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Knowledge Management in Higher Education Institutions

Volume - I



Editors:

Dr. K.S. Shivraj

Dr. T. Pratheepan

Dr. Punit Gupta

Knowledge Management in Higher Education Institutions

Volume - I

International Conference on
Knowledge Management in Higher Education Institutions
(ICKHI 2021)
7-8 April 2021



Organized by
Central Library
Manipal University Jaipur, India



Jointly with
University Library
Uva Wellassa University, Sri Lanka

Editors
Dr. K. S. Shivraj
Dr. T. Pratheepan
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Knowledge Management in Higher Education Institutions

Volume-I

by

Dr. K. S. Shivraj

Dr. T. Pratheepan

Dr. Punit Gupta

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Laser Type Setting

Dr.K.S.Shivraj

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PREFACE

Knowledge Management is a systematic process by which knowledge needed for an organization to succeed is created, captured, shared, and leveraged. Current higher education institutes recognize their valuable intelligences and have adopted their changing role in the society.

Librarians and information professionals are trained to be experts in information searching, selecting, acquiring, organizing, preserving, repackaging, disseminating, and serving. In the specific context of Library and Information Science, one of the implications of use of ICT is that Libraries can reach out globally to provide their services 24 hours a day in very cost-effective manner. ICT has enabled users to avail many services without any human intervention and the role of LIS professional is changing from an intermediary to a facilitator and enabler.

This International Conference on Knowledge Management in Higher Education Institutions (ICKHI 2021) will deliberate the profile of library professionals in the present-day context whose main role is to explore, evaluate, promote, and implement various emerging technologies. Innovation, collaboration, strong communication skills, and strong project management skills will be keys to success of the library professionals. The Conference aims to provide a platform to learn and share the ideas among librarians, professional from public & academia, research scholars, students, archivists, information providers and vendors, e-publishers, and virtual electronic communities.

A total of 150 papers were received from professionals and research scholars of reputed institutions all across the world. However, 85 papers have been selected for inclusion in the conference proceeding volumes under the following broad categories.

1. Knowledge Management in Information Centers (KM)
2. ICT Enabled Library Services (IT)
3. Open-Source Software & Resources in Higher Education (OS)
4. Digital / Virtual Libraries in Academic Institutions (DL)
5. Mobile and Semantic Web Technologies in Libraries (MS)
6. Copy Right Issues and Total Quality Management (CR)
7. E- Learning / Virtual Learning (EL)
8. LIS Education & Best Practices in Libraries (LS)

We express our sincere gratitude to Dr. Gopalakrishna Prabhu, President, Manipal University Jaipur, and Dr.Niti Nipun Sharma, Pro President, Manipal University Jaipur for having given this opportunity to organize the online Conference.

Our special thanks to Prof. Jayantha Lal Ratnasekera, Vice-Chancellor, Uva Wellassa University, Sri Lanka for their support to conduct this conference jointly.

We would also like to place on record our sincere thanks to the member of International Advisory Committee, National Advisory Committee, and the Organizing Committee, staff of MUJ, India and UWU Sri Lanka for their valuable support and assistance. We express our most sincere gratitude and appreciation to all the authors for contributing research papers for the conference volumes.

Dr.K.S.Shivraj
Dr. T.Pratheepan
Dr. Punit Gupta

Jaipur
5 August 2021

प्रो. धीरेन्द्र पाल सिंह
अध्यक्ष

Prof. D. P. Singh
Chairman



विश्वविद्यालय अनुदान आयोग
शिक्षा मंत्रालय, भारत सरकार
University Grants Commission
Ministry of Education, Govt. of India



MESSAGE

It is a matter of great pleasure to note that the Central Library of Manipal University, Jaipur and Uva Wellassa University, Sri Lanka are jointly organising an Online International Conference on "*Knowledge Management in Higher Education Institutions (ICKHI 2021)*" during 7th & 8th April 2021.

I appreciate the efforts of the University in collaborating with our neighboring country on such a topical and relevant theme. The International Conference assumes significance in the backdrop of our recently announced National Education Policy (NEP) 2020, which aims to make Indian education more holistic and multi-disciplinary and the two nations can benefit from the best practices of each other.

I am sure that the papers presented during the conference on various sub themes will not only offer an enriching literary experience to the participants but also result in a seminal publication for the researchers and interested stakeholders.

I extend my greetings and best wishes to the organisers, speakers and all the participants of the International Conference and wish the event a grand success.


(Prof. D.P. Singh)

22nd March, 2021

ಪ್ರೊ. ಎಸ್.ಸಿ. ಶರ್ಮ
ನಿರ್ದೇಶಕರು
ಪ್ರೊ. ಎಸ್.ಸಿ. ಶರ್ಮ
ನಿರ್ದೇಶಕ
Prof. S.C. Sharma
Director



ರಾಷ್ಟ್ರೀಯ ಮೌಲ್ಯಾಂಕರಣ ಮತ್ತು ಮಾನ್ಯತಾ ಪರಿಷತ್ತು
ವಿಶ್ವವಿದ್ಯಾಲಯ ಅನುದಾನ ಆಯೋಗದ ಸ್ವಾಯತ್ತ ಸಂಸ್ಥೆ
राष्ट्रीय मूल्यांकन एवं प्रत्यायन परिषद
विश्वविद्यालय अनुदान आयोग का स्वायत्त संस्थान
NATIONAL ASSESSMENT AND ACCREDITATION COUNCIL
An Autonomous Institution of the University Grants Commission

17-03-2021

MESSAGE

I am very happy to know that Central Library of Manipal University, Jaipur jointly with Uva University, Sri Lanka is organizing an Online International conference on "Knowledge Management in Higher Education Institutions (ICKH-2021)" on 7th and 8th April 2021.

The concept of accreditation has gained momentum in India; people and institutions have realized that quality enhancement is significant for institutions and the country. The libraries of institutions also play a pivotal role in the entire gamut of the accreditation process since they contribute largely to the enhancement of the learning process.

The conference theme has a forward looking perspective and would go a long way in discussing emerging trends related to Knowledge Management in Higher Education Institutions which is the need of the hour.

On this auspicious occasion, I extend my best wishes to Vice-Chancellor, Registrar, Organising Chair, Delegates/participants, Staff and Students of the University.

S - C Sharma

(S.C. Sharma)

Message

I am delighted to learn that the Central Library, Manipal University Jaipur jointly with Uva Wellassa University, Sri Lanka is organizing an Online International Conference on **Knowledge Management in Higher Education Institutions** during 7th - 8th April 2021.



It is inspiring to note that more than 150 research papers have been received from academicians from all over India and other countries like Egypt, Nigeria, Hungary, UAE, Oman, Saudi Arabia, Sri Lanka, Ethiopia, Algeria, and South Africa. With such diverse and massive participation, I am sure this conference would create a knowledge-fueled environment providing a common platform for researchers, technologists, and scholars to exchange their ideas and interact with one another on the emerging trends related to the thrust area. It is expected that the discussions and findings of the conference would drive innovations and keep everyone abreast of the latest technological development.

On behalf of Manipal University Jaipur, I would like to extend my warm welcome to all the participants of ICKHI-2021. My congratulations to Central Library and the organizing committee for their determined efforts to organize this conference in a befitting manner.

I wish the conference a grand success.

Dr. G K Prabhu
President
Manipal University Jaipur

Message

I am pleased to note that the Central Library, Manipal University Jaipur jointly with Uva Wellassa University, Sri Lanka is organizing an Online International Conference on **Knowledge Management in Higher Education Institutions** during 7th-8th April 2021. Fostering knowledge management in the workforce is gaining importance, with the rapid advancements in higher education. One of the major challenges for academicians is to apply their expertise across various grounds of knowledge management and engage in interdisciplinary research. This challenge has to be viewed as an opportunity for progression in higher education. The other major challenge is to identify how these techniques can help young researchers to enrich their knowledge and create novel applications in the fields of Science and Humanity, Social Sciences, Library Sciences and other Allied Sciences.



I am confident that this conference would give an important insight into the wide-ranging domains of Science and Humanity. It would provide a platform for illustrating the latest developments and applications in the areas of Knowledge Management and Innovation within various fields of Engineering, Health Sciences, Social Sciences, and other related domains. Intellectually stimulating interactions and exchange of productive ideas would be beneficial to all the participants.

I congratulate the Central Library on this endeavour and wish the conference a great success.

Prof. (Dr.) N N Sharma
Pro-President
Manipal University Jaipur

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Knowledge Dissemination Culture in Higher Educational Institutions: A Comparison of Private and Public Institutions in Bangalore

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Abstract - Knowledge is a vital asset to an organization. It is classified as explicit which can be codified and stored and tacit which depends on personal memory and skill which is transferred through training or mentoring. Knowledge sharing culture identifies the ways and means by which information can be passed on to all the members of an organization. It can be done by the formal way, i.e., through the regular meeting, circulars, and issuing handbook, or it can be through informal ways such as discussion over tea or peer meetings and mentoring. In this research attempt is made to assess knowledge sharing culture among faculty members of the higher education and to compare the knowledge sharing culture in private and public institutions. 150 respondents are identified from private and public institution each through convenience sampling. Descriptive and ANNOVA are the tools used to analyze the data. The results indicated that private institutions are better knowledge disseminators when compared to public institutions. The research suggested that integration of technology and formation of FLC (faculty learning communities) can enhance knowledge sharing culture in private and public institutions.

Keywords: Knowledge Management, Knowledge Sharing Culture, Higher Education.

Introduction

Michael Polanyi, a philosopher in 1958, introduced knowledge as something that can have an intrinsic value placed on it and two types of knowledge are tacit and explicit. Clarke (1998) defines knowledge as “an understating of why and how something works.” Moreover, Davenport, De Long and Beer (1998) said that “Knowledge is information combined with experience, context, interpretation, and reflection.” Knowledge Management, (KM) was described roughly two decades ago. In simple it means organizing information and knowledge holistically to make it available for all the members. Magnier Watanabe & Senoo (2008) KM is defined as “the process of acquiring, storing, diffusing and implementing both tacit and explicit knowledge inside and outside the organization’s boundaries with the purpose of achieving corporate objectives in the most efficient manner. One among the important process of knowledge management is knowledge dissemination.

Knowledge dissemination means making knowledge more active and relevant for the firm to create values. Knowledge is employed in a product, processes, and services. It is a task of an organization to identify the right type of knowledge in the right place to gain competitive advantage. When innovation and creativity are the hallmarks of the present competitive arena, an organization should be quick to locate the required knowledge. Organizations intentionally share knowledge by written communications, training, conferences, publications, job rotation and job transfer, and mentoring. Many a times there is unintentional human interaction resulting in transfer of knowledge. These interactions could be informal discussions, networks, job rotation, task forces and stories. Knowledge dissemination means the distribution of knowledge from individual to individual and from team to team, within an institution. According to Senge (1990), learning involves digesting, absorbing and applying. The process of transferring knowledge helps

to reduce the amount of knowledge in areas or individuals which have a high concentration of such knowledge to areas that need it.

Review of Literature

Arcdichvili and Wenting (2002) in their study viewed that knowledge as the power which can transform the individual or society. They have emphasized the importance of knowledge sharing in educational institutions. The study includes discussions, solving problems, learning and general interaction connected with knowledge sharing. The study describes how participants in a Community of Practice (CoP) experience knowledge sharing in the higher education system and the factors that influence exchange of knowledge in a CoP. The study revealed that e document information is yet unexplored at Universities and this will enable the sharing of knowledge in communities of practice. The researcher suggested that management initiatives which aimed merely to improve communication among faculty members should focus on CoP which is important. The study concluded that CoPs could be an essential vehicle for Overcoming the Barriers and enabling the free flow of knowledge more efficiently within the higher education institutions. HaiZhuge (2002) in his research on "A Knowledge flow model for peer- to – peer team knowledge sharing and management" has researched on how to realize effective knowledge sharing in the group and proposed a knowledge flow model for peer-to-peer knowledge sharing management in teams. He proposed a model which consists of the concepts, rules, and methods about the knowledge flow, its process, and the knowledge flow engine. The research revealed that the representation of knowledge flow should have five features like, information accumulation, classification, abstraction, and analogy version management. He suggested that to provide an integrated approach to model teamwork process. He concluded that the proposed model enables a team to stabilize its knowledge level in case of rotation among team members. Dr. JC Henning (2003) conducted a study on "Collaboration and sharing of knowledge" had explored that the Role of Consortia in knowledge sharing. The study states that library consortia can play a significant role in collaboration and share information or knowledge. The study showcased the role of academic libraries and their services integral part of teaching and learning; they create a partnership with faculty members, researchers, students and funding agencies. Librarians and libraries are always willing to share resources and knowledge to all the department and members. The study further emphasized the use of technology which can enhance and facilitates collaboration. The study suggested that existing collaboration along with shared library system can enrich the knowledge sharing experience with colleagues. The study concluded every member to actively engage in sharing knowledge at meetings, training sessions, site visits and other interactive sessions. L. A. Abdillah (2014) in his research "Managing information and knowledge sharing cultures in higher education's institutions," has discussed the importance of information in higher education. Information and knowledge are stored in the form of experience and skill in every single individual of the organization. The success of the higher educational institution depends on how the institution is managing and disseminating knowledge by using information technology is the focus of this study. This study discusses ways and tools for building knowledge sharing culture by members of the institution. The study found that implementation of knowledge management does not require sophisticated systems but could use the freely available application over the Internet; secondly, IT plays a significant role and is the backbone of the success of KM. Good support from top management and creating knowledge sharing culture is essential for the growth and success of higher education.

Objectives of the Study

1. To assess knowledge sharing culture among the faculty members of the institution.
2. To compare the knowledge sharing culture among private and public Institutions.

Methodology

The data was collected from 150 respondents from private and public institutions each. The respondents were selected through convenience sampling method. T test is used to compare knowledge sharing culture in private and public institutions.

TABLE I FRIEDMAN TEST- KNOWLEDGE ON DISSEMINATION/ SHARING

	Mean	SD	Mean Rank	Reliability
New members of staff are assigned mentors who help them to find their way in the organization.	2.71	1.11	3.40	0.783
Much knowledge is shared in informal ways, e.g. in the corridors, tea-rooms, etc.	2.50	1.05	3.04	
Regular meetings are organized, and important matters are discussed.	2.94	1.04	3.86	
Colleagues inform one another regularly about positive experiences and successful projects undertaken.	2.51	1.08	3.01	
Our peer review system allows opportunities for discussing work methodologies	2.73	1.10	3.49	
Job rotation occurs, based on one's know-how, thereby ensuring knowledge distribution	3.15	1.12	4.21	

Primary Source

It could be noted from the table that among the six factors “Job rotation occurs, based on one's know-how, thereby ensuring knowledge distribution” was ranked first. “Regular meetings are organized, at which important matters are discussed.” was ranked second. “Our peer review system allows opportunities for discussing work methodologies” was ranked third. The reliability is 0.783.

TABLE II TYPE OF INSTITUTION WISE OPINION ABOUT THE KNOWLEDGE ON DISSEMINATION/ SHARING

Factors	Type of institution				T	P
	Private Institution		Public Institution			
	Mean	SD	Mean	SD		
New members of staff are assigned to mentors who help them to find their way in the organization.	3.02	1.13	2.40	1.00	5.02	<0.001**
Knowledge is shared in informal ways, e.g.in the corridors, tea-rooms, etc.	2.53	1.14	2.48	0.95	0.39	0.700
Regular meetings are organized, at which important matters are discussed.	3.09	1.07	2.80	0.98	2.41	0.016*
Colleagues inform one another regularly about positive experiences and successful projects undertaken.	2.67	1.18	2.34	0.93	2.71	0.007**
Our peer review system allows opportunities for discussing work methodologies	2.97	1.20	2.50	0.95	3.75	<0.001**
Job rotation occurs, based on one's know-	2.92	1.23	3.39	0.95	3.68	<0.001**
how, thereby ensuring knowledge distribution						

** Highly Significant

From the above table knowledge dissemination culture there is a significant difference in five aspects. However, there is no significant difference in one aspect i.e. knowledge is shared in informal ways both private and public institution faculty does enhance their knowledge through informal ways.

Suggestions

Private institutions are better knowledge disseminators when compared to public institutions, but educational system in whole have some deficiencies in knowledge sharing culture. These challenges can be tackled by integrating technology with KM Process. This will enhance the information flow between and across all section of the institutions. Also forming Faculty learning communities based on interest who will regularly meet to discuss and share their research ideas and progress to instill new ideas to foster innovation and development. Informal discussions should be constructive to build collaborative and interdisciplinary research competencies. Assigning mentors to new faculty members based to enable them to adjust to the institution culture should be practiced.

Conclusion

Educational institution can become more complex if it does not good KM practices in place. Institutions should not only encourage staff member to attend conferences and seminars but to share their learning in common forum so that all the members can enrich their learning. Knowledge sharing culture will strengthen the knowledge base of faculty members to contribute effectively to institution and society.

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Overviews of Knowledge Management with the Role of Library and Library Professionals in 21st Century

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Abstract - *Library is always being heart of the any educational institutes. Knowledge Management through library is directly connected with progress or development of any kind of educational Institute. Library is an essential area where knowledge management using, applied and utilized towards progress of its parent institution. Knowledge Management (KM) is a wide term. Worldwide each and every second's knowledge is creating, updating, storing, processing, and applying in different way different place. So it is the great challenge to manage this never ending knowledge creation. Although library professionals in every country and every place trying to manage this knowledge for our present and future when or whenever we need. In this paper mainly focus on role of library in the prospects of Knowledge management.*

Keywords: *Knowledge Management, Role of library.*

Introduction

Knowledge economy may be a knowledge-based economy. within the information economy era, the management refers to effectively determine, acquire, develop, resolve, use, store and share information, to make associate approach to reworking and sharing of silent and specific information, and to boost the emergency and innovation capability by utilizing the knowledge of the team. Since information has become the drive for social development, the eye of the society to info and information is rising and people's demands for info and information are increasing step by step. This has provided a decent setting for library development. Moreover, as info and information has become a crucial productive issue for the fashionable financial set-up, the society can inevitably need intense management information and knowledge. The way to manage information can become a crucial subject facing libraries within the close to future. Information management in libraries ought to be targeted on effective analysis and development of information, creation of information bases, exchange and sharing of information between library staffs (including its users), training of library employees, rushing up specific process of the implicit information and realizing of its sharing.

Objectives of the Study

1. To examine the concepts of knowledge and KM
2. To analysis the Knowledge Management Tools, Technologies, &Architectures
3. To determine the scope of KM in LIS profession
4. To examine the opportunities and threats for LIS
5. Professionals as emerged from the origin of KM.
6. To identify the requirement of competencies among LIS professionals for their involvement in KM practice.

Literature Review

Knowledge Management could be a method geared toward making, characteristic, and sharing and mistreatment data at the extent of a corporation. Knowledge management in educational establishments may be applied in 5 key areas like analysis, course of study development, alumni services body services and strategic coming up with (Kidwell *et al.*, 2000). in keeping with Townley (2001), librarians have developed and applied several kilometre principles within the

provision of library services. Reference, cataloguing, and alternative library services are designed to encourage the utilization of scholarly data and so increase the number of educational data employed in instruction. The continued education through skilled training courses or workshops plays a big role within the implementation of data management altogether up to date organizations (Sanchez, 2001). Roman-Velazquez (2004) found that data management comes enforced in a very hierarchy culture had a lower rate of success than data management comes enforced in tribe, market, and adhocracy cultures. The researchers conjointly found that organizations having stronger cultural values at the structure and department levels had bigger success with information management efforts.

Methodology

Knowledge management (KM) concept, always make a new challenge to the field of Library & Information Science because of technological innovation of 21st century. This study is done by collecting and collating information from websites, some renowned journals and Blogs. It is observed that knowledge management has very crucial role in the progress of any academic's institute in present scenario. All the information and conclusion based on the data retrieved from Internet from 25th February to 3rd March, 2021.

What is KM? Knowledge management (KM) is that the method of making, sharing, exploitation and managing the information and data of an organization. It refers to a multidisciplinary approach to realize organizational objectives by creating the simplest use of information. Information management efforts usually target organizational objectives like improved performance, competitive advantage, innovation, the sharing of lessons learned, integration and continuous improvement of the organization. These efforts overlap with organizational learning and should be distinguished from that by a bigger target the management of information as a strategic quality and on encouraging the sharing of information. KM is an enabler of structure learning.

Why is Knowledge management important? Knowledge management is very important as a result of it boosts the potency of AN organization's decision-making ability. In ensuring that each one staff have access to the experience control at intervals the organization, a better work force is constructed UN agency area unit additional able to create fast, well-read choices that profit the corporate. Innovation is less complicated to foster at intervals the organization, customers take pleasure in accumulated access to best practices and turnover is reduced. The importance of information management is growing each year. Because the marketplace becomes ever additional competitive, one in every of the simplest ways that to remain before the curve is to make your organization in an intelligent, versatile manner; You would like to be able to spot problems from a distance and respond quickly to new info and innovations. Essential Knowledge Management Tools: Knowledge management tools have changed over the years. However, they still address the same basic needs.

The following categories of tools are essential for any knowledge management practice

- 1. Content Repository:** Tools that allow users to manage and share knowledge content. For many years the dominant tool for knowledge management repositories was document management software. Today, most firms prefer tools that can manage diverse content (e.g. documents, web content, and social content). For example, Content Management Systems (CMS), Enterprise Content Management (ECM) and Cloud Content Management (CCM)
- 2. Knowledge Search:** A text search tool is often part of your content repository. For example, ECM usually has a search tool. Search is a critical function that improves the value of your knowledge. All search tools are not created equally. There's a big

difference in the performance of search solutions. Some firms invest in a search tool that can search across multiple sources of data (e.g. your ECM and CRM).

