cox et al. 2009). The Barstow (2010) study addresses the importance of managerial security before engaging technical security systems. Security in the library is different from other organizations. Library security design should consider the protection of the building, its patrons, and its collections (Carey 2008). In other words, it involves managerial, physical, and technical security. One of the managerial security controls are end-user security-related behaviours. This study addresses good user behaviour as one important approach in making information security effective within an organization. This study emphasizes that security training, awareness, and motivation cause users to create good passwords. There are few studies that consider all three security controls. Due to the lack of managerial security controls, technical security controls cannot be fully used (Barstow 2010).
BALANCE SECURITY IN MPA UNIVERSITY LIBRARY

An investigation of Mahatma Phule Agricultural University Library security was undertaken in the context of these three security controls. The researcher contacted persons who are in charge of MPKV libraries security. The library systems coordinator and the manager of library administration services provided the current status of various security controls for Mahatma Phule Agricultural University library. The following are questions and responses. MPKV library have security policies and procedures for library staff. Mahatma Phule Agricultural University Library tries to protect a great number of electronic resources. Mahatma Phule Agricultural University library said that they try to protect books, various multimedia, equipment, and online digital resources. They also protect our human resources, of course. Their server is located in another building for security protection. All daily activities are backed up on this server. The tapes are then placed in their vault, which is protected with a fire-retardant unit called the Halon system. Books that are checked out must be desensitized before they can leave the building. Mahatma Phule Agricultural University library have 3M (Minnesota Mining and Manufacturing) security gates that will alert staff if someone tries to leave the building without having checked items out. All items that are able to be checked out have security strips imbedded in them. Mahatma Phule Agricultural University library keep all their rare books in their vaults, which are climate-controlled. The entire basement of the building is on a pressurized sprinkler system in case of fire. The building is controlled by laser sensors for fire. It is also controlled after closing hours with laser sensors for movement and is monitored by the police department 24 hours a day. Mahatma Phule Agricultural University library have some physical security controls. Mahatma Phule Agricultural University library have 16 security cameras located on the inside of the building. These cameras are monitored not only by Mahatma Phule Agricultural University library but by the security office of the university. Mahatma Phule Agricultural University library use electromagnetic security strips for physical items. They have a cement and steel vault. They have security cameras and monitors, motion detectors, coded locks, and alarms throughout the building. They have a security officer in the building at times. The Mahatma Phule Agricultural University campus information technology services provides Mahatma Phule Agricultural University library’ firewall, anti-virus, and Microsoft Windows Active Directory LDAP authentication to their desktops and laptops. They use a proxy server authenticated to the campus Microsoft Windows Active Directory LDAP services for electronic resources. Library has an online training guide and includes the policies in them as well. They also emphasize these verbally in periodic meetings throughout the year. To avoid these ineffective security controls, a balanced library security guideline is proposed.
BALANCED LIBRARY SECURITY MODEL

To cope with various dangers, the National Security Telecommunications and Information Systems Security Committee (NSTISSC) security model has been used because it suggests a more detailed perspective on security. (See Figure 1; Krisnamurthy, Clifton, and Bishop 2004).

![NSTISSC security model](image)

**Fig. 1** NSTISSC security model.

The NSTISSC security model, as shown in Figure 1, illustrates three dimensions central to the discussion of information security. If we extend the relationship among the three dimensions represented by the axes, we end up with a $3 \times 3 \times 3$ cube with 27 cells. Each of these cells represents an area of intersection among these three dimensions that must be addressed to secure information systems. For example, when a user stores information, he or she refers to a policy about confidentiality for secured information storage. The NSTISSC model shows three goals of information security. These include (1) confidentiality, (2) integrity, and (3) availability.

First, confidentiality ensures that only those with sufficient privileges may access certain information. When unauthorized individuals or systems can access information, confidentiality is breached. To protect the confidentiality of information, a number of measures are used. These include information classification, secure document storage, application of general security policies, and education of information custodians and end users (Whitman and Mattord 2004).
Second, integrity is the quality or state of being whole, complete, and uncorrupted. The integrity of information is threatened when it is exposed to corruption, damage, destruction, or other disruptions of its authentic state. Corruption can occur while information is being compiled, stored, or transmitted (Whitman and Mattord 2004).

Third, availability is the characteristic of information that enables users to access information without interference or obstruction and in a required format. A user in this definition may be either a person or another computer system. Availability does not imply that the information is accessible to any user; rather, it means availability is given or granted only to authorized users (Whitman and Mattord 2004). To meet the three goals of information security in library, the library system considers all three security controls. The following three security control guidelines must be considered. For managerial security control, a security team must be formed, security policies and procedures must be in place, security architecture must be in place, and security awareness and training must be provided (Wilkinson and Lewis 2008).

A security team is composed of technical and non-technical members from different departments. These members represent relationship between tasks and security concerns. To know what to protect, risk assessment must be done in advance. Some studies (Caminada et al. 1998) address the value of risk assessment. Risk assessment allows organizations to determine the effectiveness of security measures. A security team makes and modifies security policies. Security architecture is like a blueprint. Without security architecture, a library cannot implement effective security systems. For technical security control, based on security policies, security architecture, and result of risk assessment, a system can be implemented. Training must be followed by implementation and maintenance. For physical security control, based on security policies, security architecture, and risk assessment, a system can be implemented. In summary, technical and physical security controls must be implemented based on security policies, security architecture, and result of risk assessment.

CONCLUSION
Libraries have changed in terms of services and resources. Many resources in libraries are offered in electronic forms. Current libraries consist of physical spaces, physical resources, and electronic resources, and they also assist patrons. However, research related to library security shows that most libraries mainly focus on physical security. Even though current libraries provide huge numbers of digital resources, the libraries mainly emphasize physical security controls. This study investigated research on library security and the security present in an academic library. Libraries provide physical, technical, and managerial services and resources. To protect these resources, physical,
technical, and managerial security controls are needed. To propose a balanced library security model, this study investigated previous studies related to library security and the status of security at an academic library. A balanced library security control guideline is presented. This security control guideline can be applied to libraries to protect patrons, physical resources, and electronic resources.

REFERENCES


INFORMATION LITERACY IN THE PRESENT : ERA

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INTRODUCTION
Information is nothing but knowledge. The knowledge acquired in any manner like study, experience or instruction. Information therefore, refers to, acquired knowledge that is received, understood and stored. The ability to read and write is Literacy. But the ability to find, to use and to communicate information is Information Literacy.

In simple words, information literacy is about people’s ability to operate effectively in an information society. It includes awareness of professional ethics, critical thinking, the need for evaluation and organizing of information to the effective use of the same. The concept of Information Literacy was introduced in 1974 by Paul Zurkowski, President of Information Industry Association. He said, “Information literates were the people trained in the application of information resources”.

Information literacy is a complex phenomenon that is much more than acquiring the skills needed for using computers and the Internet. It goes beyond the abilities of finding information and requires communication skills.

DEFINITION
Information Literacy can be defined in relation to the active process of finding and using information in relation to need or purpose. According to American Library Association (1989) ‘to be information literate, a person needs to be able to recognize when information is needed and have the ability to locate, evaluate and use effectively the needed information’. (Andretta: pp15)

Information literacy, therefore, is a means of personal empowerment. It allows people to verify or refute expert opinion and to become independent seekers of truth. It provides them with the ability to build their own arguments and to experience the excitement of the search of knowledge (Andretta: pp. 67)

Many attempts have been made to define and characterize information literacy. According to Doyle (1994), the attributes of an information literate person are:

- Recognize the need for information.
- Recognizing that accurate and complete information is the basis for intelligent decision making
• Identify potential sources of information
• Develop successful search strategies
• Access sources of information, including computer-based and other technologies
• Evaluate information
• Organize information for practical application
• Integrate new information into an existing body of knowledge
• Use information in critical thinking and problem-solving (Ref: Dorothy Williams)

INFORMATION LITERACY COMPETENCE
Information Literacy empowers people in all walks of life to seek, evaluate, use and create information effectively to achieve their personal, social, occupational and educational goals. Information literate people are able to access information about their health, their environment, their education and work, empowering them to make critical decisions about their lives. Competence is the ability to perform a specific task, action or function successfully (Wikipedia). Therefore acquiring information literacy or being information literate is Information Literacy Competency.

DIGITAL LITERACY, E-LITERACY AND E-LEARNING
‘Digital literacy’ concept was introduced by Paul Gilster. It denotes a broad concept that links together other relevant literacies, including information literacy and e-literacy (Bawden). Combination of Information Communication Technology Literacy and Information Literacy leads to a broader term called ‘e-literacy’ which is closely linked to ‘e-learning’.

‘E-literacy’ refers to enabling the individuals and the institutions to move successfully in a world reliant upon electronic tools and facilities. Thus, the literacy that concentrates on the use of ICT is e-literacy. It is also called as ‘digital literacy’ or ‘computer literacy’ or ‘Information technology literacy’. While information literacy deals with the content and communication, e-literacy deals with the technological infrastructure.

E-learning refers to the use of network technology to design, deliver, select, administrate and extend learning. The learning materials are found on the computer in various forms like CDROM databases, OPAC, multi-media work stations and web based domains. This virtual learning or computer assisted learning has removed the barriers of access to information/knowledge. E-learning not only increases the access to learn but also is faster and low in cost. E-learning is becoming an increasingly mainstream feature of educational delivery.
INFORMATION AND COMMUNICATION TECHNOLOGY SKILLS

Every user (student) needs to understand at least how to use a library to access resources for their studies with the abundance of information available. *Information skills* refer to evaluative skills of an individual to select the most appropriate resource. Emerging demand for information has tremendously increased due to the World Wide Web. To utilize, to access web resources, they need to have Information Technology (IT) skills, which lead to awareness of advanced technologies.

Information skills and Information technology are interconnected and hence referred together as Information and Communication Technology (ICT) skills. If IT is the machine, ICT is the product. While IT implies one-way communication, ICT implies interaction between the user and the data. Emerging ICT tools have added a new dimension to education.

INFORMATION TECHNOLOGY LITERACY

Information technology literacy deals with an understanding of the technology infrastructure that underpins much of today’s life; an understanding of the tools the technology provides and their interaction with the infrastructure; and an understanding of the legal, social, economic and public policy issues that shape the development of the infrastructure and the applications and use of the technologies. It comes under the purview of information literacy.

Information literacy, on the other hand, deals with content and communication: it encompasses authoring, information finding and organization, the research process, and information analysis, assessment and evaluation. The content can take many forms: text, images, video, computer simulations, and multi-media interactive works. Content can also serve many purposes: news, art, entertainment, education, research and scholarship, advertising, politics, commerce, and documents and records that structure activities of everyday business and personal life. Information literacy subsumes but goes far beyond traditional the textual literacy that has been considered part of a basic education (the ability to read, write, and critically analyze various forms of primarily textual literary works or personal and business documents). Thus we can conclude that information literacy is a broader concept and information technology literacy is a smaller as well as narrower concept of the information literacy.

ROLE OF LIBRARIES IN INFORMATION LITERACY

The role of libraries and librarians in information literacy is tremendous and they are uniquely qualified to support and teach information literacy skills. Information literacy is not just a library issue. Basically, an all round performance by any individual or organization, because, it enables students to be lifelong learners and critical thinkers. It is – a fundamental principal of higher education. The new pedagogic paradigm emphasizes the empowerment of students & encourages them to take control of their own learning.
The student becomes a learner, the teacher becomes a coach; in addition to that, ICT has added more flavor in learning and teaching environment. The teacher-centered university becomes a learner-centered educational environment; teaching is transformed into the design and management of learning experiences. These new learning environments for students have a significant impact on academic libraries because they play a central role in the transformation of the learning environment.

CONTRIBUTING FOR THEIR LIFE LONG LEARNING HABITS
Libraries should take an effective role and need to understand their users, the learners and need to know how people learn and how the provision of information and information resources contributes to learning.

CONTRIBUTION ON DYNAMIC INFORMATION EXPLORATION
Libraries should serve not only as repository of information and it should be a dynamic gateway to information. Ever since the library is available in online; it explores to dynamic level. Library should also provide active and dynamic laboratory in which students and faculty can explore, investigate and retrieve information wherever it may be found: locally or virtually. Librarians are the partners in information literacy education. ALA, 1989 reports that “Information Literacy is a survival skill in the Information Age”. Librarians should be able to take a lead role in developing and delivering learning support strategies to ensure the true meaning of Information Literacy.

CONTRIBUTION AS COMPUTER LITERATE MENTORS
Nowadays, librarians are tech savvy, able to work as equal as computer literate. They should be able to assist users in two core skill areas; the World Wide Web (WWW) viz., and the library databases. As database builders, they should provide access to the various valuable information.

CONCLUSION
Rabindra Nath Tagore has rightly said that “It is better profile of education to know how to use a library than posses a University Degree”. Libraries play a major role in the dissemination of information literacy. They recognize and undertake an educational role for the wider community. Thus they promote, stimulate, facilitate and contribute to the development of information literacy. Thereby enhancing knowledge and skills of the community. Libraries also network and liaise with a view to integrating and embedding information literacy concepts, which in turn promotes information literacy as a key concept in lifelong learning. In this way they establish themselves as “Learning Libraries” for the 21st century.
REFERENCES


INTELLECTUAL FREEDOM, COPYRIGHT AND OPEN SOURCE: A DILEMMA OF DIGITAL ERA

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ABSTRACT

Intellectual property denotes knowledge or information with a commercial value. With the rapid ICT advances, information is no longer restricted to the libraries. It has over flown the conventional barriers and can be accessed any time and any place.

Possession of large amounts of information may be inherently less useful than access to a smaller, coherent and relevant information collection. The current trend is towards ‘access’ rather than ‘ownership’.

The line between copying for private use (fair use) and copying for general distribution has grown permeable. However, the concept of fair use still remains weak as there are no clear cut guidelines. Question of copyright ownership will continue to be a bone of contention issue.

Key words: Copyright, Fair Use, Intellectual Freedom, Open Access.

INTRODUCTION

The term ‘intellectual freedom’ describes the actions in which every individual has the freedom to think, say, write and propagate any idea or belief. From the ALA point of view, intellectual freedom begins with opposition to censorship of books and other library materials.

In fact, the dispute about intellectual freedom is not between those who are for or against the concept. It is between people who believe in different applications of intellectual freedom between the absolutists who would not deny anyone the right to create, disseminate, read anything of their choice, and those who agree with this notion, but would restrict access to certain materials by certain groups. It is a paradox that both the groups profess for intellectual freedom.
SCARCITY AMIDST PLENTY

Even though people have access to millions of information bits, we cannot surmise that they are well informed. Access to large amounts of information may be inherently less useful than access to a smaller, well chosen, coherent and relevant information.

OWNERSHIP VS. ACCESS

There is a persistent trend in the present Information Age towards access rather than ownership. Why purchase an expensive encyclopedia when one can easily get more recent information over internet? It looks like the future of library service is access, access and more access.

LEARNED SOCIETIES AS PUBLISHERS

For centuries science has operated through research done in private and the results submitted to science journals published by learned societies, peer reviewing, editorial services, printing and distributions were handled by the society concerned which had little interest in taking the copyright from the author. Authors were free to use and reuse their published works as book chapters, to update articles for republication, reproduce them for distribution among colleagues and for classroom teaching.

ADVENT OF COMMERCIAL PUBLISHERS

As the costs of journal production increased, the learned societies found it advantageous to transfer the responsibility to commercial publishers. The latter focused mainly on maximum profits and returns on investment.

PRE-REQUISITES OF COMMERCIAL PUBLISHING

The commercial publishers required a transfer of the rights of reproduction and distribution from the authors to the publishers as a prerequisite for getting the work published.

The authors received very little or no material benefits for assigning their copy rights to the commercial publishers. In some cases, the authors had to pay ‘page charges’ in order to get their work published.

By acceding to this condition, the author has given way the right to the publisher to reproduce and distribute the work not only in print but in any digital form. For instance, the author of “A study of agrarian practices in the Himalayan mountain region” forfeits the right to perform the following without permission from the publishers.

(a) To incorporate this article as a chapter in another book.

(b) Update and revise into a new edition and publish.
(c) Reproduce and distribute copies among his person and colleagues,
(d) Include as part of academic course work material.

Commercial publishers pursued licensing arrangements to get additional income from photocopying and other reproductions of journal articles.

ENTICEMENT OF OPEN SOURCE (OS)

Most of the authors desire a wide distribution of their works, that too free of charge, because virtually there is no economic gain from their publication efforts. As such, they are tempted to put their works in the public domain (Open Source) via digital format. Electronic publishing provides possibilities for uncontrolled reproduction and distribution of works. A single digital copy suffices for worldwide distribution. OS is gaining momentum as it offers digital form journals and articles that are free of most copyright and licensing restrictions.

CONCEPT OF FAIR USE

It is generally accepted that the use of a copyrighted work for purposes such as criticism, comment, news reporting, scholarship, teaching or research is not an infringement of copyright.

Fair Use exists in digital environment as it does in print environment. It will continue to be a major concern, it is both a defence of copyright infringement and a limitation on the exclusive rights of the copyright holder.

Generally, the following factors are considered while deciding a use is fair use or not.

1. Purpose and character of use; whether for scholarship or for commercial gain.
2. Nature of copyright work.
3. Substantiality and the quantum of the portion used as to the work as a whole.
4. Market effect

AMBIGUITY OF FAIR USE AND OS

In spite of national and international debates and analysis by legal experts, the concept of Fair Use still remains vague. There are no clear cut guidelines. Editors of traditional journals say OS sounds good in theory. In the practice, the scientific community itself is quite conservative. Opening data, papers, research ideas and partial solutions to everyone/anyone is still for more an idea than reality. Traditional published paper is still viewed as a unit to award grants or assess jobs and tenures.
VULNERABILITY OF COPYRIGHTED MATERIALS

Advances in ICT have overcome the restrictions imposed by the copyright, and the copyrighted materials have become more vulnerable to unauthorized copying. The copyright holders are afraid that consumer rights in the guise of fair use would encourage unauthorized copying, make it freely available to other internet users to download and further free distribution. Free access to limitless amount of information is easier than if the same were in print format.