- 3. Communication Tool:** Tools that communicate knowledge and capture the knowledge generated by communication. This may include a variety of tools such as email, chat, instant messaging, telephone services (include VOIP), speech recognition, video conferencing and collaboration tools (e.g. whiteboards). Unified communications (UC) tools integrate communications into a single user experience.
- 4. Social Software:** Tools that facilitate the socialization of knowledge. Social features are now commonly included in core enterprise software such as customer relationship management (CRM) and ERP.
- 5. Knowledge Visualization:** Tools that are used to visually communicate knowledge. The vast majority of business knowledge is communicated with static 2D representations such as web pages and PowerPoint slides. There is great interest in dynamic, explorable, 3D representations of knowledge. A plethora of knowledge visualization tools have hit the market in recent years. The knowledge visualization market is still in its infancy but tools are maturing rapidly.
- 6. Decision Support:** Tools that seek knowledge in large volumes of data. For example, analytics and reporting software that allows users to discover patterns of knowledge in data;
- 7. Big Data:** Big data are a class of tools that store, manage and explore high velocity, variety and volume data. Firms use big data technologies to find knowledge in high volumes of structured (e.g. database tables) and unstructured data (e.g. documents, conversations).

KM Technologies

Knowledge management (KM) technology can be categorised: Groupware: Software that facilitates collaboration and sharing of organisational information. Such applications provide tools for threaded discussions, document sharing, organisation-wide uniform email, and other collaboration-related features Workflow systems: Systems that allow the representation of processes associated with the creation, use and maintenance of organisational knowledge, such as the process to create and utilise forms and documents. Content management and document management systems: Software systems that automate the process of creating web content and/or documents. Roles such as editors, graphic designers, writers and producers can be explicitly modelled along with the tasks in the process and validation criteria. Commercial vendors started either to support documents or to support web content but as the Internet grew these functions merged and vendors now perform both functions Enterprise portals: Software that aggregates information across the entire organisation or for groups such as project teams.

ELearning: Software that enables organisations to create customised training and education. This can include lesson plans, monitoring progress and online classes. Planning and scheduling software: Software that automates schedule creation and maintenance, the planning aspect can integrate with project management software

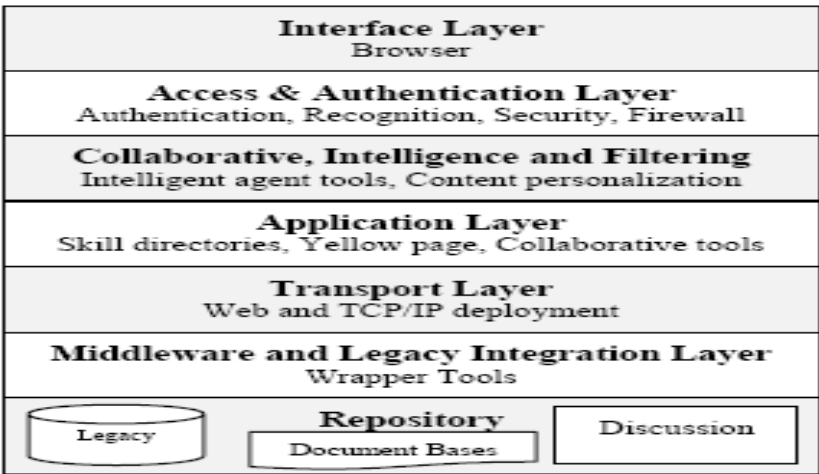
Telepresence: Software that enables individuals to have virtual "face-to-face" meetings without assembling at one location. Videoconferencing is the most obvious example.

Semantic technology such as ontologies: Systems that encode meaning alongside data to give machines the ability to extract and infer information

Knowledge Management System Design: Developing a KMS could be an advanced task and needs a careful coming up with before choosing the tools for supporting the data processes. The designed system design ought to suit the structure culture and business desires. KMS may be as easy as a folder till a posh business intelligence system that uses a sophisticated knowledge mental image and AI. Thus, we've studied many KMS architectures that aim to support data management processes and collaboration within the organization. We have a tendency to found that albeit their

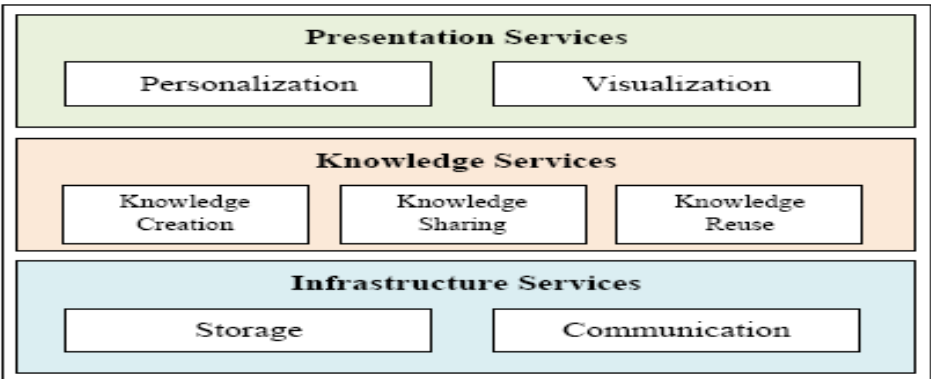
square measure variations between architectures in term of functions and services, the main elements of design square measure comparable. The overall KMS design is planned by Tiwana. He has known that the KMS ought to comprise four major components: repository, cooperative platform, network, and culture.

These four elements are thought of because the basis components for every data management system. However, alternative tools might be integrated to reinforce the standard of services of the system. Tiwana additionally planned seven-layer KMS design that is that the integration of those four elements and their appurtenant data technologies.



Source: https://theses.univ-lyon2.fr/documents/getpart.php?id=lyon2.2009.sureephong_p
Fig. 1The seven-layer architecture [Tiwana]

Chua has planned a straightforward design referred to as 3-tiered KMS design that consists of three services i.e. infrastructure services, data services, and presentation services. These services aim at supporting data processes and communication within the organization. This technique emphasizes technologies that facilitate making, sharing, and storing data. Figure II. Illustrated Chua’s three-tiered KMS design



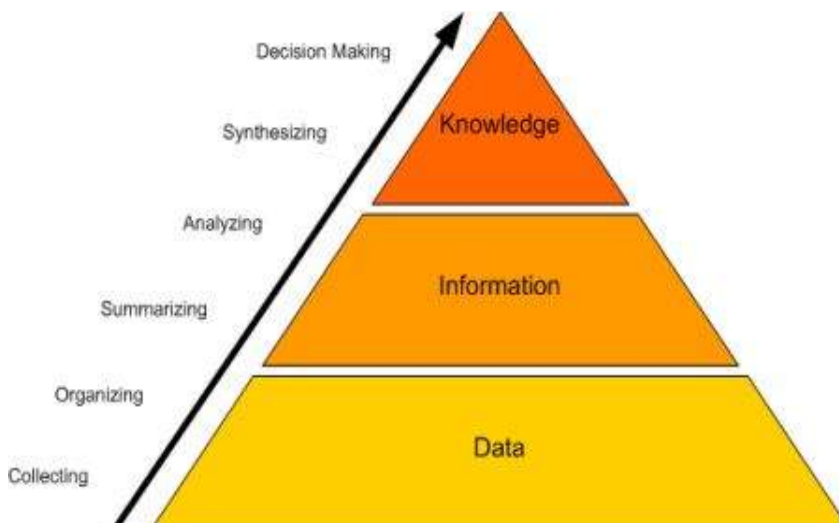
Source: https://theses.univ-lyon2.fr/documents/getpart.php?id=lyon2.2009.sureephong_p
Fig. 2 The three-tiered architecture [Chua]

The first tier in this model comprises the infrastructure services which focus on storage and communication technology. Storage technology is a part of a repository in the general model, and is typically the basis for supporting KM processes, particularly knowledge creation and knowledge reuse. The communication technology makes possible for the KMS to support knowledge transferring activity among the users.

The second tier is the knowledge services which focus on technologies for creating, sharing, and reusing of knowledge in the system. The technology for knowledge creation helps users to convert their tacit knowledge in to codified (explicit) knowledge. Knowledge sharing technology refers to the flow of knowledge from one part of the organization to other parts. The knowledge reuse helps users to retrieve required knowledge from the system when needed. The third tier is presentation services which mainly focus on displaying the suitable information for users to support their decision-making. Technologies that provide presentation services are primarily concerned with enhancing the interface between the user and the information/knowledge sources. This part is related to the culture of knowledge usage of the organization by visualizing and personalizing all services in the KMS to suit the organizational culture. However, to design these services, the organizational analysis is required.

Knowledge Management Method

The process of knowledge management is universal for any enterprise. Sometimes, the resources used, like tools and techniques, are distinctive to the structure setting. The data Management method has six basic steps assisted by totally different tools and techniques. Once these steps are followed consecutive, the information transforms into data.



Source: <https://www.hebergementwebs.com/project-management-concepts/knowledge-management>
Fig. 3 The process of knowledge management

Step 1: Collecting: this can be the foremost necessary step of the data management method. If you collect the inaccurate or unsuitable information, the ensuing data might not be the foremost correct. Therefore, the selections created supported such data might be inaccurate additionally. There are several strategies and tools used for information assortment. Initial of all, information assortment ought to be a procedure in data management method. These procedures ought to be properly documented and followed by folks concerned in information assortment method. The

information assortment procedure defines sure data assortment points. Some points are also the outline of sure routine reports. As an example, monthly sales report and daily group action reports are also 2 sensible resources for information assortment. With information assortment points, the information extraction techniques and tools also are outlined. As an example, the sales report is also a paper-based report wherever a knowledge entry operator must feed the information manually to an information whereas, the daily group action report is also a web report wherever it's directly keep within the information. Additionally, to information assembling points and extraction mechanism, information storage is additionally outlined during this step. Most of the organizations currently use a software system information application for this purpose.

Step 2: Organizing: the information collected got to be organized. This organization typically supported sure rules. These rules are outlined by the organization. As an example, all sales-related information is filed along and staff-related information might be keep within the same information table. This sort of organization helps to keep up information accurately inside a information. If there's abundant information within the information, techniques like 'normalization' are used for organizing and reducing the duplication. This way, information is logically organized and associated with each other for straightforward retrieval. Once information passes step two, it becomes info.

Step 3: Summarizing: during this step, the knowledge is summarized so as to require the essence of it. The extended info is conferred in tabular or graphical format and keeps fittingly. For summarizing, there square measure several tools that may be used like software system packages, charts (Pareto, cause-and-effect), and totally different techniques.

Step 4: Analyzing: At this stage, the knowledge is analyzed so as to search out the relationships, redundancies and patterns. A skilled or a skilled team ought to be allotted for this purpose because the expertise of the person/team plays an important role. Usually, there related to reports created once analysis of data.

Step 5: Synthesizing: At now, info becomes data. The results of study (usually the reports) square measure combined along to derive varied ideas and artefacts. A pattern or behaviour of 1 entity is applied to clarify another, and conjointly, the organization can have a group of data components that may be used across the organization. This information is then keep within the structure cognitive content for more use. Usually, the cognitive content could be a software system implementation that may be accessed from anyplace through the web.

Step 6: Decision Making: At this stage, the data is employed for deciding. As associate example, once estimating a selected variety of a project or a task, the data associated with previous estimates is used. This accelerates the estimation method and adds high accuracy. This can be however the structure data management adds worth and saves cash within the long-term.

Knowledge Management Framework

1. **People** - Knowledge management must be prioritized within the company, and an ethos of sharing knowledge must be built into the DNA of the company and incentivized.
2. **Process** - There needs to be a clear system for all steps of knowledge management, while also leaving room for innovation.
3. **Technology** - Technology supports knowledge management, allowing knowledge to be searched for, found, and accessed within knowledge management systems. Technology also allows people to communicate better.

4. **Governance** - The organization's governance must prioritize and reward knowledge sharing. Without this step, instituting knowledge management systems will be a battle.

Organizations that take full advantage of knowledge management are better able to react quickly to changing market conditions, offer better services to their customers and increase their innovation and efficiency.

Knowledge Management in Libraries

As results of speedy environmental changes, educational libraries ought to rethink their structure structures in an effort to produce quality service to the university community. The stress is additional on the requirements of the library user than the requirements of the library.

In the gift era of knowledge and communication technology, information has become a key resource. though the standard operate of libraries is to gather, process, propagate, store and utilize info to produce service to their user communities; the setting during which libraries operate these days has modified because of the developments in ICT, that necessitates new ways that of data handling. Knowledge management may be a viable means that during which educational libraries might improve their services within the information economy. This will be achieved through making a structure culture of sharing information and experience at intervals the library. The success of educational libraries depends on their ability to utilize info and information of its employees to rise serves the requirements of the educational user community. The dynamic role of educational librarians as information managers emphasizes the requirement to perpetually update or acquire new skills to stay relevant to the today's library setting. Educational libraries may have to structure their functions, expand their roles and responsibilities for effective delivery of library and data services to satisfy the ever dynamic user desires.

Strategies for KM in Libraries

Knowledge management method involves the creation, capturing, sharing and utilization of information. Whether or not the key objective of educational libraries is to supply resources and data services to support the university community, the key resource that's needed is data. That is, the data of the library's operation, the knowledge of library users and their desires, data of the library assortment and knowledge of library facilities and technologies obtainable.

These sorts of data should be place along in order that new data is made that ends up in the development and development of service to the users. However, this various data is quite spread across all library sections and up the library hierarchy. The data isn't control by one individual solely however by variety of people. Academic librarians will become a part of the data creation method through collaborating within the teaching and analysis activities of the university. Data creation during this context ought to involve all the management effort through that the educational library consciously strives to accumulate competencies that area unit neither obtainable internally nor outwardly. Successful libraries area unit people who area unit user-centric and are able to reply to users' desires. As users became a lot of subtle, educational libraries got to develop innovative ways that to reply - to feature worth to their services. it's vital to make sensible library web site to change librarians to not solely offer associate in-depth using reference service however conjointly to become experienced handling completely different user enquiries.

For academic libraries to utilize their ability, it's necessary that they become knowledge-based organizations. Educational libraries got to prepare themselves for exploitation and sharing data. The importance of information sharing ought to be supported the potential of educational librarians to spot, integrate and acquire external data.

Role of the Library Professionals

The transformation from ancient library professionals to information manager is clearly current. However, this at hand shift of incorporating data management within the library activities needs a good deal of preparation. The challenge for the knowledge skilled lies in applying competencies utilized in 'managing information' to the broader image of 'managing knowledge'. A recent report issued by the Association of analysis Libraries (ARL) complete that "publishing services are speedily turning into a norm for analysis libraries."

The success of educational libraries depends on the capabilities and skills of its workers in fulfilling the wants of the university community a lot of expeditiously and effectively. To achieve success during this setting, people got to acquire new combination of skills like technical, structure and social skills.

Academic library professionals ought to focus a lot of on user-centric services that meet the objectives of the university.

There are several new initiatives that may be preoccupied by the educational librarians such as:

1. Making institutional repositories to support the archiving and distribution of a good vary of pedantic and teaching materials made by college at their establishments.
2. Developing digital publication services to support the planning, management and distribution of on-line journals and monographs, and
3. Participating in education, reach and support activities addressing pedantic communication problems.

University libraries will add worth to the data creation method in an exceedingly variety of how and a few of them are given below

1. By operating closely with the educational employees (faculty) within the choice of library Resources.
2. By operating closely with the publishers in negotiating access terms – worth for content access, use and distribution.
3. Providing facilities for on-demand printing of material for users among the library.
4. Providing on-line & off-campus access to aggregative, added and signed resources in electronic and/or print kind.
5. Market intelligence for the publishers through variety of channels starting from reviews to the 'blogs' to be made from the new system and adding worth for the users among their establishments.

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.

Challenges Faced by Educational Libraries

The speedy growths of knowledge and communication technologies have enabled libraries to gather less of print material and a lot of electronic material in multiple formats and media. These technologies have enabled educational libraries in providing services and resources to the university community on their desktop computers. It's a challenge that needs universities to reconstitute their services to fulfil the requirements of the tutorial community.

Academic libraries ought to offer info services for users acting within the dynamic educational atmosphere. Educational librarians ought to intermediate with library users, schools and colleges to support the effective teaching, learning and analysis in universities.

The changes brought by electronic media necessitate transformation within the method librarians rely on their jobs, the users of data and communication method of that they're a part of. Educational librarians should try to stay competent navigators of every medium on order to help the library users. The challenge for tutorial librarians is to manage services, which supply users a fastidiously designated mixture of multiple formats and media.

Conclusion

Knowledge Management must be accepted as a key issue of the business strategy. Library might play a very important role in success of information management for his or her organization. Libraries beware of implicit information during a higher means for his or her productive operating and satisfy their customers. Library and information professionals develop applicable knowledge management system in our organization or libraries. The library and information professionals are best knowledge creators. Library skilled believe that professional education and training programs, community of practices, data technology and information sharing are the necessary tools of information management for educational libraries. Lack of information sharing culture, prime management commitment, incentives and rewards, monetary resources and IT infrastructure are the most important constraints for the implementation of information management in educational libraries. Libraries, with restricted budget and human resources, ought to utilize the present management structure and technology to implement information Management, either bottom-up or top-down. With a combined effort, information Management can facilitate to extend to extend potency and cater to the ever-increasing desires of our patronage.

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Knowledge Management in Higher Education Institutions: A Psychological Study

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Abstract - *The current research studies the knowledge management in higher education institutions sharing on the psychological way. In this study human know that their mind is what thing about their knowledge. When human is child they have lot of problems in life, they have no knowledge what they are doing, but in adult human life is change, they now what they are, they understand that what they are doing. When human promoted in higher education they have so many knowledge, they manage their own problem them self. They also show their knowledge management in their institutions that organizational memory plays an important role in affecting knowledge sharing over higher education of faculty members. The important message for higher education institutions is creation of strong cultural academic in accepting organizational memory and participating in the process of its creation and its implantation in forms of systems that facilitates the process of sharing knowledge by faculty members. Also, the empirical findings of this study will develop the literature on knowledge sharing, empowerment and organizational memory in higher education institutions.*

Keywords: *Knowledge Management, Higher Education, Institutions, Psychological Study.*

Introduction

The current research studies the knowledge management in higher education institutions sharing on the psychological way. In this study human know that their mind is what thing about their knowledge. When human is child, they have lot of problems in life, they have no knowledge what they are doing, but in adult human life is change, they now what they are, they understand that what they are doing. When human promoted in higher education they have so many knowledge, they manage their own problem them self. They also show their knowledge management in their institutions that organizational memory plays an important role in affecting knowledge sharing over higher education of faculty members.

The important message for higher education institutions is creation of strong cultural academic in accepting organizational memory and participating in the process of its creation and its implantation in forms of systems that facilitates the process of sharing knowledge by faculty members. Also, the empirical findings of this study will develop the literature on knowledge sharing, empowerment and organizational memory in higher education institutions. (Feiz, Soltani & Farsizadeh, 2017). Knowledge management sharing that higher education is based on an understanding of knowledge creation and knowledge transfer. In implementation, goal of knowledge management is challenging issues. (McInerney, 2002).

Knowledge

Knowledge is something that will serve you your whole life. The most powerful thing in the world is knowledge, because it can create and destroy life on earth. Moreover, knowledge helps us distinguish between humans and animals. Knowledge is the ability to use your knowledge to help others. Knowledge enhances thinking in two ways. First, it helps you solve problems by freeing up space in your working memory, keep in mind that same way, knowledge also improves the reasoning and critical thinking that students must do in history, literature, and other humanities

classes. It's true that knowledge gives students something to think about, but a reading of the research literature from cognitive science shows that knowledge does much more than just helps students hone their thinking skills: It actually makes learning easier. Knowledge is not only cumulative, it grows exponentially. Those with a rich base of factual knowledge find it easier to learn more - the rich get richer.

Knowledge enhances cognitive processes like problem solving and reasoning. The richer the knowledge base, the more smoothly and effectively these cognitive processes the very ones that teachers target operate. So, the more knowledge students accumulate the smarter they become. We'll begin by exploring how knowledge brings more knowledge and then turn to how knowledge improves the quality and speed of thinking. The first stage in which factual knowledge gives you a cognitive edge is when you are taking in new information, whether by listening or reading. There is much more to comprehending oral or written language than knowing vocabulary and syntax.

Knowledge Management

Knowledge Management is the set of professional practices which improves the capabilities of the organization's human resources and enhances their ability to share what they know (Process Renewal Group). Girard & Girard (2015) "Knowledge Management is the process of creating, sharing, using and managing the knowledge and information of an organization".

Knowledge management is the creation, transfer, and exchange of organizational knowledge to achieve a [competitive] advantage. Knowledge management (KM) is the process of capturing, developing, sharing, and effectively using organizational knowledge. (Wikipedia). Knowledge management is the name of a concept in which an enterprise consciously and comprehensively gathers, organizes, shares, and analyzes its knowledge in terms of resources, documents, and people skills. (Rouse). Knowledge management is the explicit and systematic management of vital knowledge and its associated processes of creating, gathering, organizing, diffusion, use and exploitation. (Skyrme, 2011). Knowledge Management is the way you manage your organization, when you understand the value of your knowledge. (Milton)

Higher Education

knowledge management in higher education institutions, presenting a systematization of knowledge practices and tools to linking people (students, teachers, researchers, secretariat staff, external entities) and promoting the knowledge sharing across several key processes and services in a higher education institution, such as: the research processes, learning processes, student and alumni services, administrative services and processes, and strategic planning and management. (Pinto, 2014).

Higher Education Institutions

Knowledge Management is becoming a very important issue in higher education, which drives the ability of collect and analyze information, transform knowledge and apply novelties [Bhusry and Ranjan, 2011], [Machado & Davim].

As learning organizations, they will be able to extend knowledge skills, produce top quality graduates, enhance innovation and creativity and contribute effectively to the knowledge production and intellectual property development [Kok, 2005], [Abdullah, Selamat *et al.*, 2005]. The increase of knowledge assets is itself higher education and it clearly contributes to the future of economic and social development. In fact, knowledge management is gaining acceptance in the academic sector in the last few years, once it becomes clear that universities have a major role to

play in the knowledge economy, bringing new challenges for higher education institution [Selamat *et al.*, 2005], [Bhusry and Ranjan, 2011], [Sedziuvienne & Vveinhardt, 2009]. Knowledge Management is becoming a very important issue in higher education, which drives the ability of collect and analyze information, transform knowledge and apply novelties [Bhusry and Ranjan, 2011], [Machado & Davim]. It is necessary to point out the valuable knowledge, create a methodology for receiving and consolidating knowledge, to perform spread of knowledge among the students and staff, and to generate new knowledge and innovation through knowledge sharing [Sedziuvienne & Vveinhardt, 2009], [Machado & Davim]. Knowledge has become a key strategic resource, necessary to prosperity and competitiveness. Higher education institution will experience intensified pressure, influenced by the knowledge economy and also the globalization, with more interconnected entities and where knowledge, creativity and innovation are the essential elements for competitiveness [Cranfield and J. Taylor, 2008].

Conclusion

Effective knowledge management in many psychological disciplinary contexts must be based on understanding the dynamic nature of knowledge itself. Current thinking about Knowledge management in higher education institution literature and concludes with a view towards knowledge management programs built around knowledge as a dynamic process. The important message for higher education institutions is creation of strong cultural academic in accepting organizational memory and participating in the process of its creation and its implantation in forms of systems, that facilitates the process of sharing knowledge by faculty members. The transfer of implicit knowledge to explicit and accessible formats, the goal of much Knowledge management in higher education institution is challenging, controversial, and endowed with ongoing management issues. Knowledge management is based on an understanding of knowledge creation and knowledge transfer. In implementation, Knowledge management is an effort to benefit from the psychological knowledge that resides in an organization by using it to higher education institution. In higher education institution there are so many competitions, so higher education institution is suffering a lot of problems in their higher education.

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Knowledge Management Prioritization as a Mechanism for Accelerating Human Resource Capacity and Organizational Productivity

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Abstract - Since the emergence of Knowledge Management (KM) as a scientific discipline in the early 1990s and Thomas A. Stewart's publication of a cover story in Harvard Business Review highlighting the importance of intellectual capital to social entities in this post-industrial information age, it has attracted much attention amongst many organization's and practitioners. Bearing the aforementioned in mind, the objective of this study is to examine the definitions of knowledge management which apparently was first used in its current context at Mckinsey in 1987 and went public at a conference in Boston in 1993, by recapping its origins which principally sprouted within the management consulting community, and explores its essential four components of which are people, process, content/IT, and strategy in the context of modern organization's and their roles in accelerating human capital development and organizational productivity. The study additionally highlights knowledge management processes and models and causes of limitations in their application. Secondary data was the data collection methodology utilized for the paper. The research findings among others show there is a significant correlation between knowledge management and the degree of a firm's productivity and encourages the adoption of Community of Practice (CoPs) which are groups of individuals with shared interests that come together in person or virtually to tell stories, to share and discuss problems and opportunities. Furthermore, in the context of a "knowledge economy". Knowledge management is a key asset as it represents a vital strategic individual and organizational resources, therefore, it is recommended that more deliberate corporate investment is required in recognizing, creating, transforming, and distributing knowledge as it aids to improve an organization's efficiency and saves knowledge within the business establishment.

Keywords: Knowledge Management, Human Capital Development, Organizational Productivity, Knowledge Gaps, Knowledge Management Process.

Introduction

The fast-technological change has made organizations to be in constant wrestle to maintain competitive benefits by any means possible. Knowledge is now being important asset for development and productivity of any organization. For many companies, the time of rapid technological change is also the time of incessant struggle for maintaining competitive advantage (Jelena, Vesna & Mojea, 2012). Knowledge is considered the principal tool of competitiveness and innovation in the composition of commodity chain to the broader processes of regional and national economic development [Barney, 1995; Bhatt, 2000; Daniels and Bryson, 2002; Shapira *et al.*, 2006]. Knowledge management facilitates and incorporates approaches to the recognition, capture, assessment, retrieval and exchange of all information assets of an organization.

The results of the study conducted by (Zheng *et al.*, 2009) suggest that Knowledge Management fully mediates the impact of organizational culture on organizational effectiveness, and partially mediates the impact of organizational structure and strategy on organizational effectiveness. Productivity as a concept focused on improvement strategy is the most critical objective of any

company in today's competitive world; thus, knowledge management promises to build the required framework and the requisite technical infrastructure in organization and human-driven placement. An important management process is the introduction of new training strategies and methods for teaching manpower to control costs, enhance efficiency and customer satisfaction. Due to the fact that the various information technology and techniques used in the knowledge management function represent different effects in separate processes and the improvement of various indicators in the organizational Productivity, therefore, demands more knowledge and coordination from today's businesses in order to minimize costs due to the lack of available resources, shorten delivery times, increase efficiency and boost productivity.

Knowledge Management as emphasized by Kolam (2004) in Bhojaraju (2005) helps an organization to gain insight and understanding from its own experience. Knowledge management is an analysis of "strategic resources" that highlights unique resources, relevant elements and possible bottlenecks, which obstruct knowledge flow to the point of use. Knowledge Management protects intellectual assets from decay, seeks opportunities to enhance decisions, services and products through adding intelligence, increasing value and providing flexibility (Bhojaraju, 2005). As organizations use expertise to maintain their competitiveness in a complex market setting, the value of knowledge management cannot be overemphasized.

Knowledge Management complements and enhances other organizational initiatives such as; total quality management (TQM), business process re-engineering (BPR) and organizational learning as well as providing a new and urgent focus to sustain competitive position (Bhojaraju, 2005).

Knowledge Management is an approach to achieving organizational goals by making the best use of information or by doing what is necessary to make the most of knowledge resources. Data and information, while also still interrelated, are distinct from knowledge. On the one hand, while data represents raw numbers or descriptions about information, conclusions, or beliefs, data is data of significance and intent that is processed. In the other hand, knowledge is information that is approximate, useful or actionable.

Knowledge is details for a decision.

Definition of Variables

Skyrme [2001] defines knowledge management as "the explicit and systematic management of vital knowledge—and its associated processes of creation, organization, diffusion, use and exploitation".

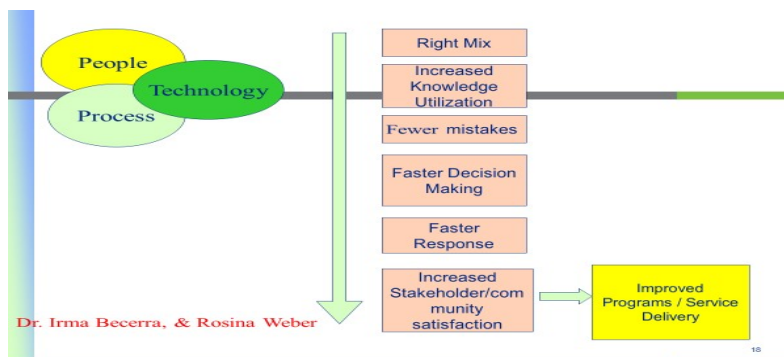
Knowledge: Is a collective of insights, understandings, beliefs, behavioral routines, procedures and policies which are concerned about markets, products, technologies and processes (Li *et al.*, 2012).

Knowledge Management: Is the entire set of practices and activities which are involved in manipulating the stocks and flows of knowledge in the firm, starting from how knowledge is created and continuing to how it is harvested, stored, shared and reused in new and related situations (Li *et al.*, 2012). **Organizational Performance:** Refers to what the organization does to improve efficiencies, how the organization plans to excel against the competition and how the organization plans for the future; to find out the gaps of performance occurrence (McGuire 2006). **Explicit knowledge** refers to structure knowledge expressed by text, images and symbols, which can be taught verbally and learned by textbooks, reference materials, databases, etc. (Polanyi, 1985). **Tacit knowledge** only exists in people's minds, which is difficult to express by words, symbols, images media. (Polanyi, 1985). **Human resources capacity** is defined as the development of knowledge, skills and attitudes in individuals and groups of people relevant in design,

development, management and maintenance of institutional and operational infrastructures and processes that are locally meaningful. Groot and Molen (2000).

Knowledge Management

Knowledge management is rooted in the concepts of organizational learning and organizational memory. When members of an organization collaborate and communicate ideas, teach, and learn, knowledge is transformed and transferred from individual to individual [Bennet *et al.*, 2003]. Knowledge management can be used to encourage organizations to gain decision-making processes more productive and to allow organizations to generate new knowledge and to apply this knowledge to generate more improvements in products, systems and policies. Adopting knowledge management, organizations can improve their capabilities of creating, managing, sharing and applying their knowledge, sharpen their business intelligence, enhance their managerial decisions efficiency and effectiveness, and ultimately achieve better business performance [Herschel & Jones, 2005; and Lo & Chin, 2009].



It is possible to divide the management of knowledge into individual knowledge and organizational knowledge. Individual knowledge is the awareness that exists in the mind of an individual, while organizational knowledge is the knowledge that is generated by interactions between technology, techniques and individuals. In reality, many knowledge management projects are information projects that yield to little innovation in products and services; which make management to develop structures that allow firm to recognize, create, transform and distribute knowledge (Gold *et al.*, 2001). Some researchers proposed a model for knowledge management comprising four competencies; absorption, diffusion, creation and utilization: Absorption is the process of acquiring new knowledge from elsewhere in the organization; diffusion is the process of spreading knowledge among the members of the organization; creation is the production of new knowledge and utilization is the use of intelligence in goods and services. Knowledge management has been split by other researchers to perform knowledge audits, build knowledge management.

Life Cycle of Knowledge Management

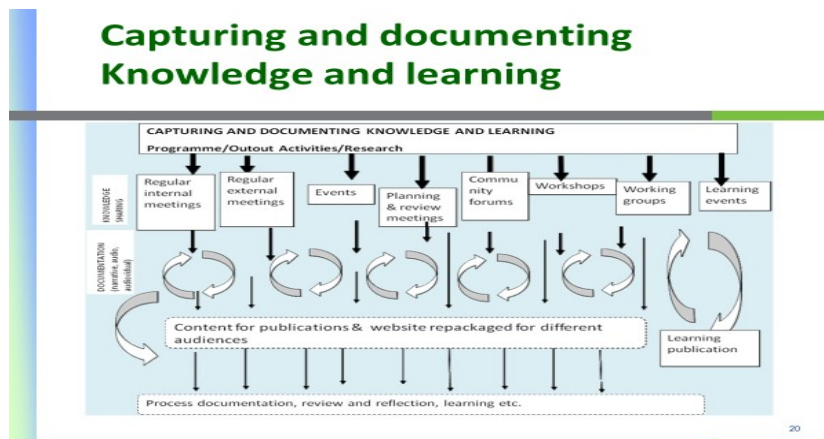
The life cycle of Knowledge Management requires both the production and development of organizational knowledge. The development of knowledge includes creating new knowledge or replacing new material with established knowledge. Organizations therefore need cultivate a knowledge-building culture by finding ways to inspire workers to communicate through the development of rewards and recognition of positive values and communication of impacts on individuals, groups and organizations. Knowledge creation requires the search for, identification of, and assimilation of potentially useful knowledge, often from outside the organization, in

comparison to knowledge formation. Knowledge management can play a key role in order to improve corporate efficiency by generating, exchanging, disseminating and maintaining knowledge and providing the company a superior value proposition based on this knowledge. The company needs to enable individuals to work together more efficiently, to collaborate and to communicate in order to build a knowledge sharing culture - eventually to make organizational knowledge more efficient. The aim of knowledge sharing is to assist a company as a whole to achieve its business goals. Management of information, efficiency and creation of knowledge are organizational assets for organizational productivity. Knowledge management life cycle provides a guide on implementing knowledge management within organization efficiently, thus the person responsible for it needs to closely follow that guide (Sagsan, 2006).

Organizational Productivity

Productivity is a mixture of accuracy and efficient use of available personnel and manufactured goods, and performance defines quality. Performance and efficiency are two essential components of productivity and various factors usually influence them. Organizational productivity is a set of organized and planned steps to strengthen the program and to make effective use of talent, equipment, spaces and locations. In modern systems, these activities are planned and implemented. Many authors such as Raşul *et al.*, (1998) assessed the influence of Knowledge Management elements on organizational performance and productivity whilst some say that the impact is hard to measure Haji *et al.*, (2014). Some authors like Raşul *et al.*, (1998) and Haji *et al.*, (2014) suggest that elements of Tacit & Explicit knowledge positively affect organizational productivity, while others try to gauge the relationship and consider other factors like knowledge sharing Mansell, R. (1999). Knowledge management can be used as a tool to enhance organizational productivity. Enhancing the organizational productivity increases the productivity and work force of an organization.

Human Resource Capacity



Groot and Molen (2000) defined human resources capacity building as the development of knowledge, skills and attitudes in individuals and groups of people relevant in design, development, management and maintenance of institutional and operational infrastructures and processes that are locally meaningful. In a general sense, capacity building for employees can refer to improvements in the capacity of all employees to perform suitable tasks within the organization's broad set of performance standards. Brews (1994) expanded the meaning of human

resources capacity building to include empowerment. This is a broader approach while still focusing mainly on education, training and human resource development. He posited that capacity building gives substance to empowerment. If empowerment is the value, then capacity building is the content. Capacity building activities equip empowered employees to achieve organizational goals (Brews, 1994).

Benefits of Knowledge Management

Knowledge management has many advantages which includes the following below

1. It provides professionals of an organization with the knowledge they need to do their job efficiently.
2. It can empower creativity and drive competitive advantage.
3. It can also eliminate information bottlenecks if applied effectively, strengthen the competence of governments and increase the standard of service of governments.
4. It can facilitate their learning (from each other as well as from external sources). This learning by individual employees allows the organization to become constantly growing and changing in response to the market and the technology [Sabherwal, 2008].
5. It adds positive impact on organizational performance which brings about innovation and improvement of performance.
6. It will help develop the learning and exposure of workers to the latest knowledge and experience in their fields. This can be achieved in a range of ways, including externalization and facilitation, social bonding, and practice groups.
7. It makes organizations to be more productive and efficient, Improve the interconnected components of organizational structures (productivity, usefulness, innovation) by many ways, including by providing individuals with better information.
8. Produce innovative solutions to problems as well as to develop more innovative organizational processes through increasingly rely on knowledge shared across individuals.
9. Implement programs in an advanced and efficient way that enhances quality and productivity or at least marketability.

Barriers of Knowledge Management

Knowledge management faces several barriers that impede Knowledge creation, storage, sharing, and application and these barriers are related to people, technology, organization, environment and knowledge characteristic. Certainly, lack of reward, shortage of technical support, lack of formal authority on the part of the innovator, and lack of fitness between knowledge and important organizational goals are the most important barriers (Ranjbarfard *et al.*, 2014).

Major issues in knowledge management identified by Kim and Park (2003) include administration, integration, indexing (tagging), and non-computerized knowledge. Sharing knowledge resources requires teamwork, which requires integrated structures and instruments to develop, access, and exchange knowledge with those who need it. Lack of web-based access may restrict access to information by a project participant from wherever internet access is accessible. A content management system based on the web should allow users to collect, store, change, share, share, reusing, archiving, and interacting with data from wherever, anywhere. Lack of understanding by top personals who were not properly trained in knowledge management can also pose as a barrier to effective knowledge management in an organization. Slow returns on investments by knowledge management initiatives due to prolonged implementations of life cycle can also be a barrier for effective knowledge management in an organization. Techniques for Effective Knowledge Management Practices According to Kim and Park (2003), information technology is at the core of knowledge management. Information technology is the tool used to capture knowledge and make it available for reuse. Knowledge management involves three techniques:

making knowledge available for use, sharing and making use of knowledge, and protecting available knowledge (Kim and Park, 2003). Wang and Wang (2009) developed a tool to measure knowledge management as it relates to how well information technology enabled knowledge management. The authors found that information technology supports knowledge management when there is an alignment of business strategies, organizational strategies, information technology strategies, and knowledge management strategies. As such, just having knowledge management tools and systems does not automatically represent effective knowledge management, but instead, the tools and practices should be developed to achieve knowledge management objectives. In addition, the work of Bosua and Venkitachalam (2013) expands on the need for knowledge management strategies to be aligned with the knowledge management processes. Alvarenga (2007) states that some of the key enablers of knowledge management include intellectual capital, organizational learning, management of innovation, information technology tools applied to knowledge management, intangible asset measures, competitive intelligence and environment scanning, strategic information management, organization development and competency management, and a community of practice. Tupenaite *et al.*, (2008) evaluated knowledge management models and proposed a model which includes four major stages: project information and knowledge gathering, acquisition of knowledge, maintaining a best practices knowledge database, and making knowledge available through a knowledge-based decision and support system.

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Effects of Demographic Characteristics on Electronic Banking Usage

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Abstract - *E-banking services are an innovative financial transaction channel that has assumed a new urgency and relevance in today's world of business, demand for financial products is changing rapidly and customer behavior regarding these products is also changing, with the change of the traditional banking sector to e-banking, new strategies have become necessary in order to attract new customers and retain existing customers, The present study aims to evaluate the effects of banking customers demographic characteristics on banking adoption with empirical details supporting the findings. Based on the survey data generated through 278 banking customers were analyzed and it was found that electronic banking adoption rates in India is very low. The reasons for low adoption of electronic banking services in India is lack of knowledge regarding electronic banking services, fear of loss of money due to hackers and uneducated banking customers. Hence, banking Industry should motivate their customers to adopt electronic non-financial Products and electronic financial Products as maximum banking customers are non-users of electronic banking.*

Keywords: *E-Banking, Adoption of E Banking, Demographic Characteristics.*

Introduction

Information Technology has become a necessary tool in today's organizations. Banks today operate in a highly globalized, liberalized, privatized and a competitive environment. In order to survive in this environment banks, have to use IT (Roshan *et al.*, 2012). IT has introduced new business paradigm. It is increasingly playing a significant role in improving the services in the banking industry. Indian banking industry has witnessed a tremendous development due to sweeping changes that are taking place in the information technology. The term "Internet Banking" has been used in literature in many different ways, partially because Internet Banking refers to several types of services through which banks' customers can request information and carry out most retail banking services via the internet, television or mobile phones. Internet Banking means providing banking products and services directly to customers through electronic, interactive communication channels. Internet Banking is defined as the automated delivery of new and traditional banking products and services directly to customers through electronic, interactive communication channels, Internet Banking includes the systems that enable financial institution customers, individuals of businesses, to access accounts, transact business, or obtain information on financial products and services through a public or private network, including the Internet. Customers access Internet banking services using an intelligent electronic device, such as a personal computer, personal digital assistant, automated teller machine, Touch-tone telephone. While the risks and controls are similar for the various e-banking access channels, this booklet focuses specifically on Internet-based services. Due to the development of technology Financial Products are being supported and used through electronic means and the same process is known as Internet Banking (Gupta, 2008).

Review of Literature

Margaret *et al.*, (2000) reports that intention to adopt Electronic banking can be predicted by attitudinal and perceived behavioral control factors, but not by subjective norms. The attitudinal

factors that are significant include relative advantage; compatibility with respondent's values, experience, and needs; trial ability; and risk. Although the findings of this study show that perceived complexity has a negative relationship with adoption intentions, this relationship is not significant. One possible reason is that since Electronic banking in Singapore is relatively new, most Internet users have yet to try it. As a result, they are unable to effectively assess the complexity of using such systems and the influence that such complexity may have on their intentions. The results of this study have also shown that there are other factors besides attitudinal ones that can help us to better understand the adoption intentions of electronic Banking.

Two additional influencing factors (subjective norms and perceived behavioral control) proposed by (Ajzen, 2002), in the theory of planned behavior, were included in this study. Although subjective norms were not found to significantly influence adoption intentions, perceived behavioral control dimensions were nonetheless found to have significant influences. In particular, self-efficacy toward using Electronic Financial Products and Electronic Non-Financial Products and the facilitating condition of perceived government support for Internet commerce were both found to significantly affect intentions to adopt Electronic Financial Products and Electronic Non-Financial Product however Mohammad *et al.*, (2012) have reported that e-banking services are being used with increasing frequency in most countries. Electronic banking enhances the development of the banking system, and it is considered as a strategic weapon for banks. Although it provides various benefits for both banks and customers, low level of customers' adoption of electronic banking services is noted in Jordan. Also, electronic banking services cannot achieve expected benefits if it is not used by banking customers. A research model was developed through integrating TAM with TBP and incorporating five cultural dimensions and perceived risk to provide a comprehensive investigation the results of the study revealed that perceived usefulness and perceived ease of use has a positive and significant impact on customers' attitude toward electronic banking services. Banks should make electronic banking services more useful and usable. They could achieve this by increasing the customers' awareness of the usefulness of using electronic banking services through advertising and long-term customer services, this study used a cross-sectional design. One possible direction for future studies is to conduct a longitudinal study to see whether the variables and their relationships are consistent with time. Second: this study used Hofstede's national cultural framework.

Lichtenstein *et al.*, (2006) reports key findings from an interpretive study of Australian banking, that an understanding of how and why specific factors affect the consumer decision whether or not to bank on the Internet, in the Australian context. A theoretical framework is provided that conceptualizes and links consumer oriented issues influencing adoption of Digital Banking. This study also provides a set of recommendations for Australian banks. Specifically, the findings suggest that convenience is the main motivator for consumers to bank on the internet, while there is a range of other influential factors that may be modulated by banks. This study also highlights increasing risk acceptance by consumers in regard to internet-based services and the growing importance of offering deep levels of consumer support for such services. Gender differences are also highlighted. Finally, this study suggests that banks will be better able to manage consumer experiences while moving to Electronic Financial Products and Electronic Non-Financial Products if they understand that such experiences involve a process of adjustment and learning over time, and not merely the adoption of a new technology Sheikh *et al.*, (2017).

Jayashree, (2013) studied that Online banking (Digital Banking) has emerged as one of the most profitable e-commerce applications over the last decade. Although several prior research projects have focused on the factors that impact on the adoption of information technology or Internet, there is limited empirical work which simultaneously captures the success factors (positive

factors) and resistance factors explores and integrates the various advantages of online banking to form a positive factor named perceived benefit. In addition, drawing from perceived risk theory, five specific risk facets – financial, security/privacy, performance, social and time risk – are synthesized with perceived benefit as well as integrated with the technology acceptance model (TAM) and theory of planned behavior (TPB) model to propose a theoretical model to explain customers' intention to use Online banking. The results of this study indicated that the intention to use online banking is adversely affected mainly by the security/privacy risk, as well as financial risk and is positively affected mainly by perceived benefit, attitude and perceived usefulness.

Thompson *et al.*, (2011) explored a research framework based on the theory of planned behavior (Ajzen, 1985) and the diffusion of innovations theory was used to identify the attitudinal, social and perceived behavioral control factors that would influence the adoption of Digital Banking. The results revealed that attitudinal and perceived behavioral control factors, rather than social influence, play a significant role in influencing the intention to adopt Digital Banking. In particular, perceptions of relative advantage, compatibility, trial ability, and risk toward using the Internet were found to influence intentions to adopt Electronic Financial Products. In addition, confidences in using such services as well as perception of government support for electronic commerce were also found to influence intentions (Baten, 2010).