CONCLUSION

Regardless of whether a work is published in print or digitally, by a commercial publishes or a learned society or even directly by the author, a number of copyright issues need to be considered. An author receives a package of five rights viz., reproduction, distribution, adaptation, public performance and the right to display the work publicly. Rights of reproduction and distribution are critical rights, regardless of how that publication occurs-- print form or digital form.

Internet has become a global phenomenon. The cost is independent of distance and the information is accessed in real or virtual time with little delay. Information is no longer restricted to the libraries and has over flown the conventional barriers and can be accessed any time, any place. It has become impossible to monitor copyright violations and the question of copyright ownership will continue to be bone of contention issue. New avenues are to be developed where both copyright owners as well as the users are benefited.

REFERENCES


INTRODUCTION

As the 21st century often called the Century of Knowledge, is indeed the Century of Mind. In this century Intellectual Property is a powerful driver of economic growth. Hence it is essential to protect the Intellectual assets of our country. Unless an until one will not be aware of protecting these assets the nation’s development will not be possible.

Intellectual property refers to creations of the mind: inventions, literary and artistic works, symbols, names and images. Intellectual property is divided into three categories:

1. Industrial Property: which include patents for inventions, Trademarks, (goods and Services), Industrial designs and geographical indications.

2. Copyright includes literary works such as novels, poems, plays, films musical works, Artistic works, such as drawing, paintings, photographs, sculptures, architectural designs. Rights related to copyright include those of performing artists in their performances, producers of phonogram, and those of Broadcasters in Radio and television programs.

3. Emerging forms: includes protection of life, Traditional knowledge, and Digital library.

PATENT

A patent is an intellectual property right relating to inventions and is the grant of exclusive right, for limited period, provided by the government to the patentee, in exchange of full disclosure of his invention, for excluding others for making, using, selling, importing the patented product or process producing that product for those purposes. The purpose of this system is to encourage inventions by promoting their protection and utilization so as to contribute to the development of industries, which in turn, contributes to the promotion of technological innovation and to the transfer and dissemination of technology. Under the system, Patents ensure property rights (legal title) for the invention for which patent has been granted, which may be extremely valuable to an individual or a company. One should make the fullest possible use of the patent system and the benefits it provides. Patent right is territorial in nature and a patent
obtained in one country is not enforceable in other country. The inventors / their assigns are required to file separate patent applications in different countries for obtaining the patent in those countries. Patent is legal document given to the inventor not to enjoy monopoly of his novel product but to exclude from making selling, using distributing his invention. The main goal of patent is to encourage inventors to advance the existing state of technology by awarding them a monopoly right to benefit from their invention. Hence it is said “Patent is an award for the inventor and a reward for the investor”.

The protection is granted for a limited period generally 20 years. To keep the patent in force, Renewal fee is to be paid every year. If the renewal fee is not paid within the prescribed time, the right may cease.

TRADEMARK
A trademark is any word, name, symbol or device capable of distinguishing services of one person from those of others. Trademark includes a brand name, sign, signature, numeral, packaging, shape of goods, colour combination. Trade mark is a visual symbol used in relation to any goods or services to indicate some kind of trade connection between the goods and services and the person using the mark.

The basic purpose of a trademark is to indicate the sources of origin of goods. A trademark perform three functions

- It identifies the product and its origin.
- It guarantees its unchanged quality.
- It helps in advertisement of the product.

The term of a registered trademark shall be for a period of ten years but may be renewed from time to time for an unlimited period by payment of the renewal fees.

INDUSTRIAL DESIGN
An Industrial design is the ornamental or aesthetic aspect of an article. Design right is an intellectual property right which applies to a original non common place designs of the shape or configuration of articles. Design as per the Indian act means the features of shape, configuration, pattern, ornament applied to any. Article – whether in two dimensional or three dimensional or in both forms. An article means any article of manufacture and any substance artificial or partly artificial and partly natural; and includes any part of an article capable of being made and sold separately.

The total term of a registered design is 15 years. Initially the right is granted for a period of 10 years, which can be extended, by another 5 years by paying some fee.

Earlier patent and Design Act, 1911 was repelled by India’s Design Act, 2000 which was enacted to consolidate and amend the law relating to protection of design and to comply with the Articles 25 and 26 of TRIPS agreement.
GEOGRAPHICAL INDICATIONS

A geographical indication is a sign used on goods that have a specific geographic origin and possess qualities on a reputation that are due to that place of origin. Thus GI points to a specific place or region of production that determines quality of the product. Geographical Indicator are source identifiers, indicators of quality and are as valuable to producers from particular regions as are trademarks. GI is granted to a product that are manufactured in a specific geographical location i.e. a city, town or a locality. It is a kind of certification that the product possesses certain qualities and characteristics owing to its specific origin. Assam tea, Basmati rice, Lucknow chikan work are some popular Indian products that have GI. Recently “Tirupati Laddoo” that is served as Prasad in the Venkateshwara Temple in Andhra-Pradesh has been assigned the GI. It can be noted as a consequence that in no other part of the world that particular “laddoo” be manufactured & sold under the same name.

PROTECTION OF GEOGRAPHICAL INDICATIONS

Geographical indications are understood by consumers to denote the origin and the quality of Products. Many of them have acquired valuable reputations which, if not adequately protected, may be misrepresented by dishonest commercial operators. False use of geographical indications by unauthorized trades for example “Darjeeling” for tea that was not grown in the tea gardens of Darjeeling is detrimental to consumers and legitimate producers. Hence it needs protection under the Act. Geographical Indications are protected in accordance with national laws; to prevent from misusing geographical indications the Government of India has passed “The Geographical Indications of Good (Registration and Protection) Act, 1999”. A Geographical indication is registered for a period of 10 years and can be renewed from time to time.

COPYRIGHT

Copyright provides exclusive rights to the authors for their literary work (Books, movies, Songs, Computer software, Databases, sound recordings) and artistic works (Such as painting, Sculpture drawing, architectural work). The main objective of such protection is to encourage and reward creative work. Copyright protects the form of ideas and not the ideas itself.

The duration of protection of copyright works is much longer than in the case of industrial property. Normally, it is authors or creator’s lifetime plus at least 50 years. It is limited to the boundaries of the country concerned. For cinematographic films, records, photographs, works of governments International agencies the term is 60 years from the beginning of the calendar year following the year in which the work was published. For broadcasting, the term is 25 years from, the beginning of the calendar year in which the broadcast was made.
The role of copyright in development at the national level, is to encourage creativeness; promote tertiary industry (Books, entertainment, records, films etc) promote the activities of the media. (Radio, television, cinema, press) while at the International level, it is to facilitate cultural exchanges; achieve integration in international relations. Copyright gives protection for the expression of an idea and not for the idea itself. For example many authors write text books on a subject covering various aspects. Even though the topics covered by the author are being covered in several books by different authors, each author will have a copyright on the book written by him/her provided the book is not a copy of some other book published earlier.

Copyright as provided by the Indian Copyright Act, 1957 is also valid in the Countries abroad as India is the member of Berne Convention, an International treaty on copyright.

It is noted that while protection of intellectual property is becoming increasingly acceptable in both the developed and the developing countries, some nations in Asia and Africa have still not adhered to any international copyright convention. However some of them have domestic copyright laws. This could be due to lack of information, professional expertise, and absence of motivation. Such non adherence could result in financial losses to the governments and to the Copyright owners.

TRADITIONAL KNOWLEDGE

Traditional knowledge was treated as knowledge in the public domains and so it did not qualify for patent. Several traditional plants and related knowledge in India have been allegedly falsely patented by the US patent office including Neem and Turmeric. Traditional knowledge cannot be patented if documented under the TRIPS agreement of WTO. That is why Neem and Turmeric products when patented by the US patent office were revoked once India proved that these were the products of Indian traditional knowledge. The current IPR system cannot protect traditional knowledge. A “sui generic” or alternative law, is therefore necessary to protect traditional knowledge. The development of database on traditional knowledge would help patent examiner to discover relevant prior art so as to improve examination of patent application and prevent the grant of patents.

TRADITIONAL KNOWLEDGE DIGITAL LIBRARY (TKDL)

As the first Chairman of SCIT of WIPO (Geneva), Mashelkar strongly advocated that traditional knowledge be treated at par with industrial property systems, which led to the creation of Traditional Knowledge Digital Library (TKDL). He fought successfully in changing the International Patent Classification System to include the Indian traditional knowledge, which is a breakthrough for the entire developing world. In June 2006, the Cabinet took the decision to entrust the responsibility to CSIR of providing access to TKDL for international patent offices. As a member of the prestigious International IPR Commission set up by UK Government (2001) played a crucial role in making
recommendations, which balance the rights of the poor. This has made a major impact on international thinking on IPR and development.

Since time immemorial, India has possessed a rich traditional knowledge of ways and means practiced to treat diseases afflicting people. This knowledge has generally been passed down by word of mouth from generation to generation. A part of this, knowledge has been described in ancient classical and other literature, often inaccessible to the common man and even when accessible rarely understood. Documentation of this existing knowledge, available in public domain, on various traditional systems of medicine has become imperative to safeguard the sovereignty of this traditional knowledge and to protect it from being misappropriated in the form of patents on non-original innovations, and which has been a matter of national concern. India fought successfully for the revocation of turmeric and basmati patents granted by United States Patent and Trademark office (USPTO) and Neem patent granted by European Patent Office (EPO). As a sequel to this, in 1999, the Department of Ayurveda, Yoga & Naturopathy, Unani, Siddha and Homoeopathy-(AYUSH), erstwhile Department of Indian System of Medicine and Homoeopathy (ISM&H) constituted an inter-disciplinary task force, for creating an approach paper on establishing a Traditional Knowledge Digital Library (TKDL).

The project TKDL was initiated in the year 2001. TKDL provides information on traditional knowledge existing in the country, in languages and format understandable by patent examiners at International Patent Offices (IPOs), so as to prevent the grant of wrong patents. TKDL thus, acts as a bridge between the traditional knowledge information existing in local languages and the patent examiners at IPOs.

TKDL is a collaborative project between Council of Scientific and Industrial Research (CSIR), Ministry of Science and Technology and Department of AYUSH, Ministry of Health and Family Welfare, and is being implemented at CSIR. An inter-disciplinary team of Traditional Medicine (Ayurveda, Unani, Siddha and Yoga) experts, patent examiner, IT experts, scientists and technical officers are involved in creation of TKDL for Indian systems of Medicine.

The project TKDL involves documentation of the traditional knowledge available in public domain in the form of existing literature related to Ayurveda, Unani, Siddha and Yoga, in digitized format in five international languages which are English, German, French, Japanese and Spanish. Traditional Knowledge Resource Classification (TKDL), an innovative structured classification system for the purpose of systematic arrangement dissemination and retrieval has been evolved for about 25,000 subgroups. A recent study examined randomly selected 762 US patents which were granted under AGIK35/78 and other IPC classes, having a direct relationship with medicinal plants in terms of their full text.
WORLD INTELLECTUAL PROPERTY ORGANIZATION (WIPO)

The World Property Organization (WIPO) a United Nations (UN) specialized agency was established in 1970, dedicated to the promotion of innovation and creativity for the economic social and cultural development throughout the world. WIPO currently as on September 1, 2010 has 190 member states. WIPO’s headquarters is in Geneva, Switzerland. As part of the United Nations, WIPO exists as a forum for its member states to create and harmonize rules and practices to protect Intellectual Property Rights.

CHALLENGES TO IPR & ROLE OF WIPO

The origin of the World Intellectual Property Organization (WIPO) dates back to March 1883, when with the formulation of the Paris Convention for the Protection of Industrial Property, the first major international treaty came into force in 1884. It set up an International Bureau not only to help, organize meetings of the initial 14 member states, but also to perform the necessary administrative tasks. Then in September 1886, with the adoption of the initial copyright treaty, the Berne Convention for the Protection of Literary and Artistic Works, it also had an International Bureau for its administrative work. In 1893, these two bureaux merged to form an international organization called BIRPI (the French acronym for Bureaux internationaux reunis pour la protection de la propriete Intellectuelle) –the United International Bureaux for the protection of Intellectual Property. This small organization with an initial staff of seven, was headquartered in Berne, the capital of Switzerland, till it shifted in 1960 to Geneva to be nearer the European headquarters of the United nations, as also of the other international organizations. Ten years later, in 1970 BIRPI became WIPO, with the coming into effect of the Convention Establishing the world Intellectual Property Organization, signed in Stockholm on July 14, 1967.

THE STRUCTURAL SYSTEM OF INDIAN INTELLECTUAL PROPERTY ORGANIZATION

The Indian Patent Office started its journey in the year 1956. At that time, the Indian patent system was governed by the Act VI of 1856 on protection of inventions based on the British Patent Law 1852. Certain exclusive privileges were granted to inventors of new manufacturers for a period of 14 years at that time. However, the Indian patent system has come a long way since then.

The present administrative hierarchy of the Indian patent system can be represented by the following flow chart
The Indian patent system is committed to achieve professional excellence, reliability, thoroughness, consistency, transparency, fairness and timeliness in providing product and services of highest quality to the utmost satisfaction of the users ensuring that the rights granted are commensurate with the contribution made in the field of science and technology. The following are the main objectives of the Indian patent system:

- To retain confidentiality of the inventions until made public.
- To provide search and examination report maintaining the prescribed time lines and legalities.
- To ensure timely grant of Quality Patents
- To make information dissemination system transparent, faster and easier

The Indian Ministry of Commerce & Industry under the Dept of Industrial Policy & Promotion is looking after the IP System in India followed by CGPDTM (Controller General of Patent, Design and Trade Mark). The Main offices of the IPR are located at the five metropolitan cities i.e. Kolkata, Delhi, Mumbai, Chennai & Ahmedabad. The Patent administrative office is located in Kolkata, Delhi, Mumbai, and Chennai. Whereas the main office of GI Registry in Chennai and NIIPM is the National Institute for Intellectual Property Management is a Central Government Organization under the Ministry of Commerce & Industry engaged in conducting Training / Awareness programs relating to Intellectual Property Rights (IPR) i.e. Patents, Designs, Trademarks & Geographical Indications and the Patent Information System office in Nagpur.
REFERENCES

1. Right to Information Act 2005 Patents.
5. Right to Information Act 2005 NIIPM.
DEVELOPMENT OF UNION CATALOGUE AND DIGITAL INSTITUTIONAL REPOSITORY: A CASE STUDY

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ABSTRACT

The objectives, activities and outcome of a major NAIP project 'Strengthening of Digital Library and Information Management under the National Agricultural Research System (NARS): e-Granth' which includes 12 libraries under Indian Council of Agricultural Research (ICAR) and State Agricultural Universities (SAU) are presented.

Keywords: Union Catalogue, Digital Institutional Repository, Digitization, eGranth, Marc21.

UNION CATALOGUE

A union catalogue is a pooled library catalogue describing the collections of a number of libraries. Union catalogs have been created in a range of media, including book format, microform, cards and more recently, networked electronic databases. Print union catalogs are typically arranged by title, author or subject (often employing a controlled vocabulary); electronic versions typically support keyword and Boolean queries. Union catalogs are useful to librarians, as they assist in locating and requesting materials from other libraries through interlibrary loan service. They also allow researchers to search through collections to which they would not otherwise have access, such as manuscript collections.

WorldCat is the world's largest network of library content and services. WorldCat libraries are dedicated to providing access to their resources on the Web, where most people start their search for information.

UNION CATALOGUE IN INDIA

Union catalogue is not new in India but the method of implementing the same may vary. Various projects are being run in implementing Union Catalogue using different strategies for collecting catalogues from group of libraries and placing them in a single location like, www.Granthalaya.org by Vidya Prasarak Mandal (VPM), Thane, Mumbai, India.

It is a project which intends to create bibliographic union database of holdings of all the public libraries in Konkan area including Thane, using Koha, an Open Source Library
Management Software. In this project, the koha is implemented at each center at local server and the union database is kept on a central server with catalogue updates done via Z39.5 or by sending new MAchine Readable Catalogue (MARC) records electronically. So far 800,000 books’ records in MARC format, of 19 libraries are available in the OPAC via granthalaya.org union catalogue.

1. IndCat: Online Union Catalogue of Indian Universities, by Inflibnet, Ahmedabad, Gujarat, INDIA

IndCat: Online Union Catalogue of Indian Universities is unified Online Library Catalogues of books, theses and journals available in major university libraries in India. The union database contains bibliographic description, location and holdings information for books, journals and theses in all subject areas available in more than 145 university libraries across the country. A Web-based interface is designed to provide easy access to the merged catalogues. The IndCat is a major source of bibliographic information that can be used for inter-library loan, collections development as well as for copy cataloguing and retro-conversion of bibliographic records. The IndCat consists of three components available in open access to users and librarians. The current status of IndCat is shown in Table 1.

<table>
<thead>
<tr>
<th>Database</th>
<th>No. of Records</th>
<th>No of Universities/ Inst.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Books</td>
<td>69,73,000</td>
<td>134</td>
</tr>
<tr>
<td>Theses</td>
<td>2,38,390</td>
<td>235</td>
</tr>
<tr>
<td>Serials Titles</td>
<td>12,829</td>
<td>96</td>
</tr>
<tr>
<td>Serial Holdings</td>
<td>44,560</td>
<td></td>
</tr>
</tbody>
</table>

So far, Indian union catalogues are formed collecting and combining the catalogues from the group of Indian libraries but they are not being gelled with worldwide catalogue, WorldCat.

E-GRANTH: RECOGNITION OF INDIAN UNION CATALOGUE WORLDWIDE WITH A NEW APPROACH

The aim of the project is to create the union catalogue of existing holdings of participating libraries as sub-group of WorldCat and share globally. The participating libraries are:

1. Indian Agricultural Research Institute(IARI), New Delhi (Lead Center)
2. Acharya NG Ranga Agricultural University (ANGRAU), Hyderabad
3. Central Institute of Fisheries Education (CIFE), Mumbai
4. Ch. Charan Singh Haryana Agriculture University, Hisar

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5. CSK Himachal Pradesh Krishi Vishwavidyalaya (CSKHPKV), HP
6. Directorate of Knowledge Management in Agriculture (DKMA, earlier DIPA)
7. GB Pant University of Agriculture & Technology (GBPUAT), Uttarakhand
8. Indian Veterinary Research Institute (IVRI), UP
9. Mahatma Phule Krishi Vidyapeeth (MPKV), Maharashtra
10. National Dairy Research Institute (NDRI), Karnal
11. Tamilnadu Veterinary and Animal Sciences University (TanuVAS), Tamilnadu
12. University of Agricultural Sciences (UAS), Bangalore

For this the initial step was to get the subscription to Online Computer Library Center (OCLC), USA that would enable libraries to be globally discoverable and help in sharing of online resources more effectively by uploading records in WorldCat.

Membership was taken and all the consortium partners got their Project ID, Authorization IDs and passwords, through which they could upload the existing records and make the current entries directly to WorldCat, through a middleware, Connexion – The cataloging software provided by OCLC.

Each project partner had to compile all of its computerized records created so far in the MARC 21 standard format and then upload the files to WorldCat, through OCLC. OCLC takes few months to process the uploaded and mark or add entries in WorldCat. Before the commencement of the project only two libraries out of twelve were using the Library Software that had a feature to export the records in MARC 21 standard format. Rest of the libraries had to get the module developed from their respective software vendor (Table 2).

Table 2: Institute Library Management Software export in MARC 21 Status

<table>
<thead>
<tr>
<th>Univ. or Inst.</th>
<th>Library S/W</th>
<th>Export available</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANGRAU</td>
<td>LibSys</td>
<td>No</td>
</tr>
<tr>
<td>CCSHAU</td>
<td>LibSys</td>
<td>Yes</td>
</tr>
<tr>
<td>CIFE</td>
<td>LibSys</td>
<td>No</td>
</tr>
<tr>
<td>CSKHPKV</td>
<td>LibSys</td>
<td>No</td>
</tr>
<tr>
<td>DIPA</td>
<td>eGranthalaya</td>
<td>No</td>
</tr>
<tr>
<td>GBPUAT</td>
<td>LibSys</td>
<td>Yes</td>
</tr>
<tr>
<td>IARI</td>
<td>LibSys</td>
<td>No</td>
</tr>
<tr>
<td>IVRI</td>
<td>LibSys</td>
<td>No</td>
</tr>
<tr>
<td>MPKV</td>
<td>Slim++</td>
<td>No</td>
</tr>
<tr>
<td>NDRI</td>
<td>LibSys</td>
<td>No</td>
</tr>
<tr>
<td>TANUVAS</td>
<td>SOUL</td>
<td>No</td>
</tr>
<tr>
<td>UAS</td>
<td>SOUL</td>
<td>No</td>
</tr>
</tbody>
</table>

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PROBLEMS FACED BY THE EGRANTH TEAM

1. Understanding the MARC 21 standard: MARC 21 was the entirely new standard for the project team. But the full dedication and interest of the team professionals helped in understanding the standard through various trainings and practice sessions.

2. Getting export module in their Licensed Software: Negotiation with the vendor on prices and desired module features finally resulted in the working desired module.

3. Uploading the records file to OCLC: OCLC has a defined rule for batch uploading, it took little effort from the library professionals’ side to understand and follow the same, but it comes out to be as success finally.

With this, all the current records got uploaded to OCLC one by one, making total of around 7 lakhs records. The OCLC then processed the records received, library wise. They removed the duplicate records and matched the remaining with the records already existing in WorldCat. The records that were matched were set holding of that particular library. OCLC sent back following types of files:

1. Records with Holdings set: Records that are matched in WorldCat with already existing records.
2. Duplicate Records: Duplicate records in sent records.
3. Unresolved records: Records with some kind of cataloguing or typos errors.

The statistics of batch upload are given below Table 3

<table>
<thead>
<tr>
<th>#</th>
<th>Institute</th>
<th>No. of Records Batch Uploaded</th>
<th>Holdings Set</th>
<th>Duplicate</th>
<th>Unresolved</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>IARI</td>
<td>122708</td>
<td>59212</td>
<td></td>
<td>53935</td>
</tr>
<tr>
<td>2</td>
<td>ANGRAU</td>
<td>34174</td>
<td>15391</td>
<td>0</td>
<td>23613</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>6688</td>
<td></td>
<td>13</td>
</tr>
<tr>
<td>3</td>
<td>CCSHAU</td>
<td>119462</td>
<td>68347</td>
<td>104</td>
<td>51011</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>9378</td>
<td>9369</td>
<td>9</td>
</tr>
<tr>
<td>4</td>
<td>CIFE</td>
<td>14470</td>
<td>5421</td>
<td></td>
<td>9049</td>
</tr>
<tr>
<td>5</td>
<td>CSKHPKV</td>
<td>23168</td>
<td>9891</td>
<td></td>
<td>13277</td>
</tr>
<tr>
<td>6</td>
<td>DIPA</td>
<td>32217</td>
<td>4663</td>
<td>697</td>
<td>26557</td>
</tr>
<tr>
<td>7</td>
<td>GBPUAT</td>
<td>119024</td>
<td>32739</td>
<td>60902</td>
<td>25383</td>
</tr>
<tr>
<td>8</td>
<td>IVRI</td>
<td>26294</td>
<td>13153</td>
<td></td>
<td>8980</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4039</td>
<td>107</td>
<td>15</td>
</tr>
<tr>
<td>9</td>
<td>MPKV</td>
<td>37692</td>
<td>7660</td>
<td>9</td>
<td>30023</td>
</tr>
<tr>
<td>10</td>
<td>NDIRI</td>
<td>37887</td>
<td>16201</td>
<td>81</td>
<td>21605</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3492</td>
<td>3473</td>
<td>19</td>
</tr>
<tr>
<td>11</td>
<td>TANUVAS</td>
<td>28800</td>
<td>4910</td>
<td>1452</td>
<td>13415</td>
</tr>
<tr>
<td>12</td>
<td>UAS</td>
<td>64858</td>
<td>18329</td>
<td>17665</td>
<td>28864</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>279486</td>
<td>81017</td>
<td>305768</td>
</tr>
</tbody>
</table>

Grand Total 673624 279486 81017 305768
The errors that are encountered by OCLC through BatchUpload process were:

1. Records missing both the 001 (Local System Identifier) and 008 (Fixed-Length Data Elements).
2. Records missing the 245 (Title) field.
3. The lack of Language code.
4. Records that have varying information in the publisher area.

The other step was to make entry of the current records directly into a system which reflects it globally. The current entries are made globally recognizable directly by cataloguing in Connexion Software. The software license is provided by OCLC only and is being used first time in India. This makes the catalogue entry directly available to the WorldCat following the MARC 21 standard. The flow chart of the process is shown below (Figure 1).

![Flow Chart of Cataloguing Process](image)

Figure 1: Cataloguing in Connexion

The efforts finally resulted, in forming the Union Catalogue of 12 participating consortium partners called AgriCat (http://agricat.worldcat.org/ or http://egranth.ac.in/AgriCat.html). The Union Catalogue so formed works at three level: institute level, inter-institute level and global level.

The complete process of the creation of the AgriCat, the Union Catalogue under eGranth using OCLC, is shown in Figure 2.
The records statistics in AgriCat are in Table 4.

Table 4: Institute wise Records in AgriCat subset of WorldCat

<table>
<thead>
<tr>
<th>University or Institute</th>
<th>Records in AgriCat</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANGRAU</td>
<td>27684</td>
</tr>
<tr>
<td>CCSHAU</td>
<td>76463</td>
</tr>
<tr>
<td>CIFE</td>
<td>13958</td>
</tr>
<tr>
<td>CSKHPKV</td>
<td>28440</td>
</tr>
<tr>
<td>DIPA</td>
<td>7290</td>
</tr>
<tr>
<td>GBPUAT</td>
<td>42781</td>
</tr>
<tr>
<td>IARI</td>
<td>61994</td>
</tr>
<tr>
<td>IVRI</td>
<td>23900</td>
</tr>
<tr>
<td>MPKV</td>
<td>18511</td>
</tr>
<tr>
<td>NDRI</td>
<td>30103</td>
</tr>
<tr>
<td>TANUVAS</td>
<td>24177</td>
</tr>
<tr>
<td>UAS</td>
<td>29571</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>384872</strong></td>
</tr>
</tbody>
</table>

DIGITAL INSTITUTIONAL REPOSITORY

A Digital Institutional Repository is a collection of library contents that are stored in digital formats (as opposed to print, microform, or other media) and accessible by computers. The digital content may be stored locally, or accessed remotely via computer networks. Many Open Source Software are available for IR, like Dspace, eprints etc.
DIGITAL INSTITUTIONAL REPOSITORY IN INDIA
Currently many Indian libraries have been digitized independently. Few are listed below:

1. ICRISAT, (http://dspace.icrisat.ac.in/)
2. IIT, Bombay (http://dspace.library.iitb.ac.in/)
3. Indian Institute of Management, Kozhikode (http://dspace.iimk.ac.in/)
4. Thapar University (http://dspace.thapar.edu:8080/dspace/)
5. Vidyanidhi Digital Library, Mysore (http://dspace.vidyanidhi.org.in:8080/dspace/)
7. Jadavpur University, Kolkata (http://dspace.jdvu.ac.in/)
9. Indian Institute of Science, Bangalore (http://eprints.iisc.ernet.in/)

E-GRANTH: INSTITUTIONAL REPOSITORY OF NARS
ICAR institutes and SAUs libraries possess a huge collection of rare, old and imperative collection of documents in agriculture and allied science. The physical copies of the same are quite hard to manage and maintain, as the library keeps on updating with the new collections, that needs physical space and attention. So, to maintain the old-rare collection it was decided to digitize the 2 Crores pages and making it available to the public by uploading the same in Integrated Content Management System (ICMS). In the project it was decided to get the digitization done at following four centers:

1. Acharya NG Ranga Agricultural University (ANGRAU), Hyderabad
2. Indian Agricultural Research Institute (IARI), New Delhi
3. Indian Veterinary Research Institute (IVRI), UP
4. University of Agricultural Sciences (UAS), Bangalore

And the ICMS solution was decided to be implemented at the Lead Center, IARI, New Delhi.

For identifying the digital content in each ICAR institute and SAUs library, a committee was formed so as to approve the list of documents to be digitized. Each consortium partner and other ICAR and SAUs libraries identified various types of documents to be digitized and prepared a list of them. The list is then approved and sent to the CPI, lead center, IARI (New Delhi). There duplication of records is checked and the revised list is sent back to the 4 digitization centers. Currently 1.8 Crores pages have been identified for digitization (Table 5).
Table 5: Number of pages of identified for Digitization Institute Wise

<table>
<thead>
<tr>
<th>Name of Institute</th>
<th>No. of Pgs</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANGRAU</td>
<td>1973974</td>
</tr>
<tr>
<td>APHU</td>
<td>42000</td>
</tr>
<tr>
<td>CCSHAU</td>
<td>69721</td>
</tr>
<tr>
<td>CIFE</td>
<td>122368</td>
</tr>
<tr>
<td>CIFRI</td>
<td>4509</td>
</tr>
<tr>
<td>CIFT</td>
<td>5789</td>
</tr>
<tr>
<td>CIRB</td>
<td>710</td>
</tr>
<tr>
<td>CMFRI</td>
<td>599636</td>
</tr>
<tr>
<td>CRRI</td>
<td>19080</td>
</tr>
<tr>
<td>CSWCRTI</td>
<td>13339</td>
</tr>
<tr>
<td>CTRI</td>
<td>65000</td>
</tr>
<tr>
<td>DIPA</td>
<td>200146</td>
</tr>
<tr>
<td>DOR</td>
<td>100000</td>
</tr>
<tr>
<td>DRR</td>
<td>157800</td>
</tr>
<tr>
<td>GBPUAT</td>
<td>138662</td>
</tr>
<tr>
<td>HPKV</td>
<td>15000</td>
</tr>
<tr>
<td>IARI</td>
<td>3030022</td>
</tr>
<tr>
<td>IARI(NEM)</td>
<td>2824</td>
</tr>
<tr>
<td>ISIR</td>
<td>5876</td>
</tr>
<tr>
<td>ILRI</td>
<td>48293</td>
</tr>
<tr>
<td>IVRI</td>
<td>6700000</td>
</tr>
<tr>
<td>MPKV</td>
<td>822665</td>
</tr>
<tr>
<td>NBPGGR_HYD</td>
<td>27000</td>
</tr>
<tr>
<td>NDRI</td>
<td>37679</td>
</tr>
<tr>
<td>NRCC</td>
<td>1916</td>
</tr>
<tr>
<td>NRCO</td>
<td>21000</td>
</tr>
<tr>
<td>NRCS</td>
<td>66000</td>
</tr>
<tr>
<td>PDP</td>
<td>19000</td>
</tr>
<tr>
<td>RAU</td>
<td>620031</td>
</tr>
<tr>
<td>SVVU</td>
<td>185000</td>
</tr>
<tr>
<td>TANUVAS</td>
<td>279480</td>
</tr>
<tr>
<td>TNAU</td>
<td>85727</td>
</tr>
<tr>
<td>UAS</td>
<td>2971173</td>
</tr>
<tr>
<td>Grand Total</td>
<td>1,84,36,420</td>
</tr>
</tbody>
</table>
Digitization is a first step of creating a digital institutional repository. It is a process of transforming a physical format into a digital one. This way the content can be preserved for longer period as physical content is more prone to damage. Various kinds of Scanners are available to digitize the physical content of any shape and size. To completely replace the physical content, the digital format must be exactly the xerox of it. For this the digitization process includes following steps: Scanning, Cropping, Cleaning, OCRing and PDF-A format conversion. In the eGranth project following scanners and software have been are used for digitization (Table 6.1 and Table 6.2):

**Table 6.1** List of Scanners used in eGranth project for Digitization

<table>
<thead>
<tr>
<th>List of Scanners Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avision Flatbed Scanners</td>
</tr>
<tr>
<td>Avision Sheet Feed Scanner</td>
</tr>
<tr>
<td>Book Scanners (Minolta PS7000, microbox)</td>
</tr>
</tbody>
</table>

**Table 6.2** List of Softwares used in eGranth Project for Digitization

<table>
<thead>
<tr>
<th>List of Softwares</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abbyy fine reader 8.0 Professional</td>
<td>Scanning, Cleaning and Cropping</td>
</tr>
<tr>
<td>Scan fix 4.2</td>
<td>To set the margin</td>
</tr>
<tr>
<td>Adobe Scan to PDF Utility 4.1</td>
<td>To make PDF Searchable</td>
</tr>
</tbody>
</table>

Current status of Digitization under eGranth project is as follows (Table 7.1 and Table 7.2):

**Table 7.1** : Digitization Work Status under eGranth Project

<table>
<thead>
<tr>
<th>Institute Name</th>
<th>Types of Documents Scanned</th>
<th>Total Pages Scanned</th>
<th>Cleaned Pages</th>
<th>Pages converted to PDFs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Books</td>
<td>Journals</td>
<td>Others</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ANGRAU</td>
<td>750000</td>
<td>204953</td>
<td>0</td>
<td>954953</td>
</tr>
<tr>
<td>IARI</td>
<td>920271</td>
<td>546763</td>
<td>18161</td>
<td>1485195</td>
</tr>
<tr>
<td>IVRI</td>
<td>195519</td>
<td>80938</td>
<td>414276</td>
<td>690733</td>
</tr>
<tr>
<td>UAS</td>
<td>90122</td>
<td>100312</td>
<td>211570</td>
<td>402004</td>
</tr>
<tr>
<td>1955912</td>
<td>932966</td>
<td>644007</td>
<td>3532885</td>
<td>3090204</td>
</tr>
</tbody>
</table>

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Table 7.2 : Digitization Work Status under eGranth Project

<table>
<thead>
<tr>
<th>Institute Name</th>
<th>No. of pages/PDFs with respective metadata</th>
<th>No. of pages/PDFs with respective metadata undergone QC</th>
<th>No. of Final PDFs ready to be uploaded in dspace</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PDFs</td>
<td>Pages</td>
<td>PDFs</td>
</tr>
<tr>
<td>ANGRAU</td>
<td>1112</td>
<td>558925</td>
<td>99</td>
</tr>
<tr>
<td>IARI</td>
<td>551</td>
<td>184592</td>
<td>450</td>
</tr>
<tr>
<td>IVRI</td>
<td>175</td>
<td>22000</td>
<td>0</td>
</tr>
<tr>
<td>UAS</td>
<td>846</td>
<td>152430</td>
<td>264</td>
</tr>
<tr>
<td></td>
<td>2684</td>
<td>917947</td>
<td>813</td>
</tr>
</tbody>
</table>

Software for Institutional Repository is the final step to establish the Digital IR, to place the digital content at one place with its metadata and making it available to the public with some restrictions. In eGranth project Dspace has been installed and configured. The records are being uploaded in Dspace.