Objectives of the Study

The Present Study is aimed at knowing the effects of Demographic Characteristics on electronic Banking adoption in India.

Hypothesis

- H1: Educational Status of Banking Customers does not vary with Internet Banking adoption.
- H2: Family Income of Banking Customers does not vary with Internet Banking adoption.
- H3: Age of Banking Customers does not vary with Internet Banking adoption.

Sampling Details

The primary data for the present Study were collected from the Banking Customers and these customers were identified on random basis from the state of Jammu & Kashmir. The filled up response were collected successfully from 300 respondents, however from collected 300 responses 278 responses were valid and 22 responses were incomplete and hence eliminated from the current study. Hence the sample size for the present work is treated as 278 comprising the Banking customers. Thus, the sampling procedure adopted for the present study is treated as stratified random sampling method. The primary data for the present study were collected between the Periods June 2019 to August 2019. The data collected were coded and transferred in to Statistical package for Social Science (SPSS) for the purpose of analysis.

Data Analysis and Discussion

Variations on Electronic Banking adoption between Banking Customers' Educational Status.

The variation in Electronic Banking adoption between Banking Customers' Educational Status is defined in hypothesis-1 taken up and its results are shown in table I as an outcome of Kreskas-Wallis test. Since, the descriptive details tested for Electronic Banking adoption across the five levels of Educational Status of Banking customers are not found to be satisfying normal distribution pattern; the choice of non-parametric statistical tool is made in this analysis. Banking Customers' Educational Status considered for this analysis are classified in to following five levels such as School Dropouts, up to 10th or 12th STD, Diploma or technically certified, Graduate and Post-graduate for identifying variations in adoption of Electronic Banking.

TABLE I TEST OF MEAN DIFFERENCES FOR HYPOTHESIS-1

Dependent Variables	Grouping Variables	N	Mean Rank	Kruskal-wallis Test Statistics		
	Educational Status			df	Chi-Square	Asymp. Sig.
Electronic Banking Adoption	School Dropouts	194	503.97	4	68.425*	0.000
	up to 10 th or 12 th STD	336	573.24			
	Diploma or technically certified	108	684.44			
	Graduate	288	560.66			
	Post-graduate	274	711.06			
	Total	1200				

*The mean difference is significant at 5 percent level

Source: Computed from primary data

Based on the test results provided, it can be noted that the highest Mean Rank of 711.06 is obtained for Post Graduate category of Banking Customers followed by Diploma or technically certified with a Mean Rank of 684.44. The third higher mean rank of 573.24 is found with 10th or 12th STD Banking Customers followed by Graduates with a mean rank of 560.66. The lowest mean rank of 503.97 is obtained for School Dropouts. Further, from the results shown in table-1 it can be inferred that the Chi-Square Value of 68.425 with 4 degrees of freedom has been found to be significant at 5 percent level and hence, the hypothesis-1 is rejected. This result clearly shows that there exist significant variations in the adoption of Electronic Banking between Banking Customers' Educational Status. These results confirm the earlier reported findings (Attila *et al.*, 2003).

TABLE II TEST OF MEAN DIFFERENCES FOR HYPOTHESIS-2

Dependent Variables	Grouping Variables	N	Mean Rank	Kruskal-wallis Test Statistic		
	Total Family Income Per Month			df	Chi-Square	Asymp. Sig.
Electronic Banking Adoption	Up to 15000	547	564.15	4	61.099*	0.000
	Rs.15000 to 25000	368	581.58			
	25000 to 45000	196	750.86			
	45000 to 85000	31	678.82			
	Above 85000	58	513.43			
	Total	1200				

* The mean difference is significant at 5 percent level;

Source: Computed from Primary data

Variations on Electronic Banking adoption between Banking Customers' Total Family Income per month the variation in Electronic Banking adoption between Banking Customers' Total Family Income per month is defined in hypothesis-2 taken up and its results are shown in table II as an outcome of Kreskas-Wallis test. Since, the descriptive details tested for Electronic Banking adoption across the five levels of Total Family Income per month of Banking Customers are not found to be satisfying normal distribution pattern, the choice of non-parametric statistical tool is made in this analysis. Banking customers' Total Family Income per month considered for this analysis are classified in to following five levels such as Up to Rs.15000, Rs.15000 to 25000, Rs.25000 to 45000, Rs.45000 to 85000 and Above 85000 for identifying variations in Electronic Banking adoption. Based on the test results provided, it can be noted that the highest Mean Rank of 750.86 is obtained for those Banking Customers whose monthly Income is Rs.25000-45000

followed by those Banking Customers whose monthly Income is above Rs.45000-85000 with a Mean Rank of 678.82. The third higher mean rank of 581.58 is obtained for those Banking Customers whose monthly Income is Rs.15000-25000 followed by those whose monthly Income is Rs.15000 with a mean rank of 564.15. The lowest mean rank of 513.43 is obtained for those Banking Customers whose monthly Income is above Rs. 85000. Further, from the results shown in table-2 it can be inferred that the Chi-Square Value of 61.099 with 4 degrees of freedom has been found to be significant at 5 percent level and hence, the hypothesis-2 is rejected. This result clearly shows that there exist significant variations in Electronic Banking adoption between Total Family Income per month of Banking Customers. These results confirm the earlier reported findings (Mattila *et al.*, 2003).

TABLE III TEST OF MEAN DIFFERENCES FOR HYPOTHESIS

Dependent Variables	Grouping Variables	N	Mean Rank	Kruskal-wallis Test Statistics		
	Age in years			df	Chi-Square	Asymp. Sig.
Electronic Banking Adoption	Less than 21	505	500.60	4	101.788*	0.000
	21-30	467	655.60			
	31-40	156	714.80			
	40-50	62	656.50			
	Above 50	10	941.90			
	Total	1200				

The variation in Electronic Banking adoption between Banking Customers' Age group is defined in hypothesis-3 taken up and its results are shown in table-3 as an outcome of Kruskal-Wallis test. Since, the descriptive details tested for Electronic Banking adoption across the five levels of Age group of Banking Customers are not found to be satisfying normal distribution pattern; the choice of non-parametric statistical tool is made in this analysis. Banking Customers' Age group considered for this analysis are classified in to following five levels such as less than 21, 21-30, 31-40, 40-50 and above 50 for identifying variations Electronic Banking adoption. Based on the test results provided, it can be noted that the highest Mean Rank of 941.90 is obtained for Age group of above 50 followed by those Banking Customers who are in Age group 31-40 with a Mean Rank of 714.80. The third higher mean rank of 656.50 is obtained for those Banking Customers who are in Age group 40-50 followed by Age group of 21-30 with a mean rank of 655.60. The lowest mean rank of 500.60 is obtained for Age group of less than 21. Further, from the results shown in table-3 it can be inferred that the Chi-Square Value of 101.788 with 4 degrees of freedom has been found to be significant at 5 percent level and hence, the hypothesis-3 is rejected. This result clearly shows that there exist significant variations in Electronic Banking adoption between different Age group of Banking Customers. These results confirm the earlier reported findings (Michael *et al.*, 2012)

Findings of the Study

1. It is found that significant variations exist between the adoption of Electronic Banking and Banking Customers' Educational Status. The highest adopters of electronic banking were identified as Post Graduate category of Banking Customers followed by Diploma or technically certified. The third higher adopters of electronic banking were identified as 10th or 12th STD Banking Customers followed by Graduates. The lowest adopters of electronic banking were identified as School Dropouts.
2. It is found that significant variations exist between the adoption of Electronic Banking and Banking Customers' Total family income. The highest adopters of electronic banking were identified for those Banking Customers whose monthly Income is Rs.25000-45000

followed by those Banking Customers whose monthly Income is above Rs.45000-85000. The third higher mean rank of 581.58 is obtained for those Banking Customers whose monthly Income is Rs.15000-25000 followed by those whose monthly Income is Rs.15000. The lowest mean rank of 513.43 is obtained for those Banking Customers whose monthly Income is above Rs. 85000.

3. It is found that significant variations exist between the adoption of Electronic Banking and Banking Customers' Age group. It can be noted that the highest adoption of Electronic Banking is identified for Age group of above 50 followed by those Banking Customers who are in Age group 31-40. The third higher adoption of Electronic Banking is identified for those Banking Customers who are in Age group 40-50 followed by Age group of 21-30. The lowest adoption of Electronic Banking is obtained for Age group of less than 21.

Conclusion

Electronic banking services are an innovative financial transaction channel that has assumed a new urgency and relevance in today's world of business, Electronic Banking is changing physical usage of non-Financial Products and Financial Products worldwide. Today, the click of the mouse and mobile banking offers lot of transactions regarding Electronic non-Financial Products and Electronic Financial Products. Electronic banking is safe and secure banking system but still the adoption rates in India is very low. The reasons for low adoption of Electronic banking services in India is lack of knowledge regarding Electronic banking services, fear of loss of money due to hackers and uneducated banking customers. Hence, banking Industry should motivate their customers to adopt Electronic non-Financial Products and Electronic Financial Products as maximum banking customers are non-users of Electronic banking.

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Knowledge Management in Higher Education Institutions: A Structure to Improve Cooperation

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Abstract - *Knowledge Management in Higher Education Institutions presents an organization of knowledge practices and tools to link people (students, teachers, researchers, secretariat staff, external entities) and endorsing the knowledge sharing across numerous key processes and services in a higher education institution, such as: the research processes, learning processes, student and alumni services, administrative services and processes, and strategic planning and management. They are profoundly involved in knowledge activities; however, they are responsible for the creation, exchange, protection, spreading, re-use and learning of knowledge. Colleges and universities have important opportunities to apply knowledge management practices to support every part of their mission, from education to public service to research. Knowledge management in higher education institutions involves the construction, development, maintenance and security of knowledge. Being the pioneers in the generation and dissemination of knowledge, these institutions have the enormous latent and the capability to establish their own knowledge management system. The establishment of high quality education and related services is the main machine improves the brilliance, attractiveness, reputation and popularity of any higher education institution.*

Keywords: *Knowledge Management, Knowledge dissemination, Planning and Management.*

Introduction

A knowledge management approach is the conscious integration of people, processes and technology involved in designing, capturing and implementing the intellectual infrastructure of an organization (Petrides 2004). KM plays an important role in the improvement of organizational competitive advantage through sharing of best practices, achieving better decision making, faster response to key institutional issues, better process handling and improved people skills. Higher education institutions play an important role in the knowledge-based economy. As learning organizations, you can expand your knowledge, produce high quality graduates, improve innovation and creativity and contribute effectively to the production of knowledge and development of intellectual property. [1], Knowledge management (KM) is gaining acceptance in the academic sector in recent years, when it becomes clear that universities have an important role to play in knowledge economy, which brings new challenges for HEI [2], [3], [4] According to some authors [4], [5], we can distinguish two perspectives of knowledge in institutions of higher education

1. Academic knowledge, the result of learning and teaching activities, the main purpose of the universities;
2. Knowledge of the organization, which refers to the knowledge of the general business of an institution: its strengths, weaknesses, strategies, critical success factor, relations with research centers, etc. and tools that facilitate the development of an environment of creation, collaboration and exchange of knowledge [3].

All institutions memorize access and transmit knowledge in an exclusive aspect; The contradictory factor is the way in which value is included in the products and services that go through the impressive use of knowledge capital. From the literature review, it is derived that higher education

institutions have powerful avenues where they can practice knowledge management techniques to support their goal and achieve their vision. The benefits of using the KM method in higher education can be grouped into five main categories, such as assistance in research processes, curriculum development processes, student and alumni maintenance, organizational services and planning. (Kidwell 2000) [7].

Knowledge Management in HEI and research

Knowledge-based institutions facilitate the excellent characteristics of knowledge workers, demonstrate strategic, managerial and operational characteristics. Knowledge workers carry out knowledge gathering practices, such as gathering knowledge from various sources; sharing knowledge, distributing knowledge, storing knowledge, reusing knowledge and knowledge innovations. Therefore, higher education institutions must cultivate and encourage a research-oriented curriculum for students. If higher education institutions incorporate this mechanism into their curriculum, higher education institutions can produce knowledge workers [6].

The knowledge workers construct the following characteristic of the higher education institutions. [6]. Knowledge workers demonstrate good thinking, managerial skills and analytical skills that transform them into innovative and creative skills. Knowledge workers continuously learn, create awareness about the demand for a changing environment in the future and implement those strategies supported and supported by the organization.

Knowledge workers have built trust among workers and believe in team spirit, partnerships, cooperation and coordination. Knowledge workers calculate risks and are ready to face risks, just as they are emotionally intelligent people. Knowledge workers share their knowledge, skills and ideas with others and at the same time learn from others. Knowledge workers have a great motivation and produce the best performance for organizational development through productivity (knowledge-oriented students), quality (in terms of education), innovations and intellectual property. Knowledge workers maintain the organization as a source of value creation, strategic and concurrent facilitator. Knowledge workers facilitate good services to students, staff and faculty members. Knowledge workers offer the best and most important quality of research.

Benefits from Knowledge Management facilitates following benefits to the higher education institutions. [6] Improve services for students, staff, teachers, pupils and internal and external members. Minimize response times for research activities. Encourages the institute to carry out interdisciplinary research activities. Improve competitiveness and responsiveness for research proposals, funds, collaborations and new business opportunities. It focuses on the quality of research at the institutional level that will cultivate future scientists. Improves the competitiveness and responsiveness of research researchers. Minimize the time spent on research and reduce administrative costs. Facilitate interdisciplinary research. Improve quality in updating and reviewing the curriculum. Knowledge management develops the capacities of human capital, client capital (students), organizational capital, innovative capital and intellectual property and financial capital.

Review of Literature about Knowledge E Management

Jennifer Rowley (2000) [7] In his study entitled "Higher education is ready for the management of knowledge", the applicability of the concepts of knowledge management in the higher education system as the repository of knowledge, access to knowledge, the environment of knowledge and the resources of knowledge identification of existing systems. The study is also associated with the creation of knowledge and experience. This is a system of evaluation of knowledge.

Arumugam Rathinavelu (2005) [8] In his study "Knowledge of design management system" discussed knowledge management in an educational environment. He said that an educator will take on new technologies to be followed. The various needs of the students. The recent study shows that HEIs are serious regarding the field of education that improve the quality of teaching, improvement, methods of learning, preserving the teachings and providing the students who are controlled from different companies. The study found that the good information system Communication technology (ICT) can help students create high quality multimedia systems through the web based exchange system. The study suggested that there is a solution for learning in an active mode. The study concluded that the use of information and communication techniques (ICT) can improve the practice of knowledge exchange that will improve the teaching-learning process.

A. F. McCarthy (2006) [9] In his study entitled "Knowledge Management Evaluation of the strategies and processes used in higher education" Educational institutions to explore strategies to increase knowledge based on knowledge activities aligned with the objectives of the institutions. The purpose of the study is to determine whether the KM process used in business and industry is applicable in the field of higher education. This study is conducted through the investigation of a case that integrates KM initiatives into the organizational culture of higher education institutions. Qualitative analysis is used to gain a deeper understanding of KM processes within higher education institutions. The study found that teaching and learning can be improved using KM and Information is shared among all members when using KM. Furthermore, KM Development has been of great help to the staff in the research area. Finally, the research concluded that all educational institutions should take KM initiatives and there should be a knowledge transfer system to all departments.

Po-Ying Chu, Li-Chieh Chen and Wan-Li Wei(2007)[10]"A study on the effect of using a knowledge management system in design education "focused on the importance of peer learning in design education that was recently acquired, as the Design Knowledge Management System (DKMS) built to facilitate peer-to-peer learning among students. This system provides a web-based platform for students to share their knowledge. An experiment was conducted at three universities where students from these universities were asked to perform tasks in DKMS, which were assessed by the faculty. The tools used to analyze the results were the mean and the standard deviation. The finding of the research has shown a high level of learning and satisfaction among students who have been qualified by DKMS.

SungChulPark 2007)[11]conducted an exploratory study on the comparison of knowledge management practices between public and private organizations. He believed that there were differences in the way of creating value from effective knowledge management in the public and private sector, and that these differences were reflected in the practice of the KM strategy. The main objective of the study is empirically based. The basic KM argument that KM in public organizations differs from that created by a private organization. He claimed that KM in public organizations is still undervalued, even though KM is so important for public organizations. The study is based on the MIT90 framework, i.e. the knowledge strategy includes coding and personalization, the knowledge structure includes the vertical and horizontal structure and the coordination and knowledge processes: acquisition and creation, archiving and recovery, transfer and sharing, application. The study concluded that in most knowledge management practices, private organizations are superior to public organizations. Thus, the researcher offered ample strategies and practices for better knowledge management practices.

Chalard Chantarasombat (2008) [12] has carried out a study on the development of a Knowledge management model for quality assurance of education in the faculty of education. The study aims

to build a model of knowledge management for quality assurance in education. The objectives of the study were to make sure that the KM agenda in the QA intertwined with the work development activity plans. Secondly, examine QA models for quality control along with activity for efficient work mechanisms, and finally examine the conditional factors of success in QA in the quality control of the Faculty of Education of a university in Thailand. The study revolved around the problems of how to build knowledge, classify knowledge, memorize knowledge, implement knowledge, share knowledge and assessment of knowledge in educational institutions. The study was undertaken in three phases, the first was to understand the conceptual structure, then identify the respondents to the research and finally create a model for knowledge administration.

Mamta Bhusryand Jayanti Ranjan (2011) [13] Researcher conducted a study entitled "Implementation of knowledge management in higher education institutions in India: a conceptual framework". India has witnessed tremendous growth in higher education institutions. With the growth of higher education institutions, challenges and competition have also increased. This has led HEI to recognize the need for knowledge management (KM). The objective of the study is to underline the implementation of knowledge management to examine the impact of information technology (IT) in KM. The study was conducted through a structured questionnaire and a content analysis that explores the functional domains and indicators that determine these domains. The researcher has proposed a conceptual framework for acquisition, encapsulation, structuring, dissemination and efficient use of organizational knowledge towards organizational objectives. The proposed framework will ensure a better transformation of the institutions' knowledge.

Mamta Bhusryand Jayanti Rajan (2011) [14] Researcher did a study on the titled "Knowledge collaboration in higher education institutions in India: designing a knowledge management solution". The study examines the concerns and priorities for knowledge management in higher education institutions in India. Explore the contributing factors and the difference between the expected and the real. The gaps identified were the lack of attention to research and advice, poor institutional planning, a weak IT infrastructure and slow and innovative learning. It is an empirical study conducted in Delhi of 152 university respondents, B-school and engineering schools. The objective of the study was to verify the validity of the existing KM framework and establish a support system for a structured KM. The study found that knowledge acquisition is high in these institutions with respect to knowledge transfer. Therefore, the dissemination of knowledge in these educational institutions should be encouraged.

Ram Shukla (2012) [15] in his study entitled "Knowledge management in higher education" referred to Knowledge Management (KM) as pillars of institutions' learning, leadership, organization and technology. The study investigates and understands the practices and perceptions of knowledge management in HEIs and the challenges of its implementation. Higher education institutions are complex institutions, with diversity, history, culture, provenance, resources and missions. The study was conducted with a structured interview and the results presented through a case study. The case examines the characteristics of the universities that impede or promote the implementation of the KM, and the perceptions of knowledge management and its challenges for implementation in the HEI sector. Some of the objectives of the study were the reasons why universities adopt knowledge management, the benefits of KM application in curriculum development, the dynamics of knowledge exchange and the key process of implementation of KM.

Sangeetha Namdu Dhamdhere (2015) [16] in the research entitled "Knowledge Management applications and status in the higher education" system aimed to find out how a generation of knowledge can be developed in higher education institutions. "She tried to create an efficient model to manage the knowledge available in different ways. Respondents were directors, HODs,

librarians and graduate students from selected institutions accredited by NAAC "A" of Pune. The study revealed that although educational institutions are the knowledge economy, staff did not have a clear familiarity with the concept of knowledge management. Most of the institution prefers to store information in the traditional copy format. We must encourage a modern method for storing information. The study suggested appropriate training for staff and students is required for the extensive use of Technology for storing knowledge.

Vitiate Kulkarni (2016) [17] conducted a survey entitled "Expectations of Indian B schools based on knowledge management systems". The study focused on understanding the perception and implementation of knowledge management in B-schools also try to find the challenges and expectations of B-Schools of India from the implementation of knowledge management systems. A stratified sampling technique was used to identify respondents from 50 B school's data were collected through structured questionnaires and interviews. The study revealed that 50% of B schools have an excellent storage structure. But the concern of these B schools was that there was no concept of mentoring service. B- schools have a large amount of deterioration in knowledge exchange and archiving process. The study suggested that this deficiency can be addressed through a reform of the work environment and through the correct implementation of the knowledge management system.

Conclusion

The knowledge management literature revealed a series of perspectives, practices, models, theories, implications, benefits and challenges, and case studies of the KM application. It has been observed that most of the research in knowledge management is carried out mainly abroad and in the IT sector. However, the literature on KM in higher education is lacking, and especially the study of KM in the Indian HEI was surprisingly minimum. Higher education institutions must focus on creating and developing knowledge workers that can succeed and excel in a competitive global environment. Higher education institutions must focus on creating and developing knowledge workers that can succeed and excel in a competitive global environment.

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Reinforcing Research in Higher Education for Quality Enhancement in Industry and Educational Institution

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Abstract - Higher Education is one way to acquire more knowledge and skills. This knowledge and skills are influenced by the students or employees learning to work with more ability in the industry for excellence rather than the survival. The Higher Education Institutions (HEIs) are working highly dynamic state all over the world. Most universities and autonomous institutions are reframing their curriculum and syllabus based on the industry requirements. The higher education institution should focus on quality of teaching through various teaching aids. This teaching aid helps the students to understand the concepts very clearly and it is possible to apply their knowledge at the industry environment. The industry also focuses on role ready engineers, though the institution and industry are working closely to produce the role read engineers. It is possible to improve the quality of the higher education teaching with research collaboration between the institution and industries. Industry always looks at the research areas based on the student or employee perception. The research is only the way to get more innovative ideas and new thoughts to produce the better quality education. Although it is necessary to retain an effective teaching through research at the institution and Industry environment.