CONCLUSION
Conversion and Sharing of library resources in electronic format through online Union Catalogue and Digital Repositories has many advantages for librarians as well as users. Standardization, preservation, making easy access and customized services to users are some of the major concerns for the libraries in the present era of digital world which can be addressed by creating digital resources as has been discussed above. Users of library resources today need fast access to their library resources directly from their work places. In addition they have to be provided more and more customized services so that they can do better in their respective area of work.

REFERENCES
8. www.egranth.ac.in

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RESOURCES AND SERVICES IN ACHARYA N.G. RANGA AGRICULTURAL UNIVERSITY LIBRARY, HYDERABAD: QUALITY ASSESSMENT BASED ON USERS’ PERSPECTIVE

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ABSTRACT

This study examines the expectations of male and female students towards library resources and services at Acharya N.G. Ranga Agricultural University, Hyderabad, Andhra Pradesh, India. It analyzes the various aspects of library collection usage, frequency and purposes of library visits, and user satisfaction of library services. It also relates major problems that hinder male and female students from using the library.

INTRODUCTION

The application of Information Communication Technologies (ICTs) in the production and dissemination of information is one of two major developments of the information age that are having a profound impact on university education pedagogy and library resources and services. The primary purpose of university libraries is to support teaching, learning, and research in ways consistent with, and supportive of, the institution's mission and goals. In addition, library resources and services should be sufficient in quality, depth, diversity, and currency to support the institution's curriculum. As a result of this, university libraries are often considered the most important resource center of an academic institution.

The growth of research in all fields of human endeavor is becoming increasingly detailed and sophisticated, faculty members and students have realized that the library has great roles to play in the provision of information necessary for their day to day research. Moreover, the library acts as a medium of getting the latest scientific and technological information either in print or electronic form. University libraries collect a variety of materials for preservation and use of the library patrons. These resources include not only traditional print-on-paper media like books, journals, newspapers, and maps, but also audiovisual materials like records, audiocassettes, video cassettes and projectors. Libraries maintain collections that include not only printed materials but also art reproductions, maps, photographs, microfiches, CD-ROMs, computer software, online databases, Internet, electronic books and e-journals and other media. In addition to
maintaining collections within library buildings, libraries often feature telecommunications links that provide users with access to information at remote sites (Halsey, 2006).

QUALITY ASSESSMENT
What is Quality?
The word ‘quality’ has several definitions. The conventional definition is “One that wears well, is well constructed will last for long time” and the strategic definition is “meeting customers’ requirements.”

- According to Juuran ‘The quality is fitness for purpose’
- According to Robinson, “Quality is meeting the requirements of customer-now and in the future.”
- According to Sarkar “Quality of a product or service is the ability of the product or service to meet the customers’ requirements.

Quality Concept in Library Services
The library is an organization to offer reference and information services to its users. Library service is the combination of the services-process and its delivery. In a library, the service offered from acquisition section, technical section, maintenance section etc. are the processes carried out there and thereafter delivered to the users. The quality should start from the acquisition section, which should be carried uniformly to circulation section. A user who had an unpleasant experience from the library will tell it to many people, but a good experience will be told to very few. Therefore it is very necessary for librarian to understand the users, what they want, how they want, and when they want the documents and information.

How to Improve the Quality in Library Services?
A user must be educated with proper technology to use the library effectively. He or she should have knowledge of what facilities and services are available in the library and information centre and how to access those efficiently and effectively.

To improve the service quality the user satisfaction survey is a tool that provides both quantitative and qualitative data. It is an important part of libraries for process and performance measurement.

Main steps to measure users’ satisfaction are:
1. Conducting sample survey.
2. Data collection.
3. Process and analysis of data.
4. Interpret and present the data.
5. Finding out result.
With the help of the result the librarian can take new steps for development of library. The regular survey will enable the library to understand the changes in users satisfaction and to plan the services accordingly.

ACHARYA N.G RANGA AGRICULTURAL UNIVERSITY LIBRARY, HYDERABAD

With a view to cater the library and information needs of teachers, students as well as research and extension personnel, the library system was reorganized in 1980, forming Central Library at Hyderabad. The Library started computerization during the AHRD Project. However with the NATP support during 2001-2005, the Central Library has been completely automated and a large collection of thesis has been digitized. Further a number of CD-ROM Databases was subscribed at Central Library for the benefit of students and staff.

The Central library continued to receive over 600 Indian and foreign periodicals. In addition, the Central Library stacks about one lakh books and 9064 dissertations and 5000 reports. With a view to help the SC, ST and BC students, special textbook collections (multiple numbers) have been built up at each of the campuses. Students can borrow a book for one semester at a nominal charge of Rs.1 to Rs.5. Separate reference book collection is established in each of the campuses. The library is very rich in collection and is fully automated and using LIBSYS software. Internet access is provided to students at a cost of Rs.10 per hour.

The Library provided with CD-ROM database searches by subscribing to CAB Abstracts, Biotechnology Abstracts, CMIE Database, AGRIS Database, FOOD & HUMAN NUTRITION Database, FST etc. from 1984 to present. CD-ROM Network servers are established in the library.

The Library has started Digitization Project. It has completed digitizing 7500 Ph.D and M.Sc. theses and the abstracts of digitized documents available. There is a total collection of 2.5 lakhs books in all the libraries and subscribing 500 Indian & Foreign Journals. The Central Library was subscribing CAB-CD database right from 1984 onwards. The CD-Towers were established at library and sufficient terminals are provided to students and staff for database access.

The Library distributed 60 copies of ‘Journal of Research ANGRAU to various national and international institutes on exchange the Central Library receives foreign and Indian publications worth over Rs.50,000. The Library is providing the services such as Books database (OPAC), Theses database, ejournals (ebSCO), Indiastat, CMIE database, Cab abstracts, Reprographic, Internet, Career Counseling and Literature search manual. LAN & WAN Connectivity has been provided through the Computer Center of the University.
OBJECTIVES OF THE STUDY

The objectives of the study are as follows:

- To find out the types of library and information services required by users;
- To elicit opinions about services offered by the library;
- To bring forth opinions about the problems faced by users;
- To collect opinions about the adequacy of information resources and their use;
- To identify the issues faced by students in searching for information in the library;
- To find remedies that may help students to use the library in a more efficient way.

LIMITATIONS

The study is limited to the Postgraduate students and Under Graduate students of the Acharya N.G Ranga Agricultural University, Hyderabad limited to the sample of 96.

RESEARCH METHODOLOGY

Questionnaire method is followed to receive data on resources and services in Acharya N.G Ranga Agricultural University Library, Hyderabad from the respondents. Due to paucity of the time questionnaire were distributed among the students of different departments. Out of 120 students 96 (80%) returned the questionnaires. The secondary data has been collected from the University’s annual reports, calendar, library profiles, brochures, syllabi, etc.

DATA ANALYSIS AND FINDINGS

30 male students and 30 research scholars were randomly sampled to find out their opinions about the services provided by the library.

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Gender</th>
<th>No. of Users</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Male</td>
<td>61</td>
<td>63.54</td>
</tr>
<tr>
<td>2</td>
<td>Female</td>
<td>35</td>
<td>36.46</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>96</td>
<td>100.00</td>
</tr>
</tbody>
</table>

From Table 1, it is observed that 63.54% of the library users belong to the male category and the remaining 36.46% of users are belonging to the female category.
Table 2 Respondents by department

<table>
<thead>
<tr>
<th>Departments</th>
<th>Male</th>
<th>%</th>
<th>Female</th>
<th>%</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>23</td>
<td>37.70</td>
<td>12</td>
<td>34.29</td>
<td>35</td>
<td>36.46</td>
</tr>
<tr>
<td>Horticulture</td>
<td>8</td>
<td>13.11</td>
<td>3</td>
<td>8.57</td>
<td>11</td>
<td>11.46</td>
</tr>
<tr>
<td>Food Science &amp; Technology</td>
<td>5</td>
<td>8.20</td>
<td>0</td>
<td>0.00</td>
<td>5</td>
<td>5.21</td>
</tr>
<tr>
<td>Plant Pathology</td>
<td>6</td>
<td>9.84</td>
<td>2</td>
<td>5.71</td>
<td>8</td>
<td>8.33</td>
</tr>
<tr>
<td>Ag Engineering</td>
<td>6</td>
<td>9.84</td>
<td>4</td>
<td>11.43</td>
<td>10</td>
<td>10.42</td>
</tr>
<tr>
<td>Home Science</td>
<td>0</td>
<td>0.00</td>
<td>11</td>
<td>31.43</td>
<td>11</td>
<td>11.46</td>
</tr>
<tr>
<td>Agri-Business Management</td>
<td>13</td>
<td>21.31</td>
<td>3</td>
<td>8.57</td>
<td>16</td>
<td>16.67</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>61</td>
<td>100</td>
<td>35</td>
<td>100</td>
<td>96</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 2 shows the distribution of respondents by department: 23 male students (37.70%) and 12 female students (34.29%) from the Department of Agriculture, 13 male students (21.31%) and 3 female students (8.57%) from the Department of Agri-Business Management, 8 male students (13.11%) and 3 female students (8.57%) from the Department of Horticulture, 6 male students (9.84%) and 4 female students (11.43%) from the Department of Plant Pathology, 6 male students (9.84%) and 2 female students (5.71%) from the Department of Plant Pathology. But only 11 female students (31.43%) from the Department of Home Science.

Table 3 Respondents by age group

<table>
<thead>
<tr>
<th>Age</th>
<th>Male</th>
<th>%</th>
<th>Female</th>
<th>%</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below 20</td>
<td>31</td>
<td>50.82</td>
<td>27</td>
<td>77.14</td>
<td>58</td>
<td>60.42</td>
</tr>
<tr>
<td>Between 21 and 25</td>
<td>22</td>
<td>36.07</td>
<td>7</td>
<td>20.00</td>
<td>29</td>
<td>30.21</td>
</tr>
<tr>
<td>Between 26 and 30</td>
<td>6</td>
<td>9.84</td>
<td>1</td>
<td>2.86</td>
<td>7</td>
<td>7.29</td>
</tr>
<tr>
<td>Between 31 and 35</td>
<td>2</td>
<td>3.28</td>
<td>0</td>
<td>0.00</td>
<td>2</td>
<td>2.08</td>
</tr>
<tr>
<td>Above 35</td>
<td>0</td>
<td>0.00</td>
<td>0</td>
<td>0.00</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>61</td>
<td>100</td>
<td>35</td>
<td>100</td>
<td>96</td>
<td>100</td>
</tr>
</tbody>
</table>

The table 3 shows that 60.42% of the male students and female students who have participated in the study were from the age group of below 20, 30.21% from the age group of Between 21 and 25, 7.29% from the age group of Between 26 and 30, and 2.08% from the age group of Between 31 and 35.

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Table 4 Frequency of library visit

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Male</th>
<th>%</th>
<th>Female</th>
<th>%</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily</td>
<td>18</td>
<td>29.51</td>
<td>11</td>
<td>31.43</td>
<td>29</td>
<td>30.21</td>
</tr>
<tr>
<td>Twice a week</td>
<td>32</td>
<td>52.46</td>
<td>19</td>
<td>54.29</td>
<td>51</td>
<td>53.13</td>
</tr>
<tr>
<td>Twice a month</td>
<td>9</td>
<td>14.75</td>
<td>3</td>
<td>8.57</td>
<td>12</td>
<td>12.50</td>
</tr>
<tr>
<td>Once a month</td>
<td>2</td>
<td>3.28</td>
<td>2</td>
<td>5.71</td>
<td>4</td>
<td>4.17</td>
</tr>
<tr>
<td>Occasionally</td>
<td>0</td>
<td>0.00</td>
<td>0</td>
<td>0.00</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>61</td>
<td><strong>100.00</strong></td>
<td>35</td>
<td><strong>100.00</strong></td>
<td>96</td>
<td><strong>100.00</strong></td>
</tr>
</tbody>
</table>

Table 4 shows that more male students (14.75%) than female students (8.57%) visited the library twice a month. On the other hand, more female students than male students visited the library for twice a week 54.29% as against 52.46%, 31.43% as against 29.51% for daily basis, and 5.71% as against 3.28% for once a month.

Table 5 Time spent in library

<table>
<thead>
<tr>
<th>Time</th>
<th>Male</th>
<th>%</th>
<th>Female</th>
<th>%</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than one hour</td>
<td>8</td>
<td>13.11</td>
<td>8</td>
<td>22.86</td>
<td>16</td>
<td>16.67</td>
</tr>
<tr>
<td>One hour</td>
<td>24</td>
<td>39.34</td>
<td>8</td>
<td>22.86</td>
<td>32</td>
<td>33.33</td>
</tr>
<tr>
<td>Two to three hours</td>
<td>17</td>
<td>27.87</td>
<td>11</td>
<td>31.43</td>
<td>28</td>
<td>29.17</td>
</tr>
<tr>
<td>More than three hours</td>
<td>12</td>
<td>19.67</td>
<td>8</td>
<td>22.86</td>
<td>20</td>
<td>20.83</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>61</td>
<td><strong>100</strong></td>
<td>35</td>
<td><strong>100</strong></td>
<td>96</td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Table 5 shows that 39.34% of male students spent an hour in the library and 31.43% of female students spent two to three hours in the library. 20.83% users spent more than three hours and 16.67% spent less than an hour in the library.

Table 6 Purpose of library visit

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Male</th>
<th>%</th>
<th>Female</th>
<th>%</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>To read text books</td>
<td>8</td>
<td>13.11</td>
<td>5</td>
<td>14.29</td>
<td>13</td>
<td>13.54</td>
</tr>
<tr>
<td>To borrow &amp; return the books</td>
<td>8</td>
<td>13.11</td>
<td>3</td>
<td>8.57</td>
<td>11</td>
<td>11.46</td>
</tr>
<tr>
<td>To consult reference sources</td>
<td>5</td>
<td>8.20</td>
<td>4</td>
<td>11.43</td>
<td>9</td>
<td>9.38</td>
</tr>
<tr>
<td>To consult journals/periodicals</td>
<td>8</td>
<td>13.11</td>
<td>5</td>
<td>14.29</td>
<td>13</td>
<td>13.54</td>
</tr>
<tr>
<td>For research purpose</td>
<td>8</td>
<td>13.11</td>
<td>3</td>
<td>8.57</td>
<td>11</td>
<td>11.46</td>
</tr>
<tr>
<td>To read newspapers</td>
<td>4</td>
<td>6.56</td>
<td>2</td>
<td>5.71</td>
<td>6</td>
<td>6.25</td>
</tr>
<tr>
<td>To read magazines</td>
<td>8</td>
<td>13.11</td>
<td>6</td>
<td>17.14</td>
<td>14</td>
<td>14.58</td>
</tr>
<tr>
<td>To complete assignment</td>
<td>8</td>
<td>13.11</td>
<td>4</td>
<td>11.43</td>
<td>12</td>
<td>12.50</td>
</tr>
<tr>
<td>For e-resources &amp; services</td>
<td>4</td>
<td>6.56</td>
<td>3</td>
<td>8.57</td>
<td>7</td>
<td>7.29</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>61</td>
<td><strong>100</strong></td>
<td>35</td>
<td><strong>100</strong></td>
<td>96</td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

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Table 6 shows that 14.58% of male and female students visited the library to read magazines whereas 13.54% read textbooks, consult journals/periodicals, 12.50% of the respondents are visit the library for complete assignments respectively. 11.46% visited the library to borrow or return books and research purpose respectively. Few users visited the library to use e-resources and services.

Table 7 Reference assistance used by respondents

<table>
<thead>
<tr>
<th>Reference Assistance</th>
<th>Male</th>
<th>%</th>
<th>Female</th>
<th>%</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>To consult reference sources</td>
<td>28</td>
<td>45.90</td>
<td>12</td>
<td>34.29</td>
<td>40</td>
<td>41.67</td>
</tr>
<tr>
<td>To find appropriate books</td>
<td>17</td>
<td>27.87</td>
<td>21</td>
<td>60.00</td>
<td>38</td>
<td>39.58</td>
</tr>
<tr>
<td>To search for journals/periodicals</td>
<td>16</td>
<td>26.23</td>
<td>2</td>
<td>5.71</td>
<td>18</td>
<td>18.75</td>
</tr>
<tr>
<td>Total</td>
<td>61</td>
<td>100</td>
<td>35</td>
<td>100</td>
<td>96</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 7 shows that 41.67% of male and female students consulted reference sources and 39.58% asked for reference assistance to find appropriate books. Not many users needed reference assistance to search for journals or periodicals in the library.