Keywords: Higher Education Institutions, Learning, Curriculum and Syllabus, Autonomous Institution, Universities, Engineers, Industry, Industry Environment.

Introduction

Higher education in the 21st century plays a vital role in other aspects of individual life such as improving the overall quality of individual life, individual health and more opportunities in their life. Today, more students are struggling to see the consequence of their college education which provides the best job opportunities and a comfortable lifestyle for their individual life. In fact, few of the individual claims that the higher education is important to get ahead in life and few of the individual feel that going to college would have improved their present standard of living significantly. The higher education in the 21st century includes Economic, Health, Civic Involvement, Personal Development, Better Communication, Realization of Passions, Greater Sense of Discipline and Sense of Accomplishment. Higher education not only trains individual chosen field, but also train the individual to understand subjects that are complex, think analytically and ability to communicate in an effective way. Higher education provides a competitive edge in the individual life. Unemployment is the very critical for youngsters to settle in their life. The Industry also expect the knowledge and skills of the individual in respective field of study due to more competent to get job in any industry. Always the individuals are capable of experts in particular field such as think, analyze explore new ideas, ask questions and be creative.

Career Opportunities in Higher Education

Higher education opportunities are categories into three different ways namely trends in higher education, importance in higher education and research in higher education.

Trends in Higher Education

Normally, the higher education might be bachelor's degree or master's degree which degree gives more employment opportunities in industry. Innovation is the most popular in industry to adopt

latest technologies to achieve the societal problem. Most universities and autonomous colleges are reframing of curriculum aspects as per requirements of the industry. Students might be able to understand and apply their skills in the relevant area of study. Bridge between the colleges and industries has to achieve the common requirement of societal problem. The students always rethink and communicate effectively. Graduate is not only providing the knowledge but also provide the skills to apply in the real world problems. Either graduate or post graduate, they have to get knowledge in emerging field like learning analytics. The main objective of the autonomous institution is to fulfill the gap between institution and industry environment. Universities and autonomous institutions can leverage the gaps within a student's background. Research is a one aspect to teach the students with more practically. It is important in teaching community in the knowledge to understand conceptually, technically and analytically with enough communication skills. Blooms taxonomy may include remember, understand, apply, analyze, evaluate and create. This taxonomy helps the students to get stronger skills to apply in the real time industry.

Importance in Higher Education

The roles of higher education in viable of getting the knowledge and skills, the institution and industry will collaborate to define the industry driven curriculum to meet out the expectation of the today's industry environment. It is looked as a way to improve the quality of life and address major social and global challenges. Higher education is mostly defined as key factors for developing performance and effectiveness. Higher education is divided into various important roles such as Creating a quality workforce, supporting business & industry and Caring out research & promoting technologies. The higher education statistical data has been collected from various sources. The arts and science statistical data collected from Bharathiar University and engineering statistical data collected from Anna University approximately.

TABLE I HIGHER EDUCATION IN VARIOUS INSTITUTIONS

Institutions/Courses	Arts	Science	Engineering
Government	69	69	15
Government Aided	162	162	12
Self-Financing	416	416	545

The table I shows how higher education is important in acquiring knowledge and skills for various types of education institutions. It can be clearly seen that the total amount of institutions varies across the different institutions. According to the table 1, there is a very large variation in arts & science and engineering for various groups. There are totally 231 governments and aided in arts and science institutions and totally 27 government and aided engineering college, the former institutions which constitutes the major part of the higher education sector. Figure 1 shows the Higher Education in various Institutions.

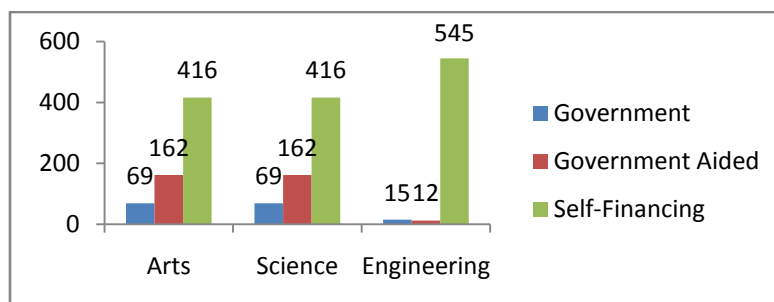


Fig. 1 Higher Education in various Institutions

In self-financing totally 416 institutions in arts and science and totally 545 self-financing colleges in which the latter constitutes the more part in the higher education.

Research in Higher Education

The major objectives of higher education are to bring the faculties and projects to cultivate the industry requirements across the world. Higher education wants to define the policies more clearly to take up the projects in right direction. The students and faculties have to take part in applying the funding proposal to solve the suitable societal problems. The research is the way to get more number of innovation ideas about the societal environment. It is a challenging task to prepare and approve the projects with required budget which increase the demand, changing employment needs, impact of new ideas and issues in staffing. Higher education is also providing opportunities and challenges to bridge gap between the institution and industry. There are various research fields such as teaching learning process, student's employability, academic activities with professional development, governance, setting of diversity and internationalization in Higher Education. The opportunities and challenges are considered for research from social, economic, cultural, political and technology advances.

Higher Education through Research Level

The higher education generally focuses on various research fields with funding in different agencies through research level. The table II represents the research data from different research levels.

TABLE II RESEARCH DETAILS OF HIGHER EDUCATION

Institutions/Categories	Total number of Employees	Total number of Employees with M. Phil.	Total number of Employees with Ph.D.	Proportion of Research Funding
Arts	602	144	48	46
Science	1038	791	453	24
Engineering	1503	-	729	83

The table II shows how higher education through research is vital in knowledge and skills for employees in education institutions. The total amount of employees varies across the different institutions with various higher education. According to the table 2, there are 935M.Phil. employees in arts and science fields of education. There are totally 1640 arts and science employees with higher education Ph.D. and totally 1503 engineering employees with higher education, the later employees constitute the major part of the higher education sector within the employees. Figure 2 shows the Research details of Higher Education.

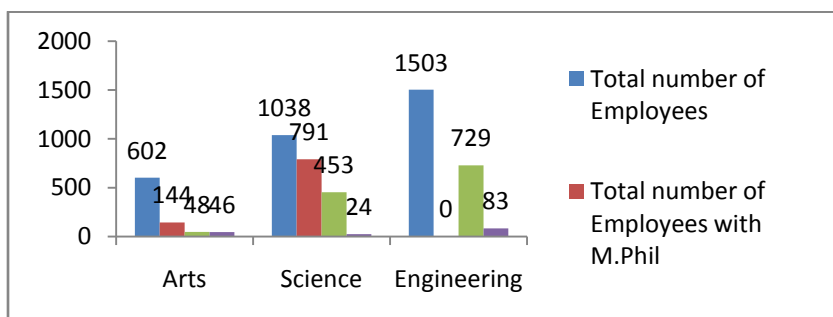


Fig. 2 Research details of HEI

The research funding among various employees varies, arts and science contains totally 70 funding through different research agencies and engineering stream contains totally 83 grand funding through various research agencies.

Higher Education at the Institution Level

The higher education generally focuses on various research fields with funding in different agencies through institution level. The table III represents the research data from different institution levels.

TABLE III INSTITUTION DETAILS OF HIGHER EDUCATION

Institutions/Categories	Total number of Faculties	Total number of Faculties with M.Phil.	Total number of Faculties with Ph.D.	Proportion of Research Funding
Arts	1638	972	561	28
Science	1952	1182	679	33
Engineering	2097	-	853	54

The table III shows how the higher education impacts the institution with different research funding's. The total amount of employees varies across the different institutions with various higher educations. There are totally 3590 arts and science faculties in arts and science and totally 2097 engineering faculties in the higher education. The total number of faculties with master of philosophy in arts and science stream is 2154 which constitutes the most part of the higher education. In arts and science stream totally contains 1240 Ph.D. graduates in which totally 61 faculties ongoing research funding in various agencies. Figure 3 shows the Institution details of Higher Education

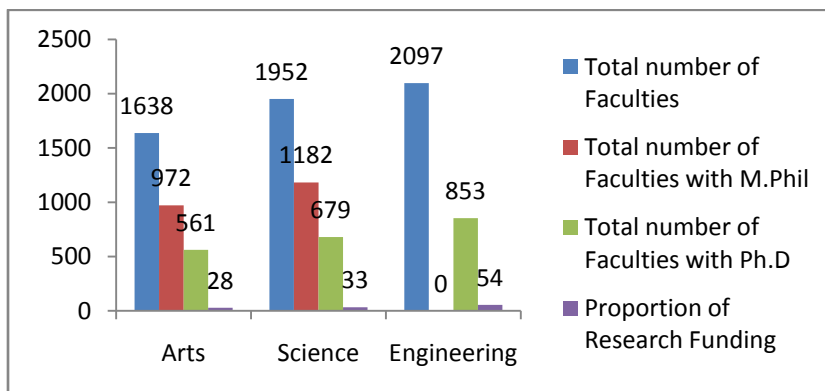


Fig. 3 Institution details of HEI

In engineering stream totally contains 853 Ph.D. graduates in which totally 54 faculties ongoing research funding in various agencies. The engineering employees with higher education, the later employees constitute the major part of the higher education sector within the employees.

Higher Education at the Research Institutions Level

The higher education generally focuses on various research fields with funding in different agencies through industry level. The table IV represents the research data from different industry levels.

TABLE IV RESEARCH INSTITUTION DETAILS IN HIGHER EDUCATION

Institutions/ Categories	Total number of Employees	Total number of Employees with M.Phil.	Total number of Employees with Ph.D.	Proportion of Research Funding
Arts	254	74	146	78
Science	343	95	214	92
Engineering	478	-	317	179

The table IV shows how higher education through research institutions for employees. The different research institutions contain various number of employees varies across the higher educations. According to the table IV, there are totally 597 arts and science employees in arts and science and totally 478 engineering employees in the higher education. The total number of employees with master of philosophy in arts and science stream is 169 which constitute the most part of the higher education. Fig. 4 shows the Research Institution details of Higher Education.

In arts and science stream totally contains 360 Ph. D graduates in which totally 170 employees ongoing research funding in various agencies. In engineering stream totally contains 317 Ph. D graduates in which totally 179 employees ongoing research funding in various agencies. The engineering employees with higher education, the later employees constitute the major part of the higher education sector within the employees.

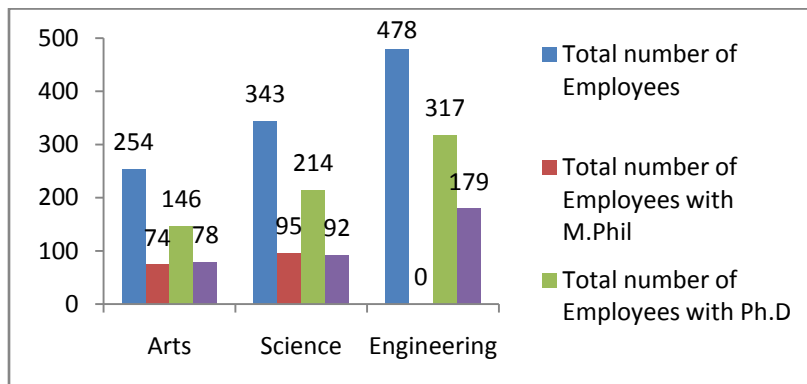


Fig. 4 Research Institution details in HEI

Summary

Higher education plays an important character in individual life such as improving the overall quality of individual life, individual health and more opportunities in their life. Higher education has to improve the quality of research rather than teaching. Normally, the institution and industry wants to collaborate to solve the societal issues. The quality of higher education is to collaborate the institution and industry to strengthen the research aspects which leads the institution and industry in next level. The research is only the way to get more innovative ideas and new thoughts to produce the better quality education. While collaborating, there are few key questions arises, they are

1. In what way the higher education will help the individual?
2. What are the various advantages of research field?
3. To what extent the research will influence the individual?
4. What are the implications of industry and institution policy?

Conclusion

Higher education is focus on developing the research activities in among students and faculty. But the issues are still currently evolving in academic profession. Students and faculty has to involve solving the societal issues. Therefore, understand and analyze the issues in current scenario should be able to enhance the policy of academic profession. If the current issues are solving correctly, it should be able to uplift the quality of students and faculties research. In essence, students and faculties should study the problem and solve it through their innovative thinking ability rather than getting knowledge. Blooms taxonomy is also influence the students and faculties to understand and apply the societal issues. Therefore, the research will help the students and faculties to get more innovative ideas and new thoughts to produce the better quality education. The institution and Industry should be able to collaborate with each other to solve the societal issues in higher education through different environment.

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Knowledge Management in Medical Colleges Affiliated to Pt. BD Sharma University of Health Sciences (PBDSUHS) Rohtak

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Abstract - The paper describes that Knowledge management is a systematic process of knowledge creation and modernization through an efficient organization and sufficient exploitation of information and knowledge resources. Discusses the role of Knowledge Management processes and applications on academic libraries and knowledge centre. Knowledge Management is a systematic process by which knowledge needed by medical colleges to succeed is created, captured, shared, controlled and leveraged. Modern higher educational institutes recognize their valuable knowledge assets and have adopted their changing role in an information and knowledge based society. Librarians and information professionals are trained to be experts in information searching, selecting, acquiring, organizing, preserving, repackaging, disseminating, and serving. One of the most important implications of the use of ICT is that medical libraries can reach out globally to provide their services 24x7 in a very cost effective and efficient manner. This paper also describes the main objectives, reviews, process, benefits and barriers of Knowledge Management in the digital era. Also explains that the knowledge management system is a decision support system and its role is to assist humans to make better decisions by making humans better informed. Finally, the paper highlights the role, skills and challenges for information professionals on Knowledge Management to manage the knowledge in the electronic environment. Further, as technology is establishing its roots deeper into the education sector, things are changing dramatically and one such change has been introduced in the form of education-based mobile applications. Paper stresses that mobile learning (mLearning) has also overcome educational problems of learners through interactive and personalized learning based on mobile apps. Paper talks about latest Mobile Technology Trends that will shape The EdTech Sector, e.g. Artificial Intelligence (AI), Chatbots, Virtual Reality (VR) and Gamification have huge impact on both education and mobile apps development niches. ICT has enabled users to avail many services without any human intervention and the role of LIS professional is changing from an intermediary to a facilitator and enabler. Their main role is to explore, evaluate, promote, and implement various emerging technologies. Innovation, collaboration, strong communication skills, skills for smart library services, and strong project management skills will be keys to success of the Library professionals in this knowledge society. This paper explains the level and status of knowledge management in Medical Colleges affiliated to the Pt. BD Sharma University of Health Sciences (PBDSUHS), Rohtak (2008). The author describes briefly smart library and their ICT based infrastructure, staff training and skills, users training and awareness, smart resources and services, and smart, embedded and collaborative librarians.

Keywords: Knowledge, Management, Innovation, Smart Library, Artificial Intelligence, 'Virtual Reality, Medical Library, Health University, Haryana, Mobile Apps, ICTs, Tools 7 Techniques.

Introduction

Today Knowledge Management (KM) has become a powerful tool for promoting innovation and realizing reengineering in the various walks of life. It occupies very outstanding position in the creation of knowledge innovation systems of a country. KM is a process of knowledge creation and modernization through an efficient organization and sufficient exploitation of information and

knowledge resources. This paper is based on theory as well as on empirical study conducted in the following Medical Colleges Affiliated to Pt. BD Sharma University of Health Sciences (PBDSUHS), Rohtak (2008).

Scope of the Study

The scope of the study is limited to following eight Medical College Libraries:

1. Pt Bhagwat Dayal Sharma Post Graduate Institute of Medical Science, Rohtak.
2. B.P.S. Govt. Medical College for Women, Khanpur Kalan (Sonapat) M 283001, 283002
3. Shaheed Hasan Khan Mewati Govt. Medical College, Nalhar (Mewat)(M) 09468266200
4. Kalpana Chawla Govt Medical College, Karnal.
5. Maharaja Agrasen Medical College, Aagroha (Hissar) (M) 01669-281193-94 FAX:- 281176
6. ESIC Medical College, NIT- 3, Faridabad Cont No. 07838182228
7. N.C. Medical College, Israna Panipat Cont No. 0183-2579081, 2579061
8. World College of Medical Sciences & Research, Village Gurawar, Tehsil & District Jhajjar M. 09992832333, 09810364

Rationale for the Study

Amid smart class rooms and teaching and learning styles in Universities, there is dire need of matching library and information services. In the contemporary classroom, five distinct teaching styles have emerged as the primary methods adopted by teachers: The Authority Style, The Delegator Style, The Facilitator Style, The Demonstrator Style and The Hybrid Style. Hybrid teaching involves developing challenging and engaging online learning activities that complement your face-to-face activities. Blended model of learning aims to enhance teaching and learning effectiveness. It is the combination of traditional face-to-face classroom learning with certain minimum level of basic e-learning features incorporated (Graham, 2005)¹.

Blended learning not only improves pedagogy with the learners' focus, but also allows students to participate actively, enables to construct knowledge collaboratively, and increases the flexibility and cost effectiveness of the student. Virtual Classroom (VC) provides solutions for 'live' and real-time online teaching and learning. It enables teachers to reach students anytime with engaging multimedia content, and to collaborate with each other virtually. Virtual Classroom introduces capabilities for creating and deploying rich online communications to effectively establish blended learning using synchronous training. Virtual classroom (VC, 2010) provides a virtual learning environment that allows instructors and learners to meet and interact with each other by using their personal computers and cameras at a remote location in real-time and acts as an alternative of face-to-face communication (Winegarden, 2005)². The definition of 'traditional library', 'automated library' 'electronic' library', digital library' 'virtual library', 'hybrid library', smart library etc., rests upon the definition of 'library'. In essence a library is the collection of books, documents, information products, such as books, journals, newspapers, digital and audio visual materials kept and organized for people to use. Keeping in view the teaching and learning styles, the concept of library as physical place has been dramatically changing to virtual place without walls for providing organized access to intellectual records. This means that today's libraries provide information wherever it resides, whether in physical places or in scattered digital information space, thereby paving way to the recent model of hybrid nature of libraries. Hybrid libraries are combines of traditional print materials as well as electronic materials, such as downloadable audio books, electronic journals, e-books, etc. Hybrid library services are of converged types of library services, consisting of the traditional library services, computing services and media services. Today, users in digital environment often expect a seamless, integrated, transparent network that allows them to link quickly and painlessly to information resources they seek. They want easy

access to full text information available in local library as well as globally on the same workstation simultaneously. The content providers, such as aggregators and publishers are working with libraries to achieve this goal. Now aggregators are one of the important content providers for libraries. EBSCO Information Services and RSS is an aggregator.

The following changes are noticed in e-environment

1. Less Interaction of users with library staff,
2. Less importance of the accuracy and timeliness of shelving order,
3. Electronic material cannot be misplaced or disturbed,
4. Access to photocopiers is not required if material is available in electronic form,
5. For printed materials the access to the physical library remains crucial,
6. In 'hybrid library', the staff must maintain the services across both world,
7. Problems to identify the determinants of library effectiveness and service quality in the new academic library: whether it is the collection in the form of e-journals and e-books or is it the library Web site and its links, serving as a portal? Is it virtual reference service? Is it access to the network itself?
8. Problems with senior library staff to accept the dramatic changes in all aspects and activities of the libraries,
9. Library staff frequently viewed support of print resources as their primary responsibility and digital support as a secondary task" (Higa, *et al.*, 2005)³.

Information literacy programmes have become a necessity and an important skill for library and informational professionals (LIPs). Also, there is great need to develop relationship between the users, library, LIPs and the information resources. Thus library and information services to the academic community are to be viewed dynamically in terms of external environment, user community and the governing and expending framework.

Objectives of the Study

To measure the level and status of knowledge management in all the libraries of Medical Colleges affiliated to Pt. BD Sharma University of Health Sciences (PBDSUHS) Rohtak.

Research Methodology

Two sets of questionnaires were designed for conducting library survey and users survey of all the eight libraries of the medical colleges. APA citation style is used for citing the references in text and end notes.

Knowledge Management Tools and Techniques

Knowledge management (KM) is about developing organizational intelligence by enabling people to improve the way they work in capturing, sharing, and using knowledge. It involves using the ideas and experience of employees, customers and suppliers to improve the organization's performance. Knowledge management tools and Techniques are the systems which organizations use for sharing information internally and externally. Examples of knowledge management tools include customer relationship systems, learning management systems and knowledge bases.

<https://youtu.be/JUZxaHj0FEI>.

1. Organizational Culture: which is supportive of knowledge management, and the processes it implies - particularly sharing the knowledge.
2. Infrastructure: Support systems, teams, structures, and collaboration.
3. Measures: Developing a process and design for managing change.
4. Technology: Can offer great advantages, particularly with the management of explicit knowledge, as a collaboration tool, and as an expert locator. However, technology should not be misused – it is just one important component of a KM strategy.

Innovative Services

Service Innovation with Web 2.0 in library services can improve the effectiveness of library knowledge management which ultimately helps not only to the students but also to the faculties and research scholars of the university. "Service Innovation may be defined as the use and improvement of various latest technologies to provide better and timely services to the users within a reasonable cost for the development of the users as well as the society as a whole" (Tiwari, 2016)⁴ Library professionals like Librarian, Library Administrator, Content Developer, Content Designer, Content Manager, Web Site operator, Data Entry operators, etc., need to provide effective and efficient services to interested people. Certain service innovations are required in libraries so that the need of users can be fulfilled. Collaboration is an effort in which people or organizations work together, i.e. one in which they collaborate. Collaborative librarianship is based on embedded librarianship. The university libraries need to adjust the e-resource structure of the library with changing and varying needs of library users. Today, Data vendors are more proactive in adapting to market changes. They have gone faster than universities in digitizing resources. Data providers such as Elsevier have nurtured readers and promoted the digital transformation of health university libraries. All the medical colleges under study have been able to digitize their dissertations and theses. Scholarly Commons provides a digital showcase for campus publications, archival materials, library special collections and other university-related creative works not published elsewhere. Open Educational Resources (OER) play an important role in faculty and library collaboration for curriculum development. Institutional repository supports the university in all educational endeavors. The first thing to do before starting the collaboration is to examine the library's mission and vision statement and the library's strategic objectives and plans. The library, then, can determine the type of collaboration intended to make and be ready to give up local control of systems and services by the participating library. Other prerequisites are. Individual skills and attributes; Individual characteristics; Team skills, attributes, characteristics, mechanisms and structures; Strategy and planning; Governance, leadership, and management; senior management buy-in; Team building; Consultation and engagement; Communication; Use of technology; and Review and evaluation

Best practices through information literacy for knowledge sharing

User needs are always the driving force behind the development of the library. Responding to these needs requires a sense of possibility. If library do not adapt to external changes, then library work will be separated from university development and library strive to bring more convenience to readers. The three main jobs, i.e., accelerating digital transformation, advancing smart services, and deepening collaborative creation help in imagining a state-of-the-art university library that helps achieve this smart library goal. The next stage of library enhancements includes plans for a scientific literature center, a shared learning space, and a scholarly exchange platform.

Mobile Services

The benefits of online library services can be derived both from the computers as well as by the use of smart and android phones. Many library users are now keeping mobiles in their pockets but they are not allowed to use them in libraries. The continuous evaluation and updating of Library 2.0 or online services along with mobile services are able to fulfill the changing requirements and demands of the users. Mobile devices, such as smart phones, tablets, e--book readers, handheld gaming tools and portable music players are practically omnipresent in today's society. These education-based users' friendly apps provide convenience to learners by helping them to achieve more in less time during the times of need. Mobile learners naturally study for 40 minutes longer than students using a desktop or tablet. Artificial intelligence (AI) technology embraces one of the biggest benefits, i.e. personalization in the education sector. With the use of AI, the schools will be able to create a global classroom. Chabot's will give a boost to online education. Chabot's do not

merely provide a personalized learning environment, but it turns lectures not only into chat conversations but also into a series of messages. Virtual Reality is the next hyped mobile technology trend which has taken the learning process beyond the learning space, and provides real-world experiences especially to medical students. Further, Gamification (i.e. learning with fun) can result in more and better student engagement. The few Innovative Education Apps, such as i) Remind, ii) Photo math, and iii) Duo lingo, etc. which provided prevailing solutions to learners such as systematic and smart learning; enhanced interaction; bridging the gaps between parents and teachers; tracking students' progress; providing eBooks and online study materials; ensuring 24x7 availability of materials; and also promoting self-learning in the traditional education system. E-Learning is the use of any electronic media in learning and teaching, which covers a wide set of applications and processes. E-learning is being implemented more and more frequently in higher education, creating new opportunities for both educational institutions and students. E-learning can also prove beneficial for professionals who can't devote full time to the conventional methods of learning. The students can learn all by themselves and independently anytime from anywhere with the assistance of helpful sources like: videos, graphics, Apps, documents, quizzes, reports, as guidance to their coursework that enables a complete in-depth understanding of concepts. Further, ICTs also allow for the creation of digital resources like digital libraries where students, teachers and professionals can access any types of research material and course material from any place and at any time. The web and the Internet is the core of ICT to spread education through E-Learning. E-Learning allows higher participation and greater interaction. It challenges the concept that face to face traditional education is superior to it. Self-learning is the thing that never happens. Therefore, education apps come with numerous material resources so that students can pleasantly interact with them.

ACRL Research Planning and Review Committee (2012)⁵ found that 55% of undergraduates have smart phones, 62% have iPods, and 21% have some kind of tablet. Over 67% of these students use their devices academically. Elmore and Stephens (2012)⁶ write, "Academic libraries cannot afford to ignore this growing trend. For many students a mobile phone is no longer just a telephonic device but a handheld information retrieval tool." The study by Liu & Briggs (2015)⁷ confirms that as of spring 2014, mobile services are already ubiquitous among the country's top 100 university libraries and are likely to continue to grow. In these libraries the most common services offered are e-books, chat/IM, mobile access to databases, and mobile access to the library catalog, mobile sites, and text messaging services. There is a trend towards responsive design for websites so that patrons can access the library's full site on any mobile device.

Smart Library Services

In today's era, a library equipped with 'smart library' technology is to be allowed freely open to library readers with no library staff. In strict sense, Technology gives facilities for controlling and monitoring of library buildings, including automatic doors, lighting, auto-services pavilions, and computers. It gives permission to use resources 24X7 hours so that the readers can use the library at times which is convenient for them. The 'smart library' requires 'smart librarians which gives users driven services. The role of librarians and libraries is changing in the present era due to the changing and varying demands of users. A smart library is an information hub connected with other libraries and information services in a larger informational environment. However, these innovative tools and services are smart only insofar as they are user-friendly and user-centered. The concept of Smart Library is associated with three dimensions: technology, service and human. Therefore, Smart Library requires Smart users, Smart Library staff and Smart Library services with latest information and communication technology (ICT). Librarianship is to mediate between users and information resources. Therefore, smart library is a new way of mediation between new users in totally new environments with new services. Here librarians must have a sense of service,

a vision of service, and the ability to apply smart technologies to improve service level. It requires exchange of library knowledge and best practices through information literacy. The paper offers strategic principles: integration of information infrastructures, building of learning resources, services and human learning. It provides guidelines and directions for medical libraries committed to improve themselves as smart libraries. Users are expecting more from the libraries, especially from the medical libraries not only for their intellectual growth but also for their day today information needs, which will certainly grow day by day. The evolution of libraries happens through three stages—modernization, automation and digitization. A smart library (SL) is an information centre with networks of many libraries and their services around the globe. Smartness means that the development of new library e-tools and services are measured on the assessment of real resources and users. New technologies such as cloud computing, data mining and artificial intelligence, along with service building, user cultivation and librarian training are essential components of smart library. Smart is more user-friendly than intelligent. As every new pattern, smartness bears new risks (Cao, Liang & Li (2018)⁸.

Smart Library Services and the Five Laws of Library Science

Today, the primary goal of a university library is to make available to users all types of data, information and knowledge in any form and format. It can be possible if all significant works are being digitally preserved and multiple modes of access to users are provided by exploring latest ICTs. Secondly, comprehensive library collection should be able to meet the needs of every part of the academic community. Thirdly, OPAC and web OPAC should be used to describe the contents of less used resources of the library. Fourthly, loyalty of users demands convenient and time saving library interface. Fifthly, university Libraries should diversify, innovate and adapt its resources and services to their users.

Pt. BD Sharma University of Health Sciences (BDSUHS), Rohtak (2008)

Pt. BD Sharma University of Health Sciences (BDSUHS), Rohtak (2008) has been established on June 2, 2008 as state university by Haryana Act 26 of 2008 vide Govt. Notification No. S.O.74/HA.26/2008/S.1/2008 dated August 18, 2008. Bhagwat Dayal Sharma (1918–1993), popularly known as Panditji, was the first Chief Minister of the state of Haryana and later Governor of Odisha and Madhya Pradesh from 30 April 1980 to 14 May 1984. Bhagwat Dayal Sharma was born in Beri, a town in the Jhajjar district of Haryana on 26 January 1917. Bansi Lal, Bhajan Lal and many other noted politicians learned politics under his guidance. Sharma Ji married Savitri Devi and they had six children; three sons and three daughters. He was educated at Col. Brown Cambridge School in Dehra Dun and St. Stephen's College Delhi

University at present is supported by PGIMS Library. However, an ambitious project to construct a state of art library building is under way. The library is centrally located within easy reach from all the departments, hostels and residential areas of PGIMS. The library has two reading halls with capacity of 600 readers. One reading hall with the capacity of 400 students open from 7.00 AM to 2.00 AM on every day. Library has at present 38476 books including 37062 general books & 1414 reference books. The library has linked with National Medical Library through ERMED Consortium (www.irmed.in). 243 online journals can be accessed via the University WiFi network in the central library, OPD areas, College Building, Director Office building and some areas of the Hospital. 1.7.1 Library of Pt. BD Sharma University of Health Sciences (BDSUHS), Rohtak (2008) University at present is supported by PGIMS Library. However, an ambitious project to construct a state of the art library building is under way. The library is centrally located within easy reach from all the departments, hostels and residential areas of PGIMS. The library has two reading halls with capacity of 600 readers. One reading hall with the capacity of 400 students open from 7.00 AM to 2.00 AM on every day.

Library PGIMS Rohtak

The Institute has a library, which has a collection of 42621 books on various streams of Medical Science. Besides this, the library also subscribes to about 150 national and international medical journals. Internet connectivity is also available in the library for the use of the staff and students of the Institute. The library is open from 7.00 am to 9.00 pm during summers and 9.00 am to 9.00 pm during winters. A project for the air-conditioning of the library is currently under progress. In addition, the Reading Room attached to the library provides a calm and serene atmosphere for the students to study. The library has two reading halls with capacity of 600 readers. One reading hall with the capacity of 400 students open from 7.00 AM to 2.00 AM on every day. Library has at present 42621 books including 41207 general books & 1414 reference books. The library is interlinking with National Medical Library through ERMED Consortium (www.irmed.in). 248 online journals are available in the library/hospitals and OPD's area. The college lacks Wi-Fi facilities, but the remaining facilities are good. The college must encourage girls to participate in sports. Classrooms are good, air-conditioned and have projectors. The library is well-stocked. The campus is lovely. The college has gained rapid success in last five years. 1.7.3 Bhagat Phool Singh Govt. Women's Medical College Khanpur. The BPS Medical College Sonapat was founded in the year 2012 with an aim to provide high-quality education in the field of Medical, It is the first women's Government Medical College of independent India and the first such institution in North India since Delhi's Lady Hardinge Medical College that was established in 1914. Shaheed Hasan Khan Mewati Government Medical College is situated on the outskirts of Nuh in Nalhar in Mewat district of Haryana state in India. Established in August 2012, Saheed Hasan Khan Mewati Govt Medical College, Nalhar is the Medical College of Haryana and the first in the Distt of Mewat. Presently it admits 100 students for MBBS course every year. Saheed Hasan Khan Mewati Hospital is the affiliated teaching hospital and has about 400 beds equipped with all modern facilities.

Kalpna Chawla Govt Medical College, Karnal (KCGMCK)

The Government of Haryana has established a Medical College and Hospital with all modern amenities in the heart of Karnal city in the name of Kalpana Chawla, famous astronaut. The Medical College and Hospital is spread over an area of more than 50 acres. With the establishment of this Medical College in Karnal, the hopes and aspirations of the people of the area will be met with the standards of health services going up and students benefiting with the advantage getting better educational avenues in a congenial environment.

Maharaja Agrasen Medical College, Agroha (Hissar) (M) 01669-281193-94 FAX

Maharaja Agrasen established the republican state of Agroha. Agroha consisted of 18 state units. The head of each state unit was given a Gotra. All the residents of that particular state unit were identified by that Gotra. It was maintained by Maharaja Agrasen that a nuptial alliance could not take place in the same Gotra. That is a girl of "Goel" Gotra could not marry a "Goel boy", but could be married in any of the other 17 Gotra. This rule enunciated by Maharaja Agrasen promoted harmony and brotherhood among all the 18 Gotra represented by state units. This facilitated promotion of unity and nationalism among the state units. Maharaja Agrasen Medical Education & Scientific Research Society was established at Agroha (Haryana) on 18th April 1988 to provide health care services, medical education and research facilities to more than 2 crore population living in Haryana and adjoining states of Rajasthan, Punjab and Himachal Pradesh and to fulfill the socialist ideals of Maharaja Agrasen Ji.

The Society commemorates the great patriarch of the Vaish Community, Maharaja Agrasen, in whose name this college was built and is located at Agroha; the Capital of his Great Kingdom. The First Medical College & Hospital in the name of Maharaja Agrasen Ji.

N.C. Medical College & Hospital Founder Late LalaNemi Chand Ji (1926 – 1993)

N.C. Medical College & Hospital aims to become a premier institute imparting best quality medical science education in the region. This can be understood by trust's commitment towards high quality education in all the education institutions running under its name. All institutions are ISO 9000:2008 Certified quality institutions. The main institution is ideally located on NH-71A (Rohtak-Panipat Road), 14 kms from Gohana Mod (Panipat) city. Late LalaNemi Chand Ji, a freedom fighter and an eminent social reformer of Bawal, district Rewari, Haryana is our first source of inspiration.

ESIC Medical College, NIT- 3, Faridabad Cont No. 07838182228

ESIC Medical College, Faridabad, or in its full name Employees' State Insurance Corporation Medical College and Hospital, Faridabad, is a Government Co-educational Medical College located at New Industrial Township-3, Faridabad, the industrial capital of India in Haryana, India.

World College of Medical Sciences and Research Haryana (WCMSRH)

Established with the purpose to serve as a core for fostering excellence in all spheres of health care, World College of Medical Sciences Research and Hospital is a leading provider of medical care and research facilities. With sincere devotion towards outstanding patient care, pioneering research and exceptional facilities, today, WCMSRH has designated all- inclusive care centers, with up to date science thriving in conjunction with research and treatment. The close association between our doctors and researchers is one of our unique strengths, making it possible for us to proffer patients with best care accessible as we realize more effectual tactics to prevent, control and eventually cure diseases in the future.

Collection of state and private medical college libraries (Year 2020-21)

TABLE COLLECTION OF STATE AND PRIVATE MEDICAL COLLEGE LIBRARIES (YEAR 2020-21)

Description	PBDS PR	BPSGM K	SHKM N	KCGM K	MAMC A	ESICM F	NCM CI	WCMS G
Books	41207	9176	9886	8790	12232	9865	10700	5060
Theses/Dissertations	500	123	100	100	150	658	120	06
Back sets of Journals	914	300	123	236	560	356	560	20
Total Collection	42621	9599	10109	9026	12942	10879	11380	50 86
e-journal and databases subscribed	13	10	10	10	10	10	--	---
e-journal through medical consortia	248	120	135	140	150	100	50	20
Current Journal Print	171	197	150	150	140	85	45	40
Foreign	25	20	20	25	20	10	--	--
Indian	146	177	130	125	120	75	45	40

Table I displays the printed books of five state and four private medical college libraries. PBDSPGIMS library comes first with 41207 books, followed by MAMCA with 12232 books, NCMCI with 10700 books, SHKMN with 9886 books, ESICMF with 9865 books and BPSGMK with 9176 books.

Availability of the web-based resources in medical college libraries

Availability of the web-based resources in five state and four private medical college libraries is presented in table II.

TABLE II SHOWING AVAILABILITY OF THE WEB-BASED RESOURCES IN MEDICAL COLLEGE LIBRARIES

Web-based Resources	PBDSPR	BPSGMK	SHKMN	KCGMK	MAMCA	ESICMF	NCMCI	WCMMSG
Catalogue (OPAC)	N	N	Y	N	N	N	N	N
Gateways	N	N	Y	N	N	N	N	N
Portals	N	N	Y	N	N	N	N	N
Online databases	N	N	Y	N	N	N	N	N
Search engines	Y	Y	Y	Y	Y	Y	Y	Y
Subject directories	N	N	N	N	N	N	N	N
Web-based library software	N	N	Y	N	N	N	N	N
Electronic journals	Y	Y	Y	Y	Y	Y	Y	Y
E-Journals(Back Volumes)	Y	Y	Y	Y	Y	Y	Y	Y
E-Books	Y	Y	Y	N	Y	Y	Y	Y
E-Data archives	N	N	N	N	N	N	N	N
E-Manuscripts	N	N	N	N	N	N	N	N
E-Maps	N	N	N	N	N	N	N	N
E-Thesis/Dissertations	N	N	N	N	N	N	N	N
E-Magazines	N	N	N	N	N	N	N	N
WWW	Y	Y	Y	N	Y	Y	N	Y
E-Newspaper	Y	Y	N	Y	Y	Y	Y	Y
E-Mail	Y	Y	Y	Y	Y	Y	Y	Y
E-Research reports	Y	Y	Y	N	Y	Y	N	N
CD-ROM/DVD-ROM	Y	Y	Y	Y	Y	Y	Y	Y
Indexes/Abstract	N	N	N	N	N	N	N	N
Reference tools in e-form	N	N	N	N	N	N	N	N
Statistical sources	N	N	N	N	N	N	N	N
Sound recordings	N	N	N	N	N	N	N	N
Video cassettes	Y	Y	Y	N	Y	Y	N	N
E-Articles	Y	Y	Y	N	Y	Y	N	N
Journal articles (full text)	Y	Y	Y	N	Y	Y	N	N
Journal articles (abstract)	Y	Y	Y	N	Y	Y	N	N
E-Entertainment	N	N	N	N	N	N	N	N

Table II shows the availability of web-based resources in nine medical college libraries. It is clear from the table that all the five state medical college libraries, i.e., PBDSPGIMS, BPSGMK, KCGMK, SHKMN, MAMCA and one ESICMF college governed by Central Govt. have the maximum web based resources, whereas three private medical colleges have the least web- based resources.

Web-based services at the medical college Libraries

Web-based services at the medical college Libraries are displayed in table III:

TABLE III WEB-BASED SERVICES AT THE MEDICAL COLLEGE LIBRARIES

E-Mail based services	PBDSP R	BPSG MK	SHKM N	KCGM K	MAMC A	ESICMF	NCMCI	WCMSG
Online reference service	Y	Y	Y	Y	Y	N	N	N
Electronic document delivery service	Y	Y	Y	Y	Y	N	N	N
Web-based reference service	Y	Y	Y	Y	Y	N	N	N
Electronic current awareness service	Y	Y	Y	Y	Y	N	N	N
Electronic research guides	N	N	N	N	N	N	N	N
Online current awareness bulletins	N	N	N	N	N	N	N	N
Electronic SDI services	N	N	N	N	N	N	N	N
Credo reference service (It is an online reference collection)	N	N	N	N	N	N	N	N
Virtual reference desk	N	Y	N	N	N	N	N	N
Online acquisition service	N	N	N	N	N	N	N	N
List of new arrivals online	Y	N	Y	N	Y	N	N	N
Online alert service for new additions and electronic indexes	N	N	N	N	N	N	N	N
Online circulation service	Y	N	N	N	N	N	N	N
Knowing circulation data (issue/return)	Y	N	N	N	N	N	N	N
Knowing availability of particular document online	Y	Y	Y	Y	Y	N	N	N
Reservation of documents online	N	N	N	N	N	N	N	N
User account status online	N	N	N	N	N	N	N	N
Cancelling of reservation online	N	N	N	N	N	N	N	N
Online request for renewal of loan	N	N	N	N	N	N	N	N
Online posting of overdue details	N	N	N	N	N	N	N	N
Cataloguing service	Y	N	N	N	N	N	N	N
Searching Web OPAC	N	N	N	N	N	N	N	N
Accessing e-journals	Y	Y	Y	Y	Y	Y	Y	Y

Accessing online databases	Y	Y	Y	Y	Y	Y	Y	Y
Accessing digital collections	Y	Y	Y	Y	Y	Y	Y	Y
Searching multiple catalogues with single command	Y	Y	Y	Y	Y	Y	N	N
Periodical section services	Y	Y	Y	Y	Y	Y	Y	Y
Electronic article delivery	N	N	N	N	N	N	N	N
Article alert service	Y	N	N	N	N	N	N	N
Open J-gate	N	N	N	N	N	N	N	N
Pro-active web-based TOC	N	N	N	N	N	N	N	N
Bulletin Boards Service	N	N	N	N	N	N	N	N
A bulletin board is an e-communications forum	N	N	N	N	N	N	N	N
Web-based user education	N	N	N	N	N	N	N	N
Web guides and tools with interactivity and flexibility to users	N	N	N	N	N	N	N	N
Web-based users training in basic library skills	N	N	N	N	N	N	N	N
Glossary of library terms in using library OPAC	N	N	N	N	N	N	N	N
Locating books, magazines, biographical data, etc.	N	N	N	N	N	N	N	N
Teaching to navigate library website and select relevant database	N	N	N	N	N	N	N	N
Instructions for searching CD ROM	Y	Y	Y	Y	Y	Y	Y	Y
Guidance in locating web-based databases and other e-resources	N	N	N	N	N	N	N	N
Instructions on subject searching training	N	N	N	N	N	N	N	N
Training in using Boolean operators	N	N	N	N	N	N	N	N
Training in searching internet resources through search engines	N	N	N	N	N	N	N	N
ILL/Document delivery	N	N	N	N	N	N	N	N
Electronic document delivery	N	N	N	N	N	N	N	N
ILL request web form	N	N	N	N	N	N	N	N
Online inter library loan service	N	N	N	N	N	N	N	N
Web forms	N	N	N	N	N	N	N	N
Indent form for acquiring some publications	N	N	N	N	N	N	N	N
Interlibrary loan request form for document delivery	N	N	N	N	N	N	N	N
Ask-a-librarian forms	N	N	N	N	N	N	N	N

On line reservation form	N	N	N	N	N	N	N	N
User survey form	N	N	N	N	N	N	N	N
Forms for consortia services of CSIR, ISRO, DRDO, DAE, ICAR, SIRNET, NICNET, NISSAT, INFLIBNET, MHRD, and IIM.	N	N	N	N	N	N	N	N
Web forms for user feedback	N	N	N	N	N	N	N	N
Form for virtual librarian who interacts in real time chat	N	N	N	N	N	N	N	N
Virtual library tours	N	N	N	N	N	N	N	N
Websites of library provide virtual library guide to the library	N	N	N	N	N	N	N	N
Ask-A-Librarian services:	N	N	N	N	N	N	N	N
These are Internet-based question and answer service	N	N	N	N	N	N	N	N
Real-time services:	N	N	N	N	N	N	N	N
Real-time interactive reference services in which the users can talk to a real, live reference librarian	N	N	N	N	N	N	N	N
Miscellaneous services:	N	N	N	N	N	N	N	N
Online staff list; Online feedback form; Online library news; Online subject gateways; Online contact addresses; Online library holidays list; Web-based frequently asked questions; Online helpdesk services; Online general library policies; Online integrated push-based-services.	N	N	N	N	N	N	N	N
Web OPAC and web search engines service	N	N	N	N	N	N	N	N

Table III displayed that few selected web-based services are provided at the five state medical college Libraries, i.e., PBDSPGIMS, BPSGMK, KCGMK, SHKMN, MAMCA and ESICMF college. But availability of web based services in three private medical college libraries, i.e., NCMCI, WCMSCG, and AMCHM have very limited or negligible web based services.