Table 8 Use of library resources

<table>
<thead>
<tr>
<th>Library Resources</th>
<th>Male</th>
<th>%</th>
<th>Female</th>
<th>%</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>General books/Text books</td>
<td>11</td>
<td>18.03</td>
<td>8</td>
<td>22.86</td>
<td>19</td>
<td>19.79</td>
</tr>
<tr>
<td>Reference books</td>
<td>9</td>
<td>14.75</td>
<td>3</td>
<td>8.57</td>
<td>12</td>
<td>12.50</td>
</tr>
<tr>
<td>Journals/Periodicals</td>
<td>6</td>
<td>9.84</td>
<td>6</td>
<td>17.14</td>
<td>12</td>
<td>12.50</td>
</tr>
<tr>
<td>General magazines</td>
<td>8</td>
<td>13.11</td>
<td>5</td>
<td>14.29</td>
<td>13</td>
<td>13.54</td>
</tr>
<tr>
<td>Newspapers</td>
<td>8</td>
<td>13.11</td>
<td>4</td>
<td>11.43</td>
<td>12</td>
<td>12.50</td>
</tr>
<tr>
<td>News clippings</td>
<td>0</td>
<td>0.00</td>
<td>0</td>
<td>0.00</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>Thesis/Dissertation</td>
<td>8</td>
<td>13.11</td>
<td>3</td>
<td>8.57</td>
<td>11</td>
<td>11.46</td>
</tr>
<tr>
<td>Conference proceedings</td>
<td>8</td>
<td>13.11</td>
<td>2</td>
<td>5.71</td>
<td>10</td>
<td>10.42</td>
</tr>
<tr>
<td>Technical reports</td>
<td>0</td>
<td>0.00</td>
<td>2</td>
<td>5.71</td>
<td>2</td>
<td>2.08</td>
</tr>
<tr>
<td>E-resources</td>
<td>3</td>
<td>4.92</td>
<td>2</td>
<td>5.71</td>
<td>5</td>
<td>5.21</td>
</tr>
<tr>
<td>Total</td>
<td>61</td>
<td>100</td>
<td>35</td>
<td>100</td>
<td>96</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 8 shows that 19.79% of male and female students have used general books and text books, 13.54% used general magazines, 12.50% used reference books, journals/periodicals and newspapers in the library. 11.46% used thesis/dissertation, 10.42% used conference Proceedings. But very few of the respondents have used e-resources and technical reports respectively in the library.
Table 9 Major Problems that hinder library use

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Male</th>
<th>%</th>
<th>Female</th>
<th>%</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inadequacy of recent publications and current core journals</td>
<td>12</td>
<td>19.67</td>
<td>9</td>
<td>25.71</td>
<td>21</td>
<td>21.88</td>
</tr>
<tr>
<td>Difficulties in locating the needed materials</td>
<td>20</td>
<td>32.79</td>
<td>4</td>
<td>11.43</td>
<td>24</td>
<td>25.00</td>
</tr>
<tr>
<td>Insufficient space, material and equipment</td>
<td>16</td>
<td>26.23</td>
<td>5</td>
<td>14.29</td>
<td>21</td>
<td>21.88</td>
</tr>
<tr>
<td>Incompetent and unqualified staff</td>
<td>8</td>
<td>13.11</td>
<td>11</td>
<td>31.43</td>
<td>19</td>
<td>19.79</td>
</tr>
<tr>
<td>Old, damaged, mutilated books and journals</td>
<td>5</td>
<td>8.20</td>
<td>6</td>
<td>17.14</td>
<td>11</td>
<td>11.46</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>61</td>
<td>100</td>
<td>35</td>
<td>100</td>
<td>96</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 9 shows that 25% of male and female students had difficulties in locating materials. 21.88% of them found the inadequacy of recent publications and current core journals and insufficient space, material and equipment. On the other hand, 19.79% of the respondents found that the library staff incompetent and unqualified. 11.46% reported that books and journals were old, damaged or mutilated.

Table 10 Library services

<table>
<thead>
<tr>
<th>Services</th>
<th>Male</th>
<th>%</th>
<th>Female</th>
<th>%</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lending Service</td>
<td>28</td>
<td>45.90</td>
<td>14</td>
<td>40.00</td>
<td>42</td>
<td>43.75</td>
</tr>
<tr>
<td>Reference Service</td>
<td>16</td>
<td>26.23</td>
<td>7</td>
<td>20.00</td>
<td>23</td>
<td>23.96</td>
</tr>
<tr>
<td>Inter-Library Loan</td>
<td>8</td>
<td>13.11</td>
<td>3</td>
<td>8.57</td>
<td>11</td>
<td>11.46</td>
</tr>
<tr>
<td>CAS/SDI</td>
<td>7</td>
<td>11.48</td>
<td>3</td>
<td>8.57</td>
<td>10</td>
<td>10.42</td>
</tr>
<tr>
<td>Bibliographical Service</td>
<td>0</td>
<td>0.00</td>
<td>2</td>
<td>5.71</td>
<td>2</td>
<td>2.08</td>
</tr>
<tr>
<td>Indexing/Abstracting Service</td>
<td>4</td>
<td>6.56</td>
<td>5</td>
<td>14.29</td>
<td>9</td>
<td>9.38</td>
</tr>
<tr>
<td>CD-ROM databases Service</td>
<td>4</td>
<td>6.56</td>
<td>7</td>
<td>20.00</td>
<td>11</td>
<td>11.46</td>
</tr>
<tr>
<td>E-journals</td>
<td>9</td>
<td>14.75</td>
<td>4</td>
<td>11.43</td>
<td>13</td>
<td>13.54</td>
</tr>
<tr>
<td>Reprographic Service</td>
<td>12</td>
<td>19.67</td>
<td>15</td>
<td>42.86</td>
<td>27</td>
<td>28.13</td>
</tr>
<tr>
<td><strong>Others</strong></td>
<td>4</td>
<td><strong>6.56</strong></td>
<td>2</td>
<td>5.71</td>
<td>6</td>
<td><strong>6.25</strong></td>
</tr>
</tbody>
</table>

(Note: multiple response were permitted)

Table 10 shows that male and female respondents opined that the Lending Service was used by 43.75% of the respondents, Reprographic Service 28.13%, Reference Service 23.96%, etc.
Table 11 Satisfaction about library services

<table>
<thead>
<tr>
<th>Satisfaction</th>
<th>Male</th>
<th>%</th>
<th>Female</th>
<th>%</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very satisfied</td>
<td>21</td>
<td>34.43</td>
<td>11</td>
<td>31.43</td>
<td>32</td>
<td>33.33</td>
</tr>
<tr>
<td>Satisfied</td>
<td>16</td>
<td>26.23</td>
<td>14</td>
<td>40.00</td>
<td>30</td>
<td>31.25</td>
</tr>
<tr>
<td>Partial satisfied</td>
<td>16</td>
<td>26.23</td>
<td>6</td>
<td>17.14</td>
<td>22</td>
<td>22.92</td>
</tr>
<tr>
<td>Not satisfied</td>
<td>8</td>
<td>13.11</td>
<td>4</td>
<td>11.43</td>
<td>12</td>
<td>12.50</td>
</tr>
<tr>
<td>Total</td>
<td>61</td>
<td>100</td>
<td>35</td>
<td>100</td>
<td>96</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 11 shows that 33.33% of male and female students were very satisfied with the quality of library services, 31.25% satisfied, 22.92% partial satisfied, and 12.50% not satisfied.

Table 12 Satisfaction about present library hours

<table>
<thead>
<tr>
<th>Opinion</th>
<th>Male</th>
<th>%</th>
<th>Female</th>
<th>%</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sufficient</td>
<td>52</td>
<td>85.25</td>
<td>32</td>
<td>91.43</td>
<td>84</td>
<td>87.50</td>
</tr>
<tr>
<td>Insufficient</td>
<td>9</td>
<td>14.75</td>
<td>3</td>
<td>8.57</td>
<td>12</td>
<td>12.50</td>
</tr>
<tr>
<td>Total</td>
<td>61</td>
<td>100</td>
<td>35</td>
<td>100</td>
<td>96</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 12 shows that 87.50% of male and female students were satisfied with the present library hours and 12.50% not satisfied.

FINDINGS AND SUGGESTIONS

The following important findings have been drawn

1. The result shows that the respondent visit to the library has 31.43% females as against 29.51% males for daily basis.
2. The result also found that 14.58% of male and female students visited the library to read magazines whereas 13.54% read textbooks, consult journals/periodicals.
3. The results shows that 19.79% of male and female students have used general books and text books, 13.54% used general magazines, 12.50% used reference books, journals/periodicals.
4. The result also found that 33.33% of male and female students were very satisfied with the quality of library services, 31.25% satisfied, 22.92% partial satisfied, and 12.50% not satisfied.
5. The result also found that the entire respondent used computer / online service.
6. Regarding the ICT service, most of the staff members are fully satisfied, E-Mail, Internet, OPAC system and online journals.

7. Further the researcher found that On-line electronic journals and research project sites are very useful.

CONCLUSION

The present study finds that male and female students at Acharya N.G. Ranga Agricultural University, Hyderabad appreciate the services provided by the library but at the same time expect more. There are a number of issues, such as lack of competent staff that create barriers in providing information services to users. It is unlikely that any library could provide all preferred documents to users but at least it should make more efforts to solicit users’ input on purchasing new books, periodicals, and other print and non-print information materials to better cater to the needs of the user community. A better policy should be formulated and implemented in order to improve the quality of the library collection. Focus groups, advisory groups, etc., could be established to solicit suggestions or recommendations on information sources. A systematic training of library staff on the use of latest technology should be implemented to improve the quality of library services. And user orientation should be accessible on a regular basis. There should also be some way for users to judge the value of library resources and services.

REFERENCES

1. Acharya N.G. Ranga Agricultural University, Hyderabad, URL: http://www.angrau.net/Library.htm


A STUDY ON INFORMATION NEEDS AND SEARCH STRATEGIES OF AGRICULTURAL SCIENTISTS OF TAMIL NADU AGRICULTURAL UNIVERSITY

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University Library
Tamilnadu Agricultural University, Coimbatore

Dr. K.Chinnasamy
Professor & Head
Dept. of Library and Information Science
Madurai Kamaraj University, Madurai

ABSTRACT
The agriculturalists role in the transfer of technology from lab to land is commendable. The central purpose of an agricultural library is to improve the agricultural research and disseminate the findings to the target population, the farmers. Therefore, it is an urgent need to focus on the information needs and search strategies of the agricultural scientists covering all facets. In this paper, an attempt is made to have a clear understanding of the various concepts related to information search of agriculture scientists and their utilization pattern.

INTRODUCTION
Information needs of scientists are generally considered to be met through the well established scientific system and secondary bibliographic services. Yet scientists’ initial source of information is generally people specially their colleagues. Scientists communicate with their colleagues via telephone, electronic mail, correspondence, conferences, and so forth. They exchange preprints and proposals. Busch and Lacy (1983) observe that although formal scientific communication is highly visible and the informal network difficult to observe, both are equally important. The age, gender, experience and designation are the variables in determining their information search capacity and resource utilization.

OBJECTIVES
- To elucidate the types of agricultural information resources and delivery mechanisms available to the agricultural scientists
- To assess the purpose and mode of information search of the agricultural scientists.
- To identify the action performed to keep abreast of current knowledge and developments by the agricultural scientists.
- To develop strategies for efficient use of available information resources.
NEED FOR INFORMATION

Singh et al. (2006) presented a useful review work which concludes that agriculture as a critical sector for national economy and major source of livelihood for the people of developing countries particularly India. Though India possesses valuable agriculture knowledge and expertise, a wide information gap exists between research and practice. Krishna Reddy and Ankaiah (2005) proposed a cost effective agricultural information dissemination system (AgriIDS) to bridge the gap. Aderreti (2005) put forward the recommendation that the extension agents and the agricultural teachers should work hand in hand so as to make the dissemination of agricultural information effective even at the grass root level.

Singh and Satija (2007) who conducted a research study on information seeking behaviour of agricultural scientists through a structured questionnaire identified that agricultural scientists seek information from varied sources for different purposes. Scientific journals have been ranked first for obtaining specific information and keeping up-to-date. The working culture of the individual needing information, the importance placed on getting it, the facilities available for seeking it, the knowledge about these facilities, the judgment of their values, and the probability of getting what is wanted are the factors that may affect information seeking behavior.

Moreover, libraries also need to strengthen their promotional activities to acquaint scientists with available resources, services and facilities. The librarian should come forward to understand the actual need and exact field of interest that the agriculturalists have their priority and to reform the library resources making the collection more purposeful and need based. The study conducted by Devendra Kumar (2010) indicates that the agricultural scientists are much diversified in the information they seek, the sources they access and use they make of the information. With this view, an attempt has been made in this paper to assess the Information needs and Search Strategies of Agricultural Scientists of Tamil Nadu Agricultural University.

METHODOLOGY

Questionnaires were used for data collection. A total of 100 questionnaires were administered and 80 questionnaires were obtained back from the scientists. Out of the 80 questionnaires 72 questionnaires were selected for analysis and eight were rejected because of incomplete response from the respondents.

SAMPLE POPULATION

University Scientists of Tamil Nadu Agricultural University were taken for the study. Owing to the suitability of the study more emphasis was given to the scientists who are working in the extension department of the university.
BACKGROUND
From the personal data of the respondents the following conclusions were drawn. Out of the total population, two-fifths (40%) of the respondents belong to the age group of 31 – 40, two-fifths belong to the age group of 41 – 50 and the remaining one-fifth belongs to the age group of 51 and above. The gender analysis shows that a few less than two-thirds (63.3%) of the respondents are male and a few more than one-third (36.7%) are female. One-third (33.3%) of them are professors, 43.3% are assistant professors and 23.3% are associate professors. This information was obtained from the designation analysis. The qualification analysis shows that nearly three-fourths (73%) have PhD and some of them (13.3%) have post doctorate too. While a few more than one-third (36.7%) of the respondents have up to 10 years of experience, few less than one-third (30%) have 11 to 20 years and one-third (33.3%) of them have more than 20 years of experience. This work presented is based on the four variables viz., age, gender, designation and experience of the respondents.

WORK CULTURE
To assess the distribution of time a survey was carried out among the respondents. Many of the respondents spend up to 3 hours per day on research. Around one-fourth (26.7%) of them spend 4 to 6 hours. In the case of teaching, nearly two-thirds (63.3%) spend up to 3 hours per day and nearly one-fourth (23.3%) of them spend 4 to 6 hours. Half (50%) of the respondents spend time on extension work. Two-fifths (40%) spend up to 3 hours per day on extension work. More than half (53%) of the respondents spend up to 3 hours per day on administration work. The nature of work and the distribution of time also play in determining the urge for information search.

DATA ANALYSIS AND INTERPRETATION
Purpose and mode of information search
Four out of five (80%) of the respondents regularly engage in information search for the purpose of research work. More than half (53.3%) of the respondents regularly search information for the purpose of general awareness.

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Purpose of Information search</th>
<th>No. of Respondents</th>
<th>Percentage %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Research work</td>
<td>57</td>
<td>80</td>
</tr>
<tr>
<td>2</td>
<td>General awareness</td>
<td>36</td>
<td>53.3</td>
</tr>
<tr>
<td>3</td>
<td>New Investigations</td>
<td>34</td>
<td>46.7</td>
</tr>
<tr>
<td>4</td>
<td>Preparing answers to questions</td>
<td>26</td>
<td>36.7</td>
</tr>
<tr>
<td>5</td>
<td>Class notes Preparation</td>
<td>65</td>
<td>90</td>
</tr>
<tr>
<td>6</td>
<td>Observation and experiments</td>
<td>31</td>
<td>43.3</td>
</tr>
<tr>
<td>7</td>
<td>Preparing lectures</td>
<td>36</td>
<td>53.3</td>
</tr>
<tr>
<td>8</td>
<td>Extension activities</td>
<td>19</td>
<td>26.7</td>
</tr>
</tbody>
</table>
A few less than half (46.7%) regularly search for information to conduct new investigations. More than one-third (36.7%) of them conduct information search regularly for getting answers to questions. Nine out of ten (90%) engage in regular search for preparing class notes. For a few more than two-fifths (43.3%), information search is for observation and experiments. For more than half (53.3%), it is for preparing / supplementing lectures. For an equal number of them, it is for discussions. More than one-fourth (26.7%) engage in information search for the purpose of extension activities.

Sources of Information

Agricultural scientists receive information either through formal sources like; Books, journals, Internet, conference proceedings etc., or through informal sources like; Conversation with colleagues, discussion forum, e-mail etc., The data collected were analysed and the percentages of use are given below (Table 2 and 3)

Formal Sources

Table 2 Utilization level of Formal Resources

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Sources of Information</th>
<th>No. of Respondents</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Books / monographs</td>
<td>67</td>
<td>93.4</td>
</tr>
<tr>
<td>2</td>
<td>Scientific-technical journals</td>
<td>67</td>
<td>93.4</td>
</tr>
<tr>
<td>3</td>
<td>Internet / intranet sources</td>
<td>67</td>
<td>93.4</td>
</tr>
<tr>
<td>4</td>
<td>Conference / workshop / seminar proc.</td>
<td>65</td>
<td>90.0</td>
</tr>
<tr>
<td>5</td>
<td>Review articles</td>
<td>62</td>
<td>86.7</td>
</tr>
<tr>
<td>6</td>
<td>Reference sources</td>
<td>60</td>
<td>83.3</td>
</tr>
<tr>
<td>7</td>
<td>Online consortium journals</td>
<td>60</td>
<td>83.3</td>
</tr>
<tr>
<td>8</td>
<td>Theses</td>
<td>60</td>
<td>83.3</td>
</tr>
<tr>
<td>9</td>
<td>Patents / reports / standard specifications</td>
<td>50</td>
<td>70.0</td>
</tr>
</tbody>
</table>

The conventional sources like books, monographs and journals and the ICT resources internet are topping the list with equal status.