Conclusion

The networked e-information has not only changed libraries role from warehousing of resources to filtering and providing unlimited information to users but also has affected all the environments. The developments in ICT are changing the concept of document from print to electronic and thus the collection development policy need to be modified to include the digital content in a collection. E-resources present a number of challenges not encountered with the selection and acquisition of traditional analogue materials and it is advisable for the library to develop clear policies and processes for the selection and management of such resources. These will provide

clarity to staff and ensure that e-resources within the library are developed with due consideration of cost, technical feasibility, licensing, access and preservation requirements, and constraints. Medical Knowledge and information is managed and organized with latest tools and techniques of knowledge management but there are many shortcomings with regard to resource sharing networks, consortia, open access resources, institutional repositories, and digitalization and digitization. Medical libraries are not as smart as expected by MBBS, MS, MD, and faculty members. Moreover, level and status of organizational culture, information Infrastructure, measurement tools, and information communication technology in medical college libraries is not conducive to develop these medical college libraries as smart and indispensable libraries.

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Resource Development in Private University Libraries

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Abstract - *In this paper is to explore the private university environments and Private universities are different in size, course offered, funding authority, and managerial capacity. However, the private universities are playing an important role & opportunities of higher education in our region. Now-a-days private universities represent the fastest growing higher education. The impact of different university Libraries environments adapted Libraries growth and development of Infrastructure, Resources as Books, Rare Books, Periodicals and etc. University libraries provide leading services as aspect of the User's ICT facilities Library Services & Information Technology up-to-date. This study is, to explore the quality education of the private universities in Malwa-Mewar region.*

Keywords: *Resource, Development, private university Libraries, Malwa-Mewar.*

Introduction

A library is a place where the collection of information resources in print or in other forms that is organized and made accessible for reading or study is kept. Education aims to impart knowledge and makes good citizens. Libraries are the repositories of knowledge and form an integral part of education. Libraries have a long history, starting with the chained and closed-access libraries of earlier times to the present-day hybrid, digital, and virtual libraries that use the latest technology for provision of information through various services.

The University libraries growth and development of Infrastructure, Architecture of buildings in different sections. Collection means the Resource of studies types of documents- Books, Rare Books, Periodicals and Serials, Academic Thesis & Dissertations, Research Reports, Annual Reviews, Govt. Publications, Conferencing Proceedings, Pamphlets, Standards & Specification, Patents, Trade Literature, Maps, Atlases, and Globes, Photographs, Illustrations, Painting, Microfilms, Microfiches, , Manuscripts, Slides, Audio Cassettes etc. and with the advent of electronic media like computerized databases, Floppies, CD-ROM, DVD, e-journals, e-books, e-thesis, Internet etc. with other special materials in addition to books as principal constituent. The Building means the development of those documents other special materials in addition to books as the principal constituent.

Private University Libraries in Malwa - Mewar Region

There are Above Ten Private University libraries of Humanities, Science, Commerce, Horticulture, Law, Education and Management Departments. Those were established from 2010 to 2018. In Malwa-Mewar Region Related part of Madhya Pradesh & Rajasthan showing by Map in below.

Collection development is dynamic and continues the activity. Various steps

1. Analysis of the information needs of users.
2. Acquisition programs to build up a balanced collection.
3. Resource sharing and its impact on collection development.
4. Weeding out programs to ensure the effectiveness of collection.
5. Collection evaluation.

“A Library is a growing organization”- S.R.Ranganathan S.R. Ranganathan remarked that “to carry knowledge to the doors of those that lack it and to educate all to perceive the light is the greatest form of service.” He postulated the theory of librarianship, which was consisted of the five laws of librarianship; books are for use, every reader his book, every book its reader, save the time of the reader, the library is a growing organism, which was contained in a work by the same title which has been described as immortalizing his name in the annals of Library Science. (Ranganathan, 2000). The library is growing to develop to Resource and Services Developing a resource management system stands as one of the major interesting research areas in library and information science.

Review of Literature

Dhingra, N.V. (2013) observed Consortium e-journals by the faculty member of Punjab Agriculture University, Ludhiana. It found that major challenges were lack of awareness, lack of proper infrastructure etc. He also suggested for the proper training for the users for maximum usage of journals. Kalbande, S., and Ingle (2013) surveyed 108 faculty members at the Mahatma Phule Agricultural University, India and observed that the impact of e-resources was visible from the decrease in the number of printed documents in comparison to the increasing number of electronic resources. Dhanavandan, Esmail, and Nagarajan, (2012) studied about the use of electronic resources at the Krishnasamy College of engineering & technology library, Cuddalore and revealed that users are giving more importance to the electronic version of the documents. It further suggested that the librarians have to evolve more scientific methods to develop a standard collection of e-resources along with print documents with assessing the requirements of the user community. Francis, A.T. (2012) studies the evaluation of Use of Consortium of e-Resources in Agriculture in the Context of Kerala Agricultural University and found that the CeRA of ICAR has become a heavily-used service by the students. Curriculum-based information literacy courses like 'library and information services', 'research methodology', etc., have contributed much towards imparting required skills for the access and use of digital information resources.

Shukla and Mishra (2011) made a study to examine their views on the usefulness of e-resources compared to that of print resources, and the place from where they prefer to access information. Research scholars prefer e-resources against print resources because of the various good features of their research work and are looking in the future to have more resources access within the university campus with better Internet connectivity.⁵Sharma & Kumar (2010) found that the libraries of textile institutes are making an effort to do well in collection development, services, and infrastructure. Review of literature presents a detailed account of original publications mainly the research publications in order to access the availability of research work already carried by different scholars. In this process, the scholar makes an attempt to fill up the gaps on which the researches have not been undertaken so far. Some of the publications undertaken by research scholar on the research topic or related Pandey (2008) stated that among three important functions of librarian namely collection, storage and dissemination of reading material, the Collection plays a vital role in the libraries. In order to meet the user's Requirement, the staff of the library must keep in mind Five Laws of Library Science given by S. R. Ranganathan. Keeping in view these laws every Library must build and develop their collection so that it can help in Furtherance of education and help its users step into a world of adventure and learning. Partap (2007) conducted a survey of the libraries of 18 colleges of education In 3 districts of Punjab. He found that the collection size of the libraries varied considerably and comparatively older colleges had large collections. Majority of the libraries were being kept open for 6 to 7 hours a day. He Suggested for the introduction of the user education programme and stressed on the need to increase the range and depth of collection and services.

Objectives of the Study

1. The study assesses: Space and related facilities issues
2. The various kinds of resources available in the library.
3. Library Resources and e-resources
4. The number of users being served.
5. The collection policies and practices.
6. The financial resources and expenditure on equipment.
7. Technical processing of documents.
8. Library services being provided.
9. ICT applications in the library.

The Scope of the Study

The scope of the present study is limited and concerned only to Malwa-Mewar and approved by UGC, AICTE, ICAR and Bar Council of India.

Methodology

A structured questionnaire was designed to collect primary data. The questionnaire was circulated to nine college libraries in the state and the questionnaires were received from all nine libraries. The presentation and interpretation of the analyzed data are given below.

Objectives of the Study

1. To know the present status of the library in Ujjain Division.
2. To compare the growth, development and use of libraries.
3. To identify the problems in growth, development and use of these libraries.
4. To identify the factors which affect the services & Resource
5. To suggest measure to make library services more effective and efficient

Methodology/Plan of Work

Primary and secondary data will be collected through various methods for evaluating the growth & development of libraries in Madhya Pradesh. Qualitative and quantitative research will be applied as per the research design for the proposed investigation. The below-mentioned methodology is incorporated to collect the relevant data.

The chapter is categorized into five groups, such as:

1. Growth & Development
2. Resource
3. Library Services
4. User Survey

University Library

A library is more important in a University because a library can do without a University whereas a university cannot function without a library. A university library is an integral part of the institution. It is primarily maintained for the benefit of students, officers, faculty members and those who are engaged in research work. It plays a very important role in the national life of the community by acquiring material for educational use for the benefit of students and teaching departments. After getting independence in 1947, the national government of India constituted the University education committee in 1948 under the chairmanship of Dr. S. Raddhakrishnan. The Committee proposed many suggestions in its report for the development and progress of higher education in the country, one of them was to give extension and empowerment to "UGC" as University Grants Commission, which was established in Delhi in 1953. Dr. C.D. Deshmukh was its chairman. Since UGC has been working as an autonomous institution and doing well for the development of College, Universities and their libraries.

Growth and Development

It is very interesting and heartening to know that library movement in Madhya Pradesh was started from the beginning of the 20th century and there was the record of maintaining manuscripts in a royal palace from the 17th century. It resembles the present library. Places of worship and personal premises were also used as libraries. At this point, the following lines from the Encyclopedia of Britannica are worth mentioning. "In the early days, there was no such difference between a library and a record room and because of which it can be considered that the library was present from since the record room came into existence. Not only this, many other books were destroyed during the outbreak of the Burmese invasion.

The rulers of Madhya Pradesh used to maintain records regarding court trials and cases in their custody, which can be called the library. In ancient times, the library is the storehouse of literature grew of the socio-economic conditions, culture and civilization of that particular place. Because of having a rich literary and cultural tradition, most of the Madhya Pradesh had a keen historical sense and produced a mass historical literature and began to keep chronicles regularly in the palace from an early period.

Collection Development

Collection development is the process of systematically building library collection to serve the varied needs of users such as studying, teaching, research, recreational, and so on. The process includes selection, acquisition, maintenance, assessment, and weeding or discarding of current and retrospective materials. It also includes planning of strategies to continue acquisition, and evaluation of collections to determine its relevance based on the needs of the library users. The main guiding factors of collection development are users' information needs and available resources within the library. When one says available resources of a library, then one considers the existing collection, a collection of associated libraries, and financial resources. For planning effective collection development of a library, it is essential to frame an exhaustive collection development policy.

Books	Transparencies
Textbooks	Miscellaneous Materials
Reference Books	Charts
Rare Books	Pictures
Thesis	Globes
Serials	Model
Newspapers	E-resources
Journals	E-journal
Annals	E-book
Periodical	E-database
Government and Institutional	E-thesis
Publication	Online e-resources
Reports	Audio- Visual Material
Committee Reports	Phone discs
Commission Reports	Phonograph
Conference Proceedings	Magnetic tapes/discs
Microforms Materials	Audio cassettes
Microfiches	Videotapes
Micro-opaque	Videocassettes
Slides	Video discs

Collection Development Policy

According to Evans, "Collection development is a process having six major components namely market analysis, collection development policies, document selection, documents acquisition, weeding and evaluation of collection". The terms Collection Development and Collection Building, are usually used interchangeably, but Collection Management is different from the above concepts. Collection Building is the selection and acquisition of library materials based on the user's actual needs and future requirements. Building suitable collections for scientific and technical libraries is a process of prime importance.

Functions of the Collection Development

The library environment is currently undergoing a rapid transformation, leading to novel ways of library collection with an emphasis on modern resources. On one side, there is an increasing demand for good library collections in terms of a large amount of data/ information and on the other hand, the publishing media is striving hard to support this demand at a lightning speed by way of modern publications as well as its accessibility.

1. User's Analysis
2. Selection Policies
3. Acquisition policies
4. Resource Sharing
5. Weeding

Library Services

The library system, public, academic or special comprises three vital ingredients viz., documents, staff and users. The fifth law of library science enunciated by Dr. S.R. Ranganathan is that "Library is a Growing Organism" and this law also states the fact that the library, as an institution, has all the characteristics of a growing organism. The growth should be evenly distributed in all three ingredients the documents, the users, and the staff. The degree of interaction between these parts determines the success of the library system. The library is said to be good when the interaction between documents and users is more and poor if the interaction is less. A library can serve its function adequately if it has a supply of good, reliable, up-to-date documents and makes them available at the time the user needs them. Library and Information Services

1. Reference Service
2. Digital reference service
3. E-mail reference service
4. Real-time digital reference service
5. Developing the current approach is the main goal of CAS
6. Selective Dissemination of Information (SDI)
7. Indexing and Abstracting Service
8. Basics of Abstracts
9. Functions of an Abstract
10. Indexing
11. Document Delivery Service
12. Modes of Document Delivery Service
13. Reprographic Service
14. Importance of Reprographic Service

The Expected Outcome of Research

1. The study of the infrastructure of libraries.

2. To get awareness for library professional.
3. To get the idea of students and researchers attitude for learning.
4. Effect on libraries in the ICT era.
5. To get success idea of the provided library services.
6. Value and ongoing usefulness of book collections.

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Total Quality Management and College Libraries

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Abstract - Total Quality Management (TQM) is the integration of all functions and process within an organization in order to achieve continuous improvement of the quality of goods and services. TQM shows how Total Quality Management can contribute to improved performance and effectiveness. This paper focuses on how to implement TQM in college library so as to improve the quality of library services through the use of different elements of TQM, ultimately fulfilling the user expectations, developing staff and user commitment and surely generating value for a college library.

Keywords: Total Quality Management, College Libraries.

Introduction

The Management of Library or Information Centre is accomplished by a combination of basic management functions, roles and skills. The managerial task includes the coordination of human, information, technical and financial resources towards accomplishing organizational goals and objectives. The scientific approach lies in decision making, planning and appropriate use of the technology. A Librarian or information professional working in a one-man-bank situation uses management skills to procure funds for the library, to decide upon its future direction and to plan for new services, and to communicate with management and other individuals within the organization in order to achieve their library's goals.

What is TQM

TQM has been defined in a variety of ways, meaning a quest for excellence, creating the right attitudes and controls to make prevention of defects possible and optimize customer satisfaction by increased efficiency and effectiveness. TQM is "a system of continuous improvement employing participative management and centered on the needs of users". [Barnard- 1993] Zaira & Jurow (1991) defines it as "TQM is the combination of socio-economic and technical process towards doing the right things (externally), everything right (internally) first time and all the time, with economic viability considered at each stage of each process". S. Thakur define the TQM is a concept which make quality the responsibility of all people within an organization. All the persons involved are expected to contribute to the overall improvement of quality. TQM is the preferred method to increase the user satisfaction. It reduces the defects of the organization and increases the productivity.

The Concept of TQM

TQM is a way of managing to improve the effectiveness, efficiency, flexibility and competitiveness of an organization as a whole and it involves whole organization getting organized and committed to quality in each department, each activity and each person at each level. For the success of TQM effecting training, effective implementation and executive involvement is essential.

TQM is the foundation for activities, which include

Commitment by top management and all employees.

1. Meeting user's requirements
2. Reducing time of development cycle

3. Improvement teams.
4. To become user driven rather than self-focused
5. External and internal alignment
6. Systems to facilitate improvement
7. Total involvement, continuous improvement and leadership commitment
8. Recognition and celebration
9. Challenging quantified goals and benchmarking
10. Focus on Processes
11. Specific incorporation in strategic planning

This shows that TQM must be practiced in all activities, by all personnel, manufacturing, marketing, Engineering, Research & development, sales, purchasing, human resources, etc.

Elements of TQM

Following an international conference in 1990, the conference Board summarized the key issues and terminology related to TQM

Quality

Quality is often used synonymously with excellence. However, for proper quality management, defining quality and its measurement are essential.

Gravin (1998) identified five approaches to define quality

1. Transcendent approach (Quality always exists)
2. Product based approach (product meeting high quality standard)
3. User based approach (quality to meet user's requirements)
4. Manufacturing based approach
5. Value-based approach

In this context of information systems, quality pertains to

1. Performance of the system
2. Quality and quality of document store,
3. Quality of information products judged in terms of defined norms or criteria,
4. User satisfaction in terms of value for money spent (cost-benefit) and value for information context (cost-effectiveness). Therefore, the Quality management strategies should integrate these various approaches for achieving improved quality information services.

Performance of the Information System mainly related to

1. accuracy of the services,
2. adequacy of and need-based services,
3. timeliness of the services,
4. Quality of information products.

The information products in LIS can be information abstracts, Bibliographies, indexes, current Awareness Bulletins etc. These products should be produced according to set norms or criteria, (like –following-CCF, Circulation before the information becomes obsolete) User based approach lies on the idea that quality lies in the eyes of the holder and that the customer or user is the ultimate quality judge.

Quality Control

Tannock (1992) states that quality control “consists merely of the operational techniques and activities that are used to fulfill requirements for quality, usually interpreted to mean conformance to the required specifications”

Quality Assurance

Carley and Waldran (1984) define quality Assurance as “Planned, deliberate actions or activities investigated and carried out with the intent and purpose of maintaining and improving the quality of learning for participants”.

The principles of TQM to enhance the Library services

Library can benefit from the principles of TQM as suggested by Sirkin (1993) –

1. Make a Library Brochure
2. Library orientation
3. Implement interlibrary loan facilities
4. Smooth acquisition procedure
5. Technology use for easy information retrieval
6. Training and development of staff
7. Motivation
8. User based information services
9. Creates service brochures
10. Conduct a user survey about library services
11. Improve signage
12. Change hours of operation
13. Use flexibility in staff assignment
14. Ask vendors to give product demonstrations
15. Give a new staff a thorough orientation
16. Improve the physical layout of the library
17. Develop an active outreach program.
18. Publicize new or changed services.
19. Develop user and staff training materials
20. Target services to specific groups
21. Offer electronic document statement
22. Smile

Librarian must find out what readers want and concentrate upon providing it.

TQM in College Library

Over many centuries libraries have adopted many different management principles from business, industry, religion, and government. A library is a business that must be operated efficiently and well. A major difference is that most libraries are non-profit organization. Management of vast amounts of information stored in different formats-printed, electronic, audio, video-requires use of the most modern management techniques. Today technologies have changed our social and economic life. In the workplace methodologies change, people work at home or on the web with flexible timetables are emerging in different fields. The most important stakeholders in the library are customers, the providers of subsidies, staff, and other libraries. These stakeholders are interested, for various reasons, in the introduction of TQM. The introduction of TQM makes great demands on the staff.

Mainly the specific objectives of the TQM in any college library

1. Understand the concept of quality, Quality control, Quality assurance, TQM.

2. Review the Quality Assurance System in college library.
3. Examine the application of TQM to Library and Information Science (LIC) sector, with particular reference to college libraries.
4. Discuss the criteria for Quality assurance in providing quality Information services.

Managing Quality in a college Library

The method of TQM represents a new age in the management of an organization. Its elements such as participating management, the personnel training and the responsible service to the users are views that the libraries are already driven by. As a result of this, the libraries are up to improve these principles, which already have been valued positively by them and put them partially in practices. Many college libraries have embarked on plans for implementing quality-related philosophies such as TQM. It is well known that TQM is a management method that libraries can benefit from it in several ways. In each and every college the library plays key role for development of professors, students, researchers in terms of knowledge navigator. Today in the information age the information explosion is very fast. Every movement new information is produced, and it is difficult for the college library should focus on providing the best services possible, and be willing to change to serve its users.

In a service organization like a college library the user satisfaction means fulfilling expectations.

Benefits of TQM for College Libraries

1. TQM reduces bureaucracy, empower staff and create a team base culture, which is keenly desired for college library.
2. TQM help us for ganging users needs and expectations in an appropriate way.
3. TQM help us to maintain qualitative library and information services.
4. TQM helps in libraries improves the image of the library staff and helps in public relation
5. TQM helps for development the qualitative library collections.
6. TQM helps to detect defects and focuses on practices that identify potential defects to prevent them from occurring.
7. Quality of service ensures courtesy, attitude, helpfulness, and treatment of users with respect.
8. Any positive actions can be taken with the use of common sense, general knowledge, public relation skill, ready with and an intention for overcoming any difficulty that may arise.
9. Tools and Techniques of TQM in College libraries.

Steps in TQM

If a library wants to implement TQM the following steps should be taken –

Phase I: Taking decision in favour of TQM

Steps 1 – Exploration

Steps 2 – Decision to implement TQM

Phase II: Organizing for quality (prepare)

Steps 3 -- Leadership Planning

- a. Organizational Behaviour
- b. Understanding Users
- c. Vision and guiding principles

Phase III: (Startup)

- Steps 4 – Identifying services, users
- Steps 5 – User's survey
- Steps 6 -- Identifying and measuring critical processes
- Steps 7 – Initial pilot project Team
- Steps 8 – Training of team members

Phase IV: (Evaluation and Expansion)

- Steps 9: Creating a TQM strategic plan
- Steps 10 – Divisional / departmental planning

Flow Charts

It is one of the simplest methods of describing the complete operation steps by step.

Symbols used for the Flow Charts

1. Operation occurs when an object is intentionally changed in any of its physical or chemical characteristics- an operation adds value to the product.
2. Transportation occurs when an object or a person moves from one location to another, excepts when the movement is part of the operation.
3. Inspection occurs when an object is verified for quality or quality in any of its characteristics.
4. Delay occurs when an object or a person waits for the future action
5. Storage occurs when an object is protected against unauthorized removal

Histograms

Histograms are visual representation of the spread or distribution of data. They are also called 'frequency distribution'. In histograms the information is represented by a series of rectangles or bars which are proportional to groups of data. Histograms also illustrate the various measures of central tendency, the mean (average), mode, and median. So, histogram can show how the data are spread out or dispersed. It may also suggest the ways of keeping a process in control. To make a histogram one draws a grid, defines a target for intended performance and then marks the actual performance level.

Run Charts

A run chart is a line graph which illustrates how a process changes over a period of time. It is an effective tool for presenting data.

Conclusion and Suggestion

Quality is a very important tool for application of TQM in college libraries which can be measured, managed and improved by measuring rod of customer satisfaction and culture which depends to a large extent on leader behavior towards staff. The whole process of TQM aims at introducing a new cultural change which is likely to bring about greater participation of the employee to achieve the goals and objects of the college library.

Based on the above discussion and observation following suggestions are made for the implementation of quality on college libraries.

1. Quality assurance of Library and Information system should be part of the Quality assurance of university TQM project.
2. There is a need to develop standard/ norms for assessing quality of information services with particular reference of college libraries.

3. There is need to evolve methodologies and mechanism for improvement of quality information services;
4. More funds to be allocated for studying the quality of information services on project basis
5. Training of staff members in providing quality information services.

To conclude, librarian of a college library or the authority concerned should remember of few words of Gandhi, .K.: - “A customer is most important visitor in our premises; he is not dependent on us, we are dependent on him”.