Informal sources

Table 3 Utilization level of Informal Resources

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Informal sources of information</th>
<th>No. of Respondents</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Conversations with colleagues</td>
<td>70</td>
<td>96.7</td>
</tr>
<tr>
<td>2</td>
<td>Email / list-serve / discussion forum</td>
<td>67</td>
<td>93.3</td>
</tr>
<tr>
<td>3</td>
<td>Interaction with knowledgeable persons</td>
<td>67</td>
<td>93.3</td>
</tr>
<tr>
<td>4</td>
<td>Agriculture portals</td>
<td>65</td>
<td>90</td>
</tr>
<tr>
<td>5</td>
<td>Private correspondence</td>
<td>60</td>
<td>83.3</td>
</tr>
<tr>
<td>6</td>
<td>Social networks / blogs / RSS feed / Face book</td>
<td>60</td>
<td>83.3</td>
</tr>
<tr>
<td>7</td>
<td>Previous knowledge</td>
<td>58</td>
<td>80</td>
</tr>
<tr>
<td>8</td>
<td>Discussion with library staff</td>
<td>50</td>
<td>70</td>
</tr>
</tbody>
</table>
The informal sources of information utilized by scientists include conversation with colleagues, informal e-mails, portals and others were analyzed and their positions are given in Table 3. Informal conversations with colleagues, interactions with knowledgeable persons and in forums are topping the list with almost equal percentage.

Preference of information source

It is interesting to note that 100% of the respondents prefer internet as a resource in their activities both for academic and personal endeavors. Besides, their preference of journals, library books, fellow workers and co-workers are on the top in the utilization of information resources. The other upcoming resources like journal abstracts, list serves, citations and electronic articles are maintaining the same level (86.7%) and also at the best use. Table 4 shows the relevant details.

Table 4 Preference of information sources

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Information Resources</th>
<th>No. of Respondents</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Internet</td>
<td>72</td>
<td>100</td>
</tr>
<tr>
<td>2</td>
<td>Journals</td>
<td>72</td>
<td>100</td>
</tr>
<tr>
<td>3</td>
<td>Library Books</td>
<td>69</td>
<td>96.7</td>
</tr>
<tr>
<td>4</td>
<td>Conversing with Co-workers</td>
<td>69</td>
<td>96.7</td>
</tr>
<tr>
<td>5</td>
<td>E-mailing Co-workers / Experts</td>
<td>69</td>
<td>96.7</td>
</tr>
<tr>
<td>6</td>
<td>Conversing with External Experts</td>
<td>67</td>
<td>93.3</td>
</tr>
<tr>
<td>7</td>
<td>Periodicals</td>
<td>65</td>
<td>90.0</td>
</tr>
<tr>
<td>8</td>
<td>Reading E-mail Alerts</td>
<td>65</td>
<td>90.0</td>
</tr>
<tr>
<td>9</td>
<td>Journal Abstracts</td>
<td>62</td>
<td>86.7</td>
</tr>
<tr>
<td>10</td>
<td>Discussion Lists / List Serves</td>
<td>62</td>
<td>86.7</td>
</tr>
<tr>
<td>11</td>
<td>Scanning Journal Titles / Citations</td>
<td>62</td>
<td>86.7</td>
</tr>
<tr>
<td>12</td>
<td>Reading Electronic Articles</td>
<td>62</td>
<td>86.7</td>
</tr>
<tr>
<td>13</td>
<td>Searching Electronic Databases</td>
<td>60</td>
<td>83.3</td>
</tr>
<tr>
<td>14</td>
<td>Library Catalogue</td>
<td>58</td>
<td>80.0</td>
</tr>
</tbody>
</table>

Methods of getting Information from the Library

The methods of getting information from the library as adopted by the respondents include personal visit, online search, personal assistants etc., Even today majority of the respondents visit library personally to procure books and non-book materials.
Table 5 Methods of getting Information from the Library

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Methods of getting Information from the Library</th>
<th>No. of Respondents</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Personal Visit</td>
<td>65</td>
<td>90</td>
</tr>
<tr>
<td>2</td>
<td>Online Search</td>
<td>50</td>
<td>70</td>
</tr>
<tr>
<td>3</td>
<td>Sending Subordinates / Research Scholars / Students</td>
<td>41</td>
<td>56.7</td>
</tr>
<tr>
<td>4</td>
<td>Sending E-mail</td>
<td>26</td>
<td>36.6</td>
</tr>
<tr>
<td>5</td>
<td>Sending Assistants</td>
<td>24</td>
<td>33.3</td>
</tr>
<tr>
<td>6</td>
<td>Calling Library</td>
<td>20</td>
<td>26.6</td>
</tr>
</tbody>
</table>

The role of personal assistant and research scholars is also there for the specified purpose. Most of the scientists are equipped with electronic resources of their own. The usage of such resources at the library is less and shows a decreasing trend as given in Table 5.

Statistical Analysis

Table 6 Independent Variable Analysis (ANOVA)

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>N</th>
<th>Mean</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>31 – 40</td>
<td>12</td>
<td>22.3333</td>
<td>3.251</td>
<td>.054</td>
</tr>
<tr>
<td>41 – 50</td>
<td>12</td>
<td>22.0000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>51 &amp; above</td>
<td>6</td>
<td>19.0000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>19</td>
<td>21.1053</td>
<td>1.099</td>
<td>.304</td>
</tr>
<tr>
<td>Female</td>
<td>11</td>
<td>22.2727</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Designation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assistant Professor</td>
<td>13</td>
<td>22.0000</td>
<td>1.402</td>
<td>.264</td>
</tr>
<tr>
<td>Associate Professor</td>
<td>7</td>
<td>22.4286</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Professor</td>
<td>10</td>
<td>20.3000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Experience</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Up to 10</td>
<td>11</td>
<td>22.2727</td>
<td>1.371</td>
<td>.271</td>
</tr>
<tr>
<td>11 – 20</td>
<td>9</td>
<td>22.0000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21 &amp; above</td>
<td>10</td>
<td>20.3000</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

390
The data collected through structured questionnaires were analysed with anova tool to find the significant variation among the variables. The four independent variables viz., age, gender, designation and experience were correlated with the other parameters. The correlation results are presented in Table 6. None of the F values in the table is significant. It shows that the respondents do not differ significantly in adopting various modes of information search in terms of their age, gender, designation and experience. Only in the case of age the value is close to significance at 0.05 level, and the mean scores show that information search is relatively less among the older respondents above the age of 50.

CONCLUSION

The scientists’ information needs are met with formal and informal sources. Journals and books are the most preferred materials under formal sources. It was equally worth noting that interaction with professional colleagues and members of discussion forum is considered as an important informal source for information exchange. Four out of five of the respondents regularly engage in information search for the purpose of research work. More than half of the respondents regularly search information for the purpose of general awareness. A few less than half of the respondents regularly search for information to conduct new investigations. The respondents do not differ significantly in adopting various modes of information search in terms of their age, gender, designation and experience.

REFERENCES

PROMOTING PUBLISHING PRACTICE AMONG P.G DOCTORAL STUDENTS THROUGH MED. E-J; BEST PRACTICE IN TAMIL NADU DR.M.G.R.MEDICAL UNIVERSITY, CHENNAI: A CASE STUDY

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“Information literacy is a set of abilities requiring individuals to recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information”

– American Literacy Association,

ABSTRACT

The advent of E-publishing has brought a revolution in journal publication, subscription and access delivery mechanism. In the event of the present atmosphere this paper discusses the necessity of the “med ej”(Medical Electronic Journal) an online e-journal of the Tamil Nadu Dr. M.G.R. Medical University is not only a milestone in the history of our University,, By launching this prestigious online initiative have made the journal digital, thus creating better opportunities for students to go global level.

INTRODUCTION

Electronic publishing will become common place at many places as faculty and researchers who serve on editorial boards seek ways to shift existing journals into this format while others seek to establish new and competitive electronic publications. Libraries can offer their technological and human resources to provide a site for developing, testing and archiving electronic publications. This activity requires a collaborative effort among libraries, faculty as the subject specialist and technologists. With the emergence of IT applications and particularly internet, there has been a shift from traditional print journal to E-Journal. E-Journals have many advantages. One can access it round the clock, across geographical barriers, which make e-journal omnipresent. Another important advantage of e-journals is that more than one person can access it at a time. The goal is to provide desktop access to freely available electronic version of journals.
WHAT IS AN ELECTRONIC JOURNAL (E-JOURNAL)?

Various names such as
- Online journals
- Electronic serials or e-serials
- Electronic periodicals
- Digital serials or d-journals

Concept of E-Journal
- An electronic journal, as its name implies, is a serial containing research papers, review articles, scholarly communications, issued periodically in electronic form
- E-Journals may be defined very broadly as any journals, magazine, e’zine, webzine, newsletters or any type of
- Electronic serial publication which is available over the Internet in the electronic environment
- Teaching, learning and research are being supported by e-journals as new powerful tools
- It has an impact not only on libraries but on authors and publishers to for correct and timely information

Benefit to Users
- Independent of space and time
- Interact with other electronic resources
- Save user’s time (Dr.S.R. Ranganthan’s Fourth Law of Library Science)
- Provides value addition such as search ability, supplements, formats unavailable in print formats
- Accelerated publication
- Can be read by multiple users simultaneously
- Can not be mutilated, stolen, lost vandalized etc,

Benefit to Libraries
- Superior resource delivery
- Improved service
- Potentiality of accurate usage to help collection development decisions
- Cost savings
- Reduced shelving, binding, maintenance, claiming
Public relation opportunities
Provided an opportunity for concrete user education
Satisfied users
Simultaneous access

Advantages of electronic journals
• Speed
• Easily searchable
• Interactive
• Accessible
• Links
• Added value
• Inexpensive
• Flexibility

Disadvantages of electronic journals
• Difficulty reading computer screens
• Search engines ignore PDF files,
• Coverage may not be as complete as in print format
• Authentication issues
• Archival issues and long term preservation
• Less control
• Users technology does not always keep up with e-journal technology
• Temporary unavailability due to technical reasons
• Managing e-journals require skilled manpower

ROLE OF VIRTUAL LIBRARY
Virtual Library also known as a Digital Library or an Electronic Library may be defined as the online facility provided by a conventional library to read books and access other facilities or it may mean a website which offers links to various sites with a large store of information in a catalogued or archived form. It is generally a part of a network with linkages to other libraries providing universal access to information through Virtual Libraries.
The Tamil Nadu Dr. M.G.R. Medical University is situated in Southern part of the City of Chennai (formerly Madras) in the State of Tamil Nadu, South India. It is about 6 Km from the Chennai International & National Airport and about 12km from the Chennai Central Railway Station.

The Tamil Nadu Dr.M.G.R. Medical University Act, 1987 (Act No.37 of 1987) received the assent of the President of India on 24th September, 1987. By Act No.9 of 1991, it was ordered that the Act may be called the Tamilnadu Dr. M.G.R. Medical University, Chennai, Act, 1987. This affiliating University started functioning from July 1988 and is governed by the said Act.

It is one of the premier Medical Universities of India named after the former Chief Minister of Tamilnadu, late Dr. M.G.Ramachandran (M.G.R) and it is the second largest Health Sciences University in India.

"Med- ej"(Medical Electronic Journal)

Med ej is the official e-journal of The Tamilnadu Dr.M.G.R. Medical University, Chennai. The articles for this e-journal will be the scientific papers submitted by the Post Graduate students of this University. This new system was initiated by the Vice Chancellor Prof.Dr. Mayil Vahanan Natarajan to start with the first step and in the right direction to help the students to publish their scientific papers. For the student should have an internet connection to access and submit the scientific paper.

Every Postgraduate student of the University is expected to publish one scientific paper in this e-journal before they appear for their final University examination. This has been made mandatory for the postgraduate students - M.D. / M.S. and D.M. /M.Ch. (April and August 2012 onwards)

Student should submit the paper at least 2 or 3 months before the exam begins, so that if a reviewer disapproves the scientific paper, students will have time to receive and resubmit again with the corrections or submit a new one copy of the first page.

The post graduate students have to submit their scientific paper only through the e-interface available at http://medej.tnmgrmu.ac.in. The cumbersome and traditional evaluation process is eliminated. This digital paper will be reviewed by a competent faculty through this fully automated and fool proof system that will completely process the scientific paper online.

The med ej committee will choose the best scientific papers at regular intervals and publish them online which will be available for the benefit of medical fraternity.
The launching of "med ej" an online e-journal of the Tamil Nadu Dr. M.G.R. Medical University is not only a milestone in the history of our University. But also this prestigious online initiative made the journal digital, thus creating better opportunities for students to go global.

CONCLUSION
With the emergence of Information Technology and particularly the internet, there is a transition in libraries from traditional print journals to electronic journals (e-journal) also solved. This has the major problems faced by the librarians/students /scholars such as postal delay, follow up of missing issues, binding, shelving etc.

When the student patrons begin to rely on electronic full texts, they often don’t bother to check print journal stacks. So it is especially important for libraries to provide a wide variety of online journals, since most patrons will select the digital versions, even if a particular title or article is not best suited for their needs.

Almost all types of users perceive many advantages of electronic journals, in particular when electronic journals are convenient for their work. The speed of access, desktop availability, and convenience of downloading and printing most often are mentioned as advantages.

REFERENCES
2. http://www.tnmgrmu.ac.in
3. http://www.tnmgrmu.ac.in/virlib.htm
E-RESOURCES IN AGRICULTURE IN INDIA WITH SPECIAL REFERENCE TO INDIAN VETERINARY RESEARCH INSTITUTE, IZATNAGAR (U.P.)

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ABSTRACT

Consortium for e-Resources in Agriculture is an e-consortium of Agricultural Libraries under Indian council of Agricultural Research for National Agricultural Research System and central/ state Agricultural Universities. E-Resources are the need of hour for fast development in agricultural sector in India. It is necessary for providing better, quick, accurate and in time information services in agriculture system through online resources. The Indian Council of Agricultural Research (ICAR) appointed many committees to meet the challenges of providing agricultural information to the users. Indian Veterinary Research Institute (IVRI) is the first premier scientific research Institute & one of the oldest Institute in India. National Library of Veterinary Sciences (NLVS), IVRI has also been participating in research and study activities for development in this specific area of the agricultural science. Krishi Prabha, CeRA, AGRIS and e-Granth projects are functioning in NLVS, IVRI, Izatnagar for e-Resources development in the field of veterinary sciences under NARS.

Keywords: ITC, e-resources, e-Journal, NARS, ICAR, IVRI, NLVS, Krishi Prabha, CeRA, AGRIS, e-Granth.

INTRODUCTION

Indian Council of Agricultural Research (ICAR) is an autonomous organization under the Department of Agricultural Research and Education (DARE), Ministry of Agriculture, Government of India. It is the apex body for co-ordinating, guiding and managing research and education in agriculture including horticulture, fisheries and animal sciences in the entire country. With 97 ICAR institutes, 05 deemed university, 46 state agricultural universities; one central agricultural university and 589 KVKs spread across the country, this is one of the largest National Agricultural Research Systems (NARS) in the world. The ICAR has played a pioneering role in ushering Green Revolution and subsequent developments in agriculture in India through its research and technology development.
HISTORY OF E-RESOURCES IN NARS

In the past, the Indian Council of Agricultural Research (ICAR) appointed many committees to meet the challenges of providing agricultural information to the users. The ICAR review committee as early 1988 recommended an integrated information system and databases through an electronic network linking NARS institutions, support planning and management of agricultural research and education to a computerised satellite-based Information Network 'ICARNET'. In 1991 the ICAR initiated a computer based network Agricultural Research Information System (ARIS). In 1997 NATP funded by World Bank was launched with the aim of strengthening the country’s Agriculture Research System. NATP has been implemented in ICAR institutes, SAUs and other organizations. Information System Development (ISD) was the sub-component of NATP. It supported Agricultural Research Information System (ARIS) and Library Improvement & Networking. The regular efforts have been made for automation, networking and strengthening of Indian Agricultural libraries under Library Improvement & Networking.

INDIAN VETERINARY RESEARCH INSTITUTE LIBRARY

The Indian Veterinary Research Institute (IVRI) is the first premier scientific research Institute of its kind established in India as Imperial Bacteriological Laboratory at Pune in 1889. The Institute has been embarking upon extensive programmes of research in frontier areas to improve animal health and production. The IVRI Library known as National Library of Veterinary Sciences is perhaps the oldest library in this specialized area in the country. This library was started as an integral part of the Imperial Bacteriological Laboratory since its foundation on December 9, 1889 in Pune. The present library building has around 3210 sq mts. area. Area of reading room is about 826 sq mts & carpet area of stack room is 1840 sq mts. The library has been using Dewey Decimal Classification Scheme for classification of the publications. The library has seating capacity of 125 readers with two reading halls, one computer section and three stack areas.

MAJOR SERVICES OF NLVS

Library Automation: The library is using Libsys automation software version 4.0 on Linux based server and is being used on LAN. The books, theses, bound volumes of journals and other publications are being bar-coded. The bar-coded photo Identity cards are being provided to the library members. The circulation work is automated using laser bar-code reader.

CD-ROM Services: A CD-Mirror Hybrid Server is being used for CD-ROM services and the service is being provided on LAN. The various databases i.e. Agris CD, Beast CD, Biological Abstracts, Biotechnology Abstracts, FSTA, Medline Express and Vet CD databases are available on CD Mirror Server. About 182 users were trained for using the CD-ROM services themselves and about 751 users availed CD-ROM facilities.
**E-mail & Internet Facilities:** This library is providing E-mail & Internet facilities on 24 terminals to its users.

**Membership of e-CERA:** This library is a member of CeRA, a Consortium for e-Resources in Agriculture, set up under NAIP, ICAR alongwith other institute and SAU libraries. Under e-CERA, Institute is getting access to about 2000 full text online journals. Necessary services are being exchanged with the member libraries under the consortium.

**e-Granth Project under NAIP:** This library is a consortium partner of 12 libraries of various ICAR institutes and SAUs under NAIP (Component I) on “Strengthening of Digital Library and Information Management under NARS (e-Granth)”. Under this project a Union Catalogue of all the partners “AGRICAT” has been created and about 22500 records of this library are available Agricat. Further a Digital Library of Institute Depositories of National Agricultural Research System (NARS) is being created.

**Consortium of Agriculture e-Resources in India**
- Krishi Prabha
- CeRA
- AGRIS
- e-Granth

**KrishiPrabha (e-theses portal of Agricultural and veterinary Sciences)**
It is repository of ‘Indian Agricultural Doctoral Dissertations’. KrishiPrabha is a full-text electronic database of Indian Agricultural Doctoral Dissertations submitted by research scholars to the 45 State/ Deemed Agricultural University. Online submission of dissertations for continues updating the data by member library of the universities. IP based access of full-text database to 125 Consortia Partners and abstracts accessible to non member world over. In the database full-text doctoral dissertations are available from 2000 to 2009. At present about 7465 full-text doctoral dissertations are available on this database. The Nehru Library, CCSHAU, Hisar (Lead Centre) to facilitate accessibility of database full-text doctoral dissertations to the researchers, teachers and students of NARS for excellence in research.

Contribution of NLVS, IVRI in Krishi Prabha – all soft copies Doctoral Dissertations of veterinary sciences submitted to Lead Centre (i.e. Nehru Library, CCS Haryana Agricultural University Hisar) from the year 2000 onwards. The National Library of Veterinary Sciences is providing online services on the IP based access of full-text dissertation database to their student, researcher, scientist and other users of the library.
The Doctoral Dissertations broadly category as under:

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Category of Doctoral Dissertations</th>
<th>Records</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Agricultural Engineering and Technology</td>
<td>158</td>
</tr>
<tr>
<td>2</td>
<td>Agriculture</td>
<td>4568</td>
</tr>
<tr>
<td>3</td>
<td>Basic Sciences</td>
<td>1196</td>
</tr>
<tr>
<td>4</td>
<td>Dairy Science</td>
<td>123</td>
</tr>
<tr>
<td>5</td>
<td>Home Science</td>
<td>280</td>
</tr>
<tr>
<td>6</td>
<td>Veterinary and Animal Sciences</td>
<td>1140</td>
</tr>
</tbody>
</table>

Doctoral Dissertations submitted to the IVRI (Deemed University) and NLVS from 2008-2011 shown in table as under:

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Year</th>
<th>Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2088</td>
<td>45</td>
</tr>
<tr>
<td>2</td>
<td>2009</td>
<td>41</td>
</tr>
<tr>
<td>3</td>
<td>2010</td>
<td>39</td>
</tr>
<tr>
<td>4</td>
<td>2011</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>185</td>
</tr>
</tbody>
</table>
CeRA (Consortium for e-Resources in Agriculture)

The CeRA has been updated to cover major publishers and being subscribed since 2008. The CeRa provide almost all reputed international journals online. The ICAR is having network connectivity across institute, deemed universities and state agricultural universities. These journals are made available over the network for the use of research community. National Agricultural Innovation Project (NAIP) has funded for establishing the consortium for e-resources in agriculture (CeRA). The Indian Agricultural Research Institute (IARI), New Delhi has provided facilities for accessibility of scientific journals to the researchers, teachers and students of NARS for excellence in research. [3]

The CeRA consortium covers the main publishers named as under –

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Publisher</th>
<th>CS Full-Text Journals</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>American Society of Agronomy</td>
<td>8</td>
</tr>
<tr>
<td>2</td>
<td>Annual Reviews Inc.</td>
<td>22</td>
</tr>
<tr>
<td>3</td>
<td>CISO Publishing</td>
<td>8</td>
</tr>
<tr>
<td>4</td>
<td>Elsevier Science</td>
<td>358</td>
</tr>
<tr>
<td>5</td>
<td>IndianJournals. com</td>
<td>131</td>
</tr>
<tr>
<td>6</td>
<td>Oxford Journals</td>
<td>30</td>
</tr>
<tr>
<td>7</td>
<td>Springer Link (Springer-Verlay)</td>
<td>70</td>
</tr>
<tr>
<td>8</td>
<td>Taylor &amp; Francis (Taylor &amp; Francis Group)</td>
<td>1079</td>
</tr>
</tbody>
</table>

National Library of Veterinary Sciences (NLVS) being one of the consortium partners of CeRA provides document delivery to its member institutes and universities, online as well as offline on receiving the request. The following table shows the activity of library in delivering the articles to the students, researchers, faculty members and scientists:

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Year</th>
<th>No. Request for Article</th>
<th>Deliver</th>
<th>Pending</th>
<th>Article not available</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2008</td>
<td>187</td>
<td>172</td>
<td>1*</td>
<td>14</td>
</tr>
<tr>
<td>2</td>
<td>2009</td>
<td>732</td>
<td>678</td>
<td>0</td>
<td>54</td>
</tr>
<tr>
<td>3</td>
<td>2010</td>
<td>905</td>
<td>736</td>
<td>0</td>
<td>169</td>
</tr>
<tr>
<td>4</td>
<td>2011</td>
<td>2845</td>
<td>2161</td>
<td>0</td>
<td>684</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>4669</td>
<td>3747</td>
<td>1*</td>
<td>921</td>
</tr>
</tbody>
</table>

* The pending shown in the table is not actually pending and the same have been delivered in that point of time but due to some problem in CeRA website the same could not be shown as delivered.

The following Table shows the usage report on the site for NLVS, Indian Veterinary Research Institute, Izatnagar.
<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Year</th>
<th>Clicks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2008</td>
<td>N.A.</td>
</tr>
<tr>
<td>2</td>
<td>2009</td>
<td>1037</td>
</tr>
<tr>
<td>3</td>
<td>2010</td>
<td>4073</td>
</tr>
<tr>
<td>4</td>
<td>2011</td>
<td>2801</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>7911</strong></td>
</tr>
</tbody>
</table>

This is the screen short of home page of CeRA for IP-based User and the URL: [www.cera.jccc.in](http://www.cera.jccc.in) [4]
AGRIS

This project related to the development of National Agricultural Research Database (NARD has been started in DIPA and two important abstracting journal have journal have been brought out from the database. It covers the maximum agricultural information generated by all ICAR Institutes.

The National Library of Veterinary Sciences (NLVS), IVRI, Izatnagar has been providing input from the year 2000 onwards according to the guideline received from the main centre from time to time. The NLVS provides input sheets to NARD with abstracts of following journals –

1. Indian Journal of Veterinary Pathology
2. Indian Journal of Veterinary Research
3. Indian Journal of Veterinary Surgery
4. Indian Veterinary Journals

This is the screen short of AGRIS stand alone software. The input is provided in the database through login and password.
e-Granth

“Strengthening of Digital Library and Information Management under NARS (e-Granth) is a project under National Agricultural Innovation Project (NAIP), Indian Council of Agricultural Research (ICAR). Its objectives – To create Online Public Access Catalogue (OPAC) under ‘Indian Agricultural Research group catalogue’ of all 12 library resources with Online Computer Library Centre (OCLC) partnership. To digitize important institutional repositories (limited to IARI, IVRI and UAS, Bangalore) including rare books and old journals and make them open access under NARS to strengthen capacity building for library and information management system.

Around 50,000 more records have been added to the AgriCat (Union Catalogue) and total 3,31,766 records are available in AgriCat upto the month of September, 2011. KOHA OSS has been installed in few institutes in a standalone system with test data for trial purpose. Digitization process, scanning of the old/ rare books, cleaning, cropping, PDF/A conversion and OCRing have been streamlined in all the four digitization centers. On an average 5 lakh pages/centres (Total about 20 lakh pages at four centres) have been digitized till September, 2011. [3]

National Library of Veterinary Sciences (NLVS) being one of the four major consortium partner, has uploaded **23,903 records of IVRI in the Worldcat as per standard of OCLC.** The library has also converted the existing data to MARC-21 format.

Further work of scanning of documents is in progress and about 6.00 lakhs pages have been scanned. Action for implementation of KOHA software is in progress.
CONCLUSION
Indian Council of Agricultural Research (ICAR) plays a vital role to support for promoting of e-resources in Institute as well as Agricultural University in India. National Agricultural Innovation Project (NAIP) provided budget for infrastructure and human resources development in India.

Krishi Prabha, CeRA, AGRIS and e-Granth all the projects are functioning smoothly in NLVS, IVRI, Izatnagar and the users of the library are well aware of the same. All efforts are being done to achieve the aim and objective of these projects by providing better, quick, accurate and in time information services in agriculture through online resources in NLVS. The National Library of Veterinary Sciences (NLVS) is serving the nation for betterment of agriculture research and education. The NLVS also provide e-resources for NARS for future betterment in Indian farming. e-Resources is the need of hour for fast development in agricultural sector in India.

REFERENCES
4. www.cera.jccc.in
5. www.egranth.ac.in
INTRODUCTION
CSK HP Krishi Vishavidalaya Palampur University library meets out the fundamentals requirements of the students, teachers, extension specialists and other staff members of the four constituent colleges of the Vishvavidalaya as well as the scientific staff, working at various Hill/Highland Agricultural Research and Extension Centres, Sub-stations and KVKs of the University.

The University library system comprises of the following libraries:
1. University Library at CSKHPKV, Palampur
2. Hill Agricultural Research & Extension Centre Library, Bajaura (Kullu)
3. Hill Agricultural Research & Extension Centre Library, Dhaulakuan (Sirmour)
4. Highland Agricultural Research & Extension Centre Library, Kukumseri (Lahaul & Spiti)

Besides, the Research Sub-stations and KVKs of the CSK HP Krishi Vishvavidyalaya have their own small workable collection of books etc. This Agricultural University Library is designated as FAO Depository library and therefore, all FAO publications are received in the library free of cost at regular intervals.

IT BASED LIBRARY RESOURCE AND SERVICES
The University Library provides the on-line/ off-line services to the readers with the help of Web based On-Line Public Access Catalogue (Web-OPAC), CD-ROM, OPAC, Searching on LAN, INTERNET access to Full-Text on-line Journals through CeRA (Consortium for e-Resources in Agriculture) and J-Gate on-line Journal Portals. Access to Full-Text e-Books (Agriculture, Veterinary and allied sciences), LIB-501 course material and other library related information etc. are also available to the readers through the University website at http://hillagric.ernet.in/library.

The CSKHPKV Library is one of the members of NARS and provides IP based, campus area network access to the full text of Ph.D theses of all the SAUs and NARS Libraries under KrishiPrabha- Indian Agricultural Doctoral Dissertation Repository.
The Library provides Digital services after the installation of one of the most advanced storage and retrieval server from the USA, which displays the following databases etc.

1. CAB Abstracts (1910- to date)
2. AGRICOLA
3. AGRIS
4. FSTA
5. MEDLINE
6. J-Gate (On-line Access)
7. CeRA (Consortium for e-Resources in Agriculture) (On-line Access)
8. KrishiPrabha (Full text of Ph.D. Theses of NARS Libraries) (On-line Access)
9. Indian Science Abstracts
10. Forestry Database in CD-ROM (FRI, Dehradun)
11. NUCSSI (National Union Catalogue of Scientific Serials in India)

Besides, the library has its own Database i.e., OPAC which gives bibliographic information of its collection as under:

1. Theses.
2. Journals.
4. FAO publications.
5. Reference Books.

ON-LINE ELECTRONIC RESOURCES

The library has provided the facilities to access on-line journals, e-books, Ph.D. theses. The teachers, students and other staff members are using these facilities in their respective Departments / Placement cells etc. and also in the Library through the following e-resources:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>J-Gate On-line Journal Portal</td>
</tr>
<tr>
<td>2</td>
<td>CeRA (Consortium for e-Resources in Agriculture)</td>
</tr>
<tr>
<td>3</td>
<td>KrishiPrabha (Access to Full text Ph.D Theses)</td>
</tr>
<tr>
<td>4</td>
<td>e-books</td>
</tr>
</tbody>
</table>
TEACHING

The University Library imparts teaching at Postgraduate level and offered the 1+0 Credit Hour course, entitled, “Literature and Technical Writing” to the Postgraduate students of the University.

ELECTRONIC RESOURCES CENTRE

This section is very important and provides On-line library services through widely used databases CD-ROM, CeRA and J-Gate, OPAC, e-Books, Web-OPAC, Theses, etc.

ACQUISITION AND TECHNICAL SECTION

The Acquisition Section plays a vital role in collection development of a library. It acquires the publications for the use of its readers. The books are purchased on the recommendations of the teachers, staff and readers. The Technical Section is responsible for the processing of the books for being placed in different Sections of the library for the use of readers. Books are classified according to Dewey Decimal Classification Scheme and cataloguing is done according to Anglo-American Cataloguing Rules. The Subject Headings are assigned from Library of Congress Subject Headings List. After the complete processing of the books, the new books are displayed in the “New Arrivals Section” and are retained for some days for bringing to the notice of the readers before restoring on the shelves of the library. These books can be accessed on New Addition interface of the OPAC.

The position of the publications added in the University library during January 2011 to December 2011 is as under:

<table>
<thead>
<tr>
<th></th>
<th>Books</th>
<th>Periodicals</th>
<th>Theses</th>
<th>Others</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>January 2011 to December 2011</td>
<td>2786</td>
<td>346</td>
<td>125</td>
<td>-</td>
<td>3257</td>
</tr>
</tbody>
</table>

The grand total of Library holdings on 31 January 2011 is as under:

<table>
<thead>
<tr>
<th></th>
<th>Books</th>
<th>Periodicals</th>
<th>Theses</th>
<th>Others</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>31 January 2011</td>
<td>48833</td>
<td>28803</td>
<td>3956</td>
<td>802</td>
<td>82394</td>
</tr>
</tbody>
</table>

PERIODICAL AND REFERENCE SECTION

The current and the back volumes of Journals and reference books are kept in this section, which is most important reading material for the teaching, extension as well as research community. The scientists as well as the students are always in acute need of consulting these documents in this section and getting photocopies of reading material. The journals and the serial publications are acquired through regular subscriptions, standing orders, exchange and even ‘gratis’ for the use of readers.
The Hill/Highland Agricultural Research & Extension Centre libraries also subscribe to the approved journals to meet out the basic requirements of the scientists working at these research & extension centres, located at the various far flung places of state. Even the Sub-stations are subscribing to some Indian journals which are useful for their research work. The University Library, CSKHPKV, Palampur issues the desired material on Inter-Library Loan or by photocopying of the required material to the Library users.

The current journals are displayed on the Display Racks, and the back volumes are placed on the open shelves. Due to the escalation of prices, the subscription of journals has become very difficult and the library is compelled to discontinue many of the important journals from the approved lists of journals. 171 Indian journals were subscribed during this period. However, the Library is able to access thousands of full text on-line primary journals through the CeRA and J-Gate on-line journals, which almost satisfy the information requirements of its readers.

The full text of Ph.D. theses of the all NARS Libraries w.e.f 2000 onwards are also accessible on Campus Area Network internet through the Krishi Prabha Database of ICAR, New Delhi.

GIFTS AND EXCHANGE
The library has established exchange relations with various National and International Organizations and institutions for the receipt of publications on exchange basis of this University. The publications from many sources are also received as ‘gratis’.

DOCUMENTATION AND REPROGRAPHIC SECTION
The Documentation and Reprographic Services are provided for the benefit of the readers. A nominal charge of @ Rs. 1 per exposure is charged from the students and staff for taking photocopies of the library material.

INTER-LIBRARY LOAN
Inter-library loan facilities are made available to the Hill Agricultural Research and Extension Centre libraries and the Sub-station libraries. The journals are issued on Inter-library loan basis, besides the books. The scientists of the local IVRI Regional Station and the IHBT, Palampur also take advantage of this library facility through ‘Inter-library loan.

BOOK BANK SECTION
The poor and needy students are entitled to get issued 3 books from book bank at a time for a full semester by depositing nominal charges of Rs. 5/- minimum and of Rs. 10/- maximum for a book depending on its price. This income is utilized for the purchase of new titles or new editions of the prescribed textbooks.
BINDERY SECTION
The library has its own Bindery with modern binding equipments where trained and qualified staff is working and space for keeping the machinery and other materials is becoming short.

FAO DEPOSITORY LIBRARY
The FAO Depository Library has completed about 28 years of its existence. The Library is regularly receiving FAO publications directly from Rome. Besides books, serial publications are also being received. FAO publications are very popular with scientists/teachers and postgraduate students and serial publications which are useful for detailed statistical data for their research work. The total publications up to the end of December, 2011, were 3756 in this section.

SPECIAL SECTION
A separate special section for the collection development of books on Himachal, Rare books, Rules-Regulation and other hilly areas under the heading “Special Section” has been established in the library. Publications relating to cultural and developmental activities of the hill area are also procured to enrich the section. The Himachal Kalasanskriti and Bhasa Academy, Shimla also donates the publications on Himachal Pradesh and books written by Himachali authors from time to time. In addition to it, Dr. Chopra collection has been added, for keeping books donated by Dr. V.L.Chopra Ex. DG, ICAR, to the University Library.

THESES SECTION
Theses Section is particularly helpful to the Postgraduate students. Copies of the theses of M.Sc., M.V.Sc. and Ph.D. students of CSK HP Krishi Vishvavidyalaya and Dr. Y.S.Parmar University of Horticulture and Forestry, Solan, are shelved in this Section. Apart from the printed copy of the thesis it is also mandatory for the CSK HPKV Ph.D students to submit along with a soft copy of the thesis at the time of theses submission, which is stored in the Library and being made accessible to readers through KrishiPrabha, and 125 theses were added to the library during the period January 2011 to December 2011. Total number of theses up to the end of December, 2011 was 3956.

CIRCULATION SECTION
This Section remains open on all working days from 10.00 A.M. to 4.00 P.M. The section is automated. Books are issued and returned in this section and overdue charges are also collected from the defaulters.
### Membership

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Category</th>
<th>Palampur</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Teachers</td>
<td>180</td>
</tr>
<tr>
<td>2.</td>
<td>Non-Teachers</td>
<td>67</td>
</tr>
<tr>
<td>3.</td>
<td>P.G. students</td>
<td>223</td>
</tr>
<tr>
<td>4.</td>
<td>U.G. students</td>
<td>418</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>888</strong></td>
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### Books Circulation (January 2011 to December 2011)

<table>
<thead>
<tr>
<th>Month</th>
<th>Books Issued</th>
<th>Books Returned</th>
<th>Books Consulted</th>
<th>Total Circulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>January 2011</td>
<td>694</td>
<td>860</td>
<td>11063</td>
<td>12617</td>
</tr>
<tr>
<td>February 2011</td>
<td>876</td>
<td>843</td>
<td>14643</td>
<td>16362</td>
</tr>
<tr>
<td>March 2011</td>
<td>660</td>
<td>1090</td>
<td>16115</td>
<td>17865</td>
</tr>
<tr>
<td>April 2011</td>
<td>665</td>
<td>1151</td>
<td>13939</td>
<td>15755</td>
</tr>
<tr>
<td>May 2011</td>
<td>667</td>
<td>1009</td>
<td>19583</td>
<td>21259</td>
</tr>
<tr>
<td>June 2011</td>
<td>126</td>
<td>295</td>
<td>11703</td>
<td>17391</td>
</tr>
<tr>
<td>July 2011</td>
<td>517</td>
<td>298</td>
<td>16576</td>
<td>17391</td>
</tr>
<tr>
<td>August 2011</td>
<td>1171</td>
<td>697</td>
<td>16748</td>
<td>18616</td>
</tr>
<tr>
<td>September 2011</td>
<td>918</td>
<td>1097</td>
<td>18053</td>
<td>20068</td>
</tr>
<tr>
<td>October 2011</td>
<td>682</td>
<td>730</td>
<td>14599</td>
<td>16011</td>
</tr>
<tr>
<td>November 2011</td>
<td>883</td>
<td>942</td>
<td>19270</td>
<td>21095</td>
</tr>
<tr>
<td>December 2011</td>
<td>338</td>
<td>732</td>
<td>15317</td>
<td>16387</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>8197</strong></td>
<td><strong>9744</strong></td>
<td><strong>187609</strong></td>
<td><strong>205550</strong></td>
</tr>
</tbody>
</table>

### Visitor Statistics (January 2011 to December 2011)

<table>
<thead>
<tr>
<th>Period</th>
<th>Students</th>
<th>Staff</th>
<th>Total Visitors</th>
</tr>
</thead>
<tbody>
<tr>
<td>January 2011</td>
<td>2000</td>
<td>157</td>
<td>2157</td>
</tr>
<tr>
<td>February 2011</td>
<td>2706</td>
<td>234</td>
<td>2940</td>
</tr>
<tr>
<td>March 2011</td>
<td>2727</td>
<td>221</td>
<td>2948</td>
</tr>
<tr>
<td>April 2011</td>
<td>2191</td>
<td>177</td>
<td>2368</td>
</tr>
<tr>
<td>May 2011</td>
<td>2552</td>
<td>468</td>
<td>3020</td>
</tr>
<tr>
<td>June 2011</td>
<td>1100</td>
<td>151</td>
<td>1251</td>
</tr>
<tr>
<td>July 2011</td>
<td>2985</td>
<td>201</td>
<td>3186</td>
</tr>
<tr>
<td>August 2011</td>
<td>3126</td>
<td>188</td>
<td>3314</td>
</tr>
</tbody>
</table>

Table Contd…
<table>
<thead>
<tr>
<th>Period</th>
<th>Students</th>
<th>Staff</th>
<th>Total Visitors</th>
</tr>
</thead>
<tbody>
<tr>
<td>September 2011</td>
<td>3576</td>
<td>218</td>
<td>3794</td>
</tr>
<tr>
<td>October 2011</td>
<td>2114</td>
<td>145</td>
<td>2259</td>
</tr>
<tr>
<td>November 2011</td>
<td>3083</td>
<td>174</td>
<td>3257</td>
</tr>
<tr>
<td>December 2011</td>
<td>1660</td>
<td>156</td>
<td>1816</td>
</tr>
<tr>
<td>Total</td>
<td>29820</td>
<td>2490</td>
<td>32310</td>
</tr>
</tbody>
</table>

**CONCLUSION**

The University Library is the hub of Teaching, Research and Extension Education activities of the University. At present the total staff strength of the Library including Faculty, Professional and supporting staff is 37. The total number of books and journals in the Library is 82394. University Library subscribes 171 Indian journals in addition to it. On-Line journals are available through CeRA and J-Gate. 235 e-Books on Agricultural, Veterinary and allied subjects are available in the Library. The Library has 10 databases concerning Agricultural and related disciplines which are available to students, teachers, scientists and other for their academic and research pursuits. Krishi Prabha Thesis On-Line database is also available for researchers. The Library has been computerized and is equipped with all modern facilities. The Library has also been running e-GRANTH NAIP Sub-Project of ICAR.
ABSTRACT

This paper deals with library and information services; marketing in the global era. It discusses about the marketing concept of today's library and information centers covering various topics such as management of libraries and commitment to customer's satisfaction. The ultimate objective of the marketing of library and information services should be the dissemination of the right information to the right customer (user) at the right time.

Keywords: Information services; Marketing; Management Library services.

INTRODUCTION

The interest in marketing has tremendously increased over the past few decades in libraries like other service centers; education, health, transportation, insurance, banking, etc. For a long time, we (librarians and information professionals) had enjoyed a supplier's market and we lost our interest in working for our customers, and yet we want customers to come back. However, we should always keep in mind that only satisfied customers come back and there are greater chances that a dissatisfied customer will find some other suppliers of information to meet his information needs. So, if we are interested to provide better services to our customer the following steps should be taken for our side.

- Management of Libraries
- Commitment to Customer Satisfaction.
- Understanding Customers
- Welcome Again and Again
- Libraries need to grow
- Improving our Image
WHAT IS MARKETING IN LIBRARIES?
In recent years, marketing has been gaining importance in libraries throughout the world. Self-support policies, increasing competitiveness in the marketplace, rising customer expectations, and widening access to information are some of the main reasons for this trend. To survive in such an environment, library and information centers must identify their users' needs and integrate this information into the everyday workings of the library. As per my opinion for the marketing we have to prepare ourselves for the following approaches.

- Marketing as an Approach
- Marketing as Metaphor
- Marketing as Philosophy
- Marketing as a set of Techniques
- Customer-Driven Marketing

DEFINITION OF MARKETING
There are several definitions of marketing given by various experts in the field of marketing one of the definitions is as under.

Kotler - "Marketing is the analysis, planning, implementation and control of carefully formulated programs designed to bring about voluntary exchanges of values with target markets for the purpose of achieving organizational objectives. It relies heavily on designing the organization's offering in terms of the target market's needs and desires and as using effective pricing, communication, and distribution to inform, motivate and serve the markets."

There are 7 major points to be emphasized in the above definition:
1. Marketing is a managerial process involving analysis, planning, implementation and control.
2. Marketing is concerned with carefully formulated programmes - not random actions - designed to achieve desired responses.
3. Marketing seeks to bring about voluntary exchange.
4. Marketing selects target markets and does not seek to be all people.
5. Marketing is directly correlated to the achievement of organizational objectives.
6. Marketing place emphasis on the target market's (consumer's) needs and desire rather than on the producer's preferences.

LEVELS OF MARKETING
There are two types of levels of Marketing
Strategic Marketing
Strategic Marketing attempts to determine how a library competes against its competitors in a marketing place. In particular, it aims at generating competitors.

Operational Marketing
It executes marketing functions to attract and keep customers and to maximize the value derived for them, as well as to satisfy the customer with prompt services and meeting the customer expectation.

BASIC MARKETING TIPS FOR LIBRARIES

Create a storytelling culture
- Spend time learning about the stories people associate with your library. Use this as a way to “Break the ice” with visitors, guests at events, donors and community leaders. Consider telling stories about real people and situations rather than statistics. For example, tell a story about an elderly couple who use the library to surf the Internet, or a local small-business owner who worked with a reference librarian to research and develop a business plan.
- Library staff are great storytellers and should be involved in marketing and PR activities when appropriate.
- Maximize your library’s communication tools and resources by conveying consistent and repeated messages in news releases and press relations, on your website, in advertising, in direct mail and in print materials.

Effective Messaging
Develop key messages to communicate about your library. Some examples of messages that we’ve learned have the greatest resonance with audiences for libraries include:
- Libraries are a democracy’s best-kept promise. They provide “information for all.”
- Libraries are unique in this information age. Information on nearly anything can be accessed in-person and also online.
- Librarians are information experts who can quickly help patrons zero-in on what they need.
- The library is an access point for information both as a building and as an online resource. The Library is an important part of our information age and serves as a forum for the exchange of Ideas delivered through a diverse collection of speakers, exhibits and programs that spark Exploration and dialogue.
- Libraries are community and cultural centers.
• People love books and they want to know that their library invests in books. Talk about them.
• Libraries are a source of lifelong learning, social interaction and entertainment.
• Libraries serve people from early childhood through their senior years.
• Libraries are an important resource in early childhood development.
• Libraries support people through school, during their search for a job, through parenting, careers and retirement.

Grassroots Outreach
Library lovers are all around you. And you know them! Reach out. You’ll be pleasantly surprised. Library lovers love to be needed

• Seek the support of authors for readings, presentations and endorsements. Most authors have a library story to tell and tend to be very generous to libraries with their time and support.
• Many key influencers and business and community leaders have not used the library in a while. Invite them to come for a visit and demonstrate to them the library’s impact on the community. Take advantage of their lack of knowledge to show them some of your services, such as research and reference assistance.
• Partnerships with cultural/ethnic communities and among communities with special interests can build strong marketing and outreach opportunities for programs and special collections.
• Partnerships with cultural groups, public broadcasting and arts organizations often garner strong new audiences, and can provide an excellent opportunity to share/trade mailing lists for fundraising and outreach efforts.
• Plan events related to special interests (such as rare books, book groups, summer reading, etc.). Such events can become media stories and opportunities for sponsor involvement. They can also help a library build its mailing list.

Media
The library is a hub for people. Reporters write stories about people. Help them make the connection between their need for human interest and hard news content, and your programs and services, as well as the resources you can provide to them.

• Consider writing an op-ed piece for your local news media positioning the library as an expert on important issues. Early childhood development, adult literacy, access to health information and meeting the needs of new communities are a few topics that are newsworthy and about which librarians can speak with authority.
• Position library staff as local experts for the media to interview (business reference, early childhood development and other specialized subjects).
Consider pitching news on a quarterly basis to secure feature stories or community news coverage above and beyond regular calendar listings. Your chances for feature coverage increase if you pitch reporters stories that are about an impact the library is making on people’s lives.

Pitch stories to electronic media. A great deal of library media placement is in newspapers. Push to include outreach to radio and TV stations, being sure to reference strong audio and visual opportunities to increase placement.

Build partnerships with the media and businesses. Newspapers, radio stations, television and outdoor media (billboards, bus shelters, etc.) can contribute valuable promotional space if they are offered benefits as a partner. Similarly, local businesses can help promote the library in creative ways – for example with discounts and premiums for library cardholders.

**Integrating Marketing and Fundraising**

At the end of the day, all the work done in public relations, marketing and fundraising has one thing it common: all of it is about storytelling. Don’t miss out on opportunities. Collaborate. Think in integrated ways. It saves you time and money and expands the reach of all your efforts.

- Timing is everything. Coordinate your fundraising communications and appeals with general library communications such as cardholder newsletters, program marketing, branch materials and Web content. This leverages resources and builds support and awareness for fundraising campaigns, while raising general awareness of your library.
- Media sponsorships are a good match for library funding campaigns. They help “sell” your project in the public phase of capital campaigns. Media partners can run ad campaigns coordinated with direct mail and Web-based fundraising.
- Fundraising campaigns are an opportunity to uncover library lovers and seek external advocates who can help make your library’s core case for support. Profile business leaders, government officials, and community leaders as supporters and champions.

Effective library program marketing also helps make the case to support fundraising. Use marketing of summer reading, an author series and other programs to also brand your library as a community resource.

**Before marketing of library and information services the following exercise should be done by the every librarian.**

1. Market Research and Customers’ Analysis
2. Development of Products and Services
3. Pricing
4. Distribution
5. Promotion
6. Evaluation of Products and Services

Every library should prepare a strategy for the development of the library marketing services they follow the following 7Ps as under 7 Ps of Marketing Strategies of libraries like, Product, Price, Place, Promotion, Participants, Physical evidence, and Process

THE BASIC STEPS OF THE MARKETING PLAN

The marketing plan is the written document that will help you develop and execute strategies to communicate your library’s mission. You don’t have to write an encyclopedia to create an effective marketing plan. You don’t need a sophisticated writing style a fancy plan. Armed with the information of what customers really think, you can begin to make the changes to become truly customer focused.

The library marketing plan model as under

Library Marketing Plan model

Planning Model

Vision

Community Assessment (required)

Service Responses (required)

Mission (required)

Goals (required)

Objectives (required)

Staff Development (required)

Collection Development (required)

Technology Plan (required)

Marketing Plan (required)
MODERN WAYS OF MARKETING INFORMATION SERVICES THROUGH LIBRARY

- Electronic Networked environment (WEB- OPAC System)
- Current Awareness Services (CAS)
- Clippings Services
- Inter Library Loan Services-
- Telephonic Renewal Facility
- Monthly Books Display
- Library Database
- Interface with the other Library-
- Research Activities of the Library
- Annual Membership
- Prepare a project reports as per users requirements

CONCLUSION

Libraries are being forced to explore the possibilities of cost recovery and profit potentials for their survival. Libraries must change according to changing market conditions and need to achieve an imaginative design of service and products, and develop communication methods and a feedback mechanism to improve service. It must be carefully considered which services can have only a token price. The impact of the information technology and the adoption of the marketing approach will help improve services for users and enhance the reputation of library and information services and professionals. Every library will grow and advance by watching user response. That would strengthen the marketing plan of the library.
Role of Agricultural Libraries in Knowledge Management

ABOUT THE EDITORS

Dr. A. K. Jain is Principal Scientist at IARI, New Delhi and Consortium Principal Investigator of NAIP Subproject ‘e-Granth’. e-Granth aims at standardization and development of Union Catalog and Institutional Repository of Indian NARS libraries with the view to preserve and promote sharing of resources amongst researchers. Worked at different scientific positions, including as ADG(ARIS) at ICAR H.Qr. Have been associated with ICT application in agriculture for last one-and-half decade through World Bank projects - NARP, NATP, NAIP in creating basic ICT infrastructure all over NARS (ICAR institutes and SAUs), Strengthening Library Digitization, KVK-ICT Network, Data Centre etc.

Dr. H. Chandrasekhara is Principal Scientist and Head, USI, IARI, New Delhi. He has about 35 years of research and development experience in the field of natural resources with special reference to water science and technology and at present with the Unit of Simulation and Informatics, IARI, New Delhi. He has been associated with various techniques (including computer modelling) for water resources development/management and applications of ICT in agricultural research. He has successfully guided a number of Ph.D. and M.Sc. students of PG School, IARI. His research accomplishments have been recognized through awards and association with professional societies. Currently, he is the Principal Investigator of ‘Consortium for e-resources in Agriculture’ (CeRA) a subproject of NAIP and interested in developing Agri-informatics at IARI. He is associated with a number of Committees/Subcommittees as Chairman and Member Secretary, for implementing ICT activities at the Institute. Dr. Chandrasekhara has more than one hundred and eighty scientific publications comprising research papers, review articles, books, chapters in books, proceedings in symposia/seminar, technical/papers and popular articles.

Dr. K. Veeranjaneulu is the University Librarian at Acharya N.G. Ranga Agricultural University, Hyderabad. He has a distinguished academic career to his credit. He was a gold medalist in BLisc. and MLisc. from S.V. University, Trupti. He pursued M.Com, MLisc., BGL. and Ph.D., from the same University. He also possesses PGDLAN and a Diploma in Software applications. He assumed editorial responsibility to many professional journals. He had written and edited more than 15 books and contributed about 97 articles. He has attended and contributed papers at many conferences and seminars. He is a life member of ILA, IATLIS, IASLIC, AALDI, FIC, APLA and ALSID. He is presently Treasurer of “Association of Agricultural Librarians and Documentalists of India (AALDI), Chief Editor of Indian Journal of Agricultural Librarians and Information Services (IJALIS) and CCPI, e-Granth Project. He has been awarded with the “USHLE-IJLIS-Param Bhsan Dr. B.B. Shukla Millennium Award for Excellence in Library and Information Science and International Human Understanding” for the 2007.

Dr. Stanley Madhan Kumar is retired University Librarian, University of Agricultural Sciences, Dharwad. He is posing rich experience in editing and editing many journals and books to his credited. Published many articles. Presently, he is the editorial committee member of “Indian Journal of Agricultural Library and Information Services”.

Ms. Y. Uma Devi, M.Sc., M.L. Isc., Presently Assistant Librarian (S.G.), Central Library, Acharya N.G. Ranga Agricultural University, Hyderabad and member of various professional associations. She has published several papers in various professional Journals.

Mr. N.P. Ravi Kumar, M.A., M.L. Isc., is Assistant Librarian, Central Library, Acharya N.G. Ranga Agricultural University, Hyderabad. He has Qualified UGC-NET in Lectureship and UGC NET (JRF). He has attended and contributed papers at Seminars and Conferences. Member of various Professional Associations.

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e-mail: info@bspbooks.net, marketing@bspbooks.net
Website: www.bspbooks.net