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Knowledge Management (KM) Literature in the Field of Library and Information Science (LIS): A Bibliometric Analysis

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Abstract - The present study is based on bibliometric analysis of Knowledge Management (KM) literature in Library and Information Science (LIS) field and the data was retrieved from LISA database from 2010 to 2019. The motivation behind the selection of the present topic is the lack of sufficient bibliometric literature based on the analysis of recent trends of the relationship between KM and LIS field. Several bibliometric methods were applied to examine the chronological, geographical, forms of publications and subject-wise distribution and authorship pattern of KM literature in LIS field. Various science indicators have been used such as: Relative Growth Rate (RGR), Doubling Time (Dt), Degree of Collaboration (DC), Co-Authorship Index (CAI), Collaborative Index (CI) and Collaborative Coefficient (CC). Findings reveal the fluctuating growth trend of publications, declining RGR (from 0.74 to 0.07) and increasing Dt (from 0.93 to 9.46) during the study period. Single authorship pattern (33.63%) is in dominance, followed by double authorship (32.50%), triple authorship (21%) and more than three authorships (12.87%). The value of DC increased from 0.61 to 0.74, of CI from 2.05 to 2.38 and of CC from 0.36 to 0.45 during 2010-2019. This indicates positive collaboration trend among authors which is further highlighted by the decreasing CAI for single authorship and increasing CAI for other modes of authorship pattern. Scholarly journal article is the dominant form of publications (3,221) and the top three most prolific authors are Patrick Ngulube (19 publications), Peyman Akhavan (15 publications), and Alexander Serenko (13 publications) respectively. United Kingdom is the leading country with 1081 documents (31.04%), followed by United States 943 (27.07%), England 326 (9.36%), Singapore 178 (5.11%) and India 143 (4.11%), among total 45 contributing countries, reflecting the dominance of developed countries for contributing literature in this particular area.

Keywords: Knowledge Management, Bibliometrics, Relative Growth Rate, Doubling Time, Collaborative Index, Co-authorship Index, Collaborative Index and Degree of Collaboration

Introduction

In a rapidly developing and technologically advanced knowledge society, modern libraries are facing new challenges. They are no longer the sole entity concerned with storage and dissemination of information. Today's 'information age' is full of various other information systems such as Google or internet that are dealing with providing access to the abundant information within seconds, as and when required by people. Thus, libraries are surrounded by competitive environment in which they have to do everything possible in order to survive as well as to make their distinct identity recognized among other information systems. The one significant characteristic that makes a library different from other information systems is its primary purpose which is to provide right information to the right user at the right time. The word 'right' denotes the quality information which is based on exact need of user, accuracy, reliability or authenticity of the source, etc. Therefore, a library is not concerned with only providing information like other information systems, but providing the right or quality information as per users' needs and convenience. Also, it aims to make users information literates, it teaches them how to search information and from where to search. The application of the concept of knowledge management (KM) is an opportunity for LIS field in order to deal with the

present challenges related to effective and innovative strategies development, competitive capabilities development and optimum utilization of library sources and services etc.

Knowledge Management (KM) is emerging out as an interesting field of research in different disciplines such as business, management, IT and recently in LIS field, etc. In recent years, the scope and application of KM concept in LIS field can be understood as a revolutionary approach contributing towards library's efforts for developing different strategies/solutions to deal with modern challenges. This has attracted the attention of both academicians and practitioners which led to the emergence of various scientific publications in this particular area of study. However, only a few studies have been found based on quantitative analysis for examining the trends and status of KM literature in LIS field among scientific community as a newly emerging area of research. Therefore, the present study is based on bibliometric analysis of Knowledge Management (KM) literature in Library and Information Science (LIS) field, as a contribution to the existing scientific literature on bibliometric/scientometric studies in this particular area.

Objectives of the Study

1. To analyze the chronological distribution of publications in the field under study
2. To find out Relative Growth Rate (RGR) and Doubling Time (Dt)
3. To study the measures of collaboration and authorship pattern of KM publications in LIS field
4. To find out different forms of literature published in the field under study
5. To find out the most prolific authors in the field under study
6. To analyze the subject-wise distribution of KM publications in LIS field
7. To study the geographical distribution of publications in the field under study

Scope and Methodology

The present study is based on bibliometric analysis of Knowledge Management (KM) literature in Library and Information Science (LIS) field covering ten years from 2010 to 2019 and LISA database has been used for the purpose of data retrieval. A total of 3,483 publications have been retrieved which are mix of research articles, books, reviews, dissertations and thesis, literature reviews, case studies, editorials, conference papers, and proceedings. Science indicators used for the study are Relative Growth Rate (RGR), Doubling Time (Dt), Degree of Collaboration (DC), Collaborative Coefficient (CC), Co-Authorship Index (CAI) and Collaborative Index (CI). MS Excel software has been used for further calculations and data analysis. APA style 7th edition has been used for giving references wherever needed.

Science Indicators

Following science indicators have been used in the study:

A. Relative Growth Rate (RGR)

It describes increase in the number of documents per unit of time and the formula used for its calculation is based on Mahapatra's model (1985) (as cited in Verma & Shukla 2019)

$$RGR = \frac{W_2 - W_1}{T_2 - T_1}$$

Where,

W1 = Loge (natural log of the initial number of contributions)

W2 = Loge (natural log of the final number of contributions)

T1 = the unit of initial time

T2 = the unit of final time

B. Doubling Time (Dt)

It is related to RGR and analyzes the time duration in which a number of publications becomes double as (as cited in Verma & Shukla, 2019)

$$Dt = 0.693 / R$$

C. Degree of Collaboration (DC)

It is the ratio of number of multi-authored publications to the single authored publications and is calculated using the formula developed by Subramanyam. (Subramanyam, 1983)

$$DC = \frac{Nm}{Nm + Ns}$$

Where,

DC = degree of collaboration

Ns = number of single authored publications

Nm = number of multi-authored publications

D. Co-authorship Index (CAI)

It is calculated using the formula developed K.C. Garg and P. Padhi (1999), which studies the changing pattern of authorship. (p. 259)

$$CAI = \frac{N_{ij}/N_{oj}}{N_{oj}/N_{oo}} \times 100$$

where,

N_{ij} = Number of publications having j author of block i

N_{io} = Total output of block i

N_{oj} = Number of papers having j authors for all blocks

N_{oo} = Total number of papers for all authors and all blocks

when,

CAI = 100, it implies the number of publications corresponds to the average within a co-authorship pattern.

CAI > 100, it implies the number of publications is higher than the average

CAI < 100 it implies the number of publications is lower than the average

E. Collaborative Index (CI)

It gives average number of authors per paper and the formula used for calculation has been developed by S. M. Lawani. (Lawani, 1980)

$$CI = \frac{\text{Total authors}}{\text{Total joint papers}}$$

F. Collaborative Coefficient (CC)

It was developed as a solution to the shortcomings of two other formulas, DC and CI. The method used for calculating Collaboration Coefficient (CC) has been suggested by I. Ajiferuke, Q. Burell and J. Tague. (Ajiferuke, Burell & Tague, 1988)

$$CC = 1 - \left[\sum_{j=1} (1/j) F_j / N \right]$$

Where as

F_j = the number of authored papers

N = total number of research published; and

k = the greatest number of authors per paper

Review of Literature

Knowledge Management (KM) is a very old concept and developed as a multidisciplinary subject which has its historical roots widely spread over different disciplines such as Philosophy, religion, Business, Management, IT, Library science, Information science etc. The whole journey of KM from being a peripheral element to evolve as a central element of socio-economic and cultural reality, started from the ancient time when KM existed in implicit form in philosophical thinking, religious teachings, agricultural practices and handicraft skills. Later the industrial revolution led to the development of explicit aspect of KM, existing in the form of knowledge and skills of workers, machinery etc. Then the speedy technological development became the reason for the emergence of concept like information management and knowledge management which has become important subject matter in every aspect of life today. There are many studies discussing different other theoretical aspects of KM like its conceptual development, characteristics, practical implementation in business management and its components, i.e. knowledge sharing, organizational learning, knowledge management systems etc. (Prusak 2001; Spender 2014; Girard & Girard 2015; Bhojaraju 2005; Fernanda & Salwa 2018)

Kumar and Mohindra (2015) explored the research trends in the field of Knowledge Management (KM) during 2000-2014. A total of 5127 articles were retrieved from Web of Science (WOS) database. The objectives are based on studying growth of literature, geographical distribution, productivity of journals, prolificity of authors, highly cited papers etc. Lotka's law to identify author's productivity and Bradford's law of scattering to identify core journals were used. Findings reveal that the "Journal of Knowledge Management" is the most productive journal with 269 articles (4.67%), fluctuating but increasing year-wise growth trend of publications has been observed, the author productivity confirms to the original Lotka's Law and distribution of articles goes well with Bradford's law of scattering. USA is the leading country with highest number of contributions with 1,268 publications (24.73%), followed by England, Taiwan and Spain, with 587 (11.44%), 482 (9.40%) and 366 (7.13%) articles respectively. India ranked at number 16 with 81 (1.58%) contributions. Maximum number of articles are published in English language (94.77%) followed by Spanish, German and so on.

Alajmi and Alhaji (2018) aimed to overview the research trends of KM in Journal of Information & Knowledge Management (JIKM) through bibliometric and content analysis. The focus of the study is to analyze yearly growth trend, the major topics discussed, prolific countries, citations analysis etc. In total, 475 articles published were retrieved from the journal indexed in Scopus database. The results showed a relatively steady growth in the number of articles published in JIKM between 2002 and 2016. US leads other countries with maximum contributions (21%), followed by India (almost 10%), Australia (8%), and the UK (7.5%). Also, papers published in JIKM are referenced in highly cited journals of computer science, business, and library and information science. The topics representing major KM research trends are knowledge discovery, taxonomy and ontology, and knowledge representation.

Jain (2020) conducted bibliometric study of Knowledge Management (KM) literature in libraries for the past 21 years from 1998 to 2019 based on Web of Science core collection bibliographical database. The objectives include: to study year-wise distribution of articles, to identify most productive research institutions, most prolific authors and publication sources, prolific countries, citations per year, co-citation, co-authorship, bibliographic coupling analysis and Keyword co-occurrence. A total of 83 sources were retrieved from Web of Science's core collection database and the data was analyzed through Web of Science's Clarivate Analytics, then exported to Microsoft Excel and VOS viewer for production of images and graphs. Findings revealed the year 2018 as most productive year, article is the dominant form and the United States is the highest

contributor, followed by South Africa. This study helped to fill the gap existing because of the lack of quantitative or statistical research showing research trends of KM literature in LIS domain.

Gaviria-Marin, M., Merigó, J. M., & Baier-Fuentes, H. (2019) presented a bibliometric overview of KM research in the business and management areas for the past ten years, based on publications indexed in Web of Science database. The study was conducted in 2018 using various bibliometric methods such as science mapping and performance analysis which included the indicators like h-index, productivity, citations, co-citations and the keywords study. The result showed the significant increase in research output of the KM field, USA came out as the most influential country in this particular field and this paper concluded that most of the fundamental research of KM has been conducted in business and management areas. (194-220) Mohd Muzzammil & Mohammad Asad (2016) conducted bibliometric study of KM literature in Web of Science database covering eight years from 2007 to 2014 and the objectives are: to study language-wise and year-wise distribution of publications, subject areas, forms of documents, geographical distribution etc. A total number of 4371 items are collected from, from the year. Findings reveal increasing productivity of Knowledge Management (KM) literature, although the productivity is irregular, the five top-most five productive countries are USA, England, Taiwan, Spain, and China.

Gaviria-Marin, M., Merigo, J. M., & Popa, S. (2018) aimed to provide a general overview of the Journal of Knowledge Management (JKM) based on bibliometric analysis of the publications between 1997 and 2016. This is one of the leading journals in KM field. The result shows irregular growth of KM publications during given time period, a positive collaboration trend between authors, and the USA and the UK are leading contributors. However, Europe is the most productive at a regional level. Ahmad, K., JianMing, Z., & Rafi, M. (2019) examined the literature of knowledge management in the LIS field using bibliometric indicators that include productive institutions, prolific authors, geographical distributions, annual publications, citations study etc. In total, 6,088 published documents were obtained from the ISI Web of Science database covering the years from 1900 to 2017. The document types include research papers, conference papers, reviews, etc. The findings show that the most productive years were 2007, 2012, and 2016-2017 and the most productive research institution was Nanyang Polytechnic University. USA is the leading country with the highest number of contributions. Ahmadi, A., & Nazim, M. (2018) used bibliometric and citation analysis methods to explore the changing trends in KM research in the field of Library and Information Science during 1986 to 2016. A total of 8,069 articles were obtained using the Web of Science database. After using filters, 500 highly cited articles were selected for the research purpose. The aspects studied are authorship, keywords, references, page count, and so on. Findings revealed that the Journal of Knowledge Management is at the top for publishing the most cited article and most articles are from the United States and England.

Data Analyses and Interpretations

Table I and Fig. 1 show year-wise distribution of publications during the given period. A total of 3,483 documents have been published and 348.30 is the average number of articles published every year. The years 2011 and 2016 are the highest and the lowest productive years with 468 articles (13.44%) and 228 articles (6.55%) respectively. Overall, the number of publications decreased from 424 to 246 documents starting from 2010 to 2019. However, 2016 shows further decline to 228 documents (6.55%). The table reflects the fluctuating growth trend during the study period. The AGR column further highlights this fluctuating growth trend and the value of average AGR is -4.95 which implies the decreasing growth trend in general.

TABLE I CHRONOLOGICAL DISTRIBUTION OF DOCUMENTS

Sl. No.	Year	No. of publications	%	AGR	Descriptive Statistics	
1	2010	424	12.17		Mean	348.30
2	2011	468	13.44	10.38	Range	240
3	2012	461	13.24	-1.50	Std. Dev	90.52
4	2013	449	12.89	-2.60		
5	2014	362	10.39	-19.38		
6	2015	301	8.64	-16.85		
7	2016	228	6.55	-24.25		
8	2017	268	7.69	17.54		
9	2018	276	7.92	2.99		
10	2019	246	7.06	-10.87		
				-4.95		
	Total	3483				

The irregular growth trend of publications has been observed in other studies also, whether they are based on analysis of KM literature as an independent subject or KM literature in LIS field. But all of them observed the overall increase in the number of publications during years. However, the present study reflects the overall decline in the number of publications (based on KM in LIS field) from 424 documents (12.17%) in 2010 to 246 documents (7.06%) in 2019.

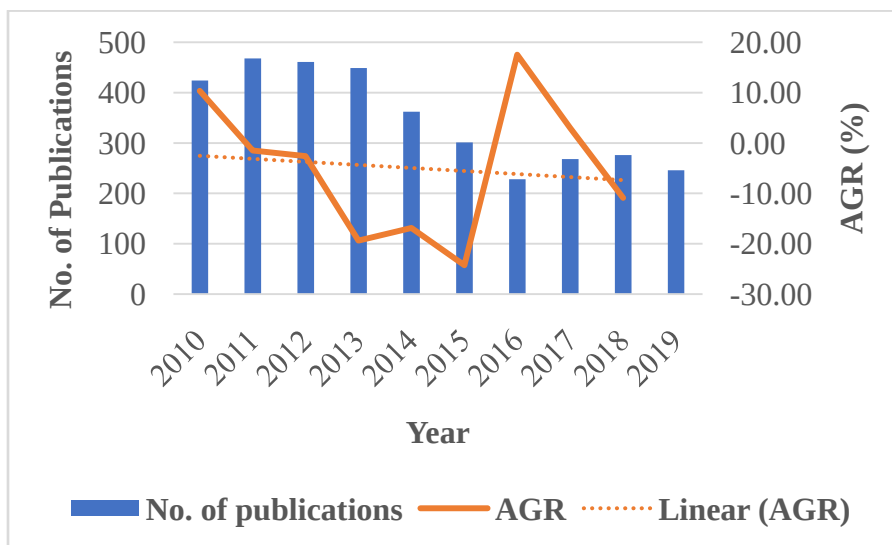


Fig. 1 Yearwise distribution of articles and Annual Growth Rate (AGR)

Table II and Fig. 2 depict relative growth rate (RGR) and doubling time (DT) of documents during 2010-2019. A declining trend can be observed through RGR column as it decreased from 0.74 in 2011 to 0.07 in 2019. Consequently, the doubling time (DT) increased from 0.93 in 2011 to 9.46 in 2019.

TABLE II RELATIVE GROWTH RATE (RGR) AND DOUBLING TIME (DT)

Sl. No.	Year	No. of publications	Cumulative No. of publications	W1 (ln of initial value)	W2 (ln of final value)	RGR (W2/W1)	Dt (0.693/R)
1	2010	424	424		6.05		
2	2011	468	892	6.05	6.79	0.74	0.93
3	2012	461	1353	6.79	7.21	0.42	1.66
4	2013	449	1802	7.21	7.50	0.29	2.42
5	2014	362	2164	7.50	7.68	0.18	3.79
6	2015	301	2465	7.68	7.81	0.13	5.32
7	2016	228	2693	7.81	7.90	0.09	7.83
8	2017	268	2961	7.90	7.99	0.09	7.30
9	2018	276	3237	7.99	8.08	0.09	7.78
10	2019	246	3483	8.08	8.16	0.07	9.46
						0.23	5.17
	Total	3483					

The value of the average relative growth rate is 0.23 and doubling time is 5.17 during these years. Hence, the declining relative growth rate shows the slow pace of increasing rate of publications in terms of proportion and it is further highlighted by the increasing doubling.



Fig. 2 Relative Growth Rate (RGR) and Doubling Time (DT)

Table III displays year-wise authorship pattern of research articles during the given period. As per the given data, the maximum number of documents based on single authorship is 1,155 (33.63%), followed by 1,116 double authorship documents (32.50%), then 721 three authored documents (21%) and then 442 documents (12.87%) have been written by more than three authors. The dominance of single authorship, followed by double, triple and then more than three authorships has been observed in other similar study conducted by Priti Jain in 2020.

TABLE III YEAR-WISE AUTHORSHIP PATTERN

Year	No. of publications				Total
	Single author	Double author	Triple author	More than three authors	
2010	163	142	73	44	422
2011	154	164	100	50	468
2012	184	129	99	47	459
2013	139	143	105	56	443
2014	103	111	74	65	353
2015	103	96	60	34	293
2016	76	61	44	36	217
2017	92	91	49	31	263
2018	77	95	58	41	271
2019	64	84	59	38	245
Total	1155	1116	721	442	3434
%	33.63	32.50	21.00	12.87	100.00

(442) However, the study of Ashiya Ahmadi and Mohammad Nazim (2018) showed that double authorship publications are in dominance, followed by triple, single and more than three author-based publications.(p.7)

TABLE IV DEGREE OF COLLABORATION (DC), COLLABORATIVE COEFFICIENT (CC) AND COLLABORATIVE INDEX (CI)

Year	No. of publications					
	Single author (Ns)	Multiple authors (Nm)	Total output (Nm+Ns)	DC (Nm/Nm+Ns)	CC	CI
2010	163	259	422	0.61	2.05	0.36
2011	154	314	468	0.67	2.15	0.40
2012	184	275	459	0.60	2.08	0.36
2013	139	304	443	0.69	2.35	0.42
2014	103	250	353	0.71	2.33	0.44
2015	103	190	293	0.65	2.13	0.39
2016	76	141	217	0.65	2.29	0.40
2017	92	171	263	0.65	2.17	0.39
2018	77	194	271	0.72	2.32	0.44
2019	64	181	245	0.74	2.38	0.45
				0.67	2.23	0.41
Total	1155	2279	3434			
%	33.63	66.37		100.00		

Table IV shows the year-wise comparison of the number of single authored articles and multiple authored articles and evaluation of degree of collaboration (DC), collaboration index (CI) and collaboration coefficient (CC). Maximum number of multiple authored documents could be noticed in comparison of single authored ones during every year from 2010 to 2019. The degree of collaboration increased from 0.61 to 0.74 during the study period, except the year 2014 when it

decreased to 0.60. The value of CI ranges from 2.05 in 2010 to 2.38 in 2019 and the value of CC ranges from 0.36 in 2010 to 0.45 in 2019. It indicates slow but significant increasing rate of collaboration during the study period. The average value of DC, CC and CI are 0.67, 2.23 and 0.41 respectively, which denote moderate degree of collaborative strength. This can be concluded that multiple authorship is more than sole authorship which indicates increasing trend of collaborative research during the given study period.

The positive collaboration trend has been observed in other various bibliometric studies based on multiple subject domains and this indicates increasing networking of authors among themselves for conducting various research works in different fields of study. For example, Jhamb et al. (2019, p. 42) conducted bibliometric analysis of geology research indexed in Web of Science database and observed increasing value of CC from 0.54 in the block year 1998-2002 to 0.66 in the block year 2013-2017. Another bibliometric study of Pakistan Journal of Library and Information Science (PJLIS) conducted by Hafiz et al. (2018, p. 143) found DC value of 0.69. A scientometric analysis of Indian forensic science research conducted by Jeyasekar and Saravanan (2015, p.138) found average value of CI, DC, and CC as 3.09, 0.84, and 0.56 respectively.

TABLE V CO-AUTHORSHIP INDEX (CAI)

Sl. No.	Year	Single author		Double author		Triple author		More than three authors		
		No. of output	CAI	No. of output	CAI	No. of output	CAI	No. of output	CAI	Total output
1	2010	163	114.84	142	103.54	73	82.39	44	81.01	422
2	2011	154	97.83	164	107.83	100	101.77	50	83.00	468
3	2012	184	119.19	129	86.48	99	102.73	47	79.55	459
4	2013	139	93.29	143	99.33	105	112.89	56	98.21	443
5	2014	103	86.75	111	96.76	74	99.84	65	143.06	353
6	2015	103	104.52	96	100.82	60	97.53	34	90.15	293
7	2016	76	104.13	61	86.50	44	96.57	36	128.89	217
8	2017	92	104.00	91	106.47	49	88.74	31	91.58	263
9	2018	77	84.48	95	107.87	58	101.94	41	117.54	271
10	2019	64	77.67	84	105.50	59	114.70	38	120.50	245
Total		1155		1116		721		442		3434

Table V shows co-authorship index (CAI) for single authored articles, double authored articles, triple authored articles and more than three authored articles during ten years' period. A fluctuating trend of CAI could be observed for all single, double, triple and more than three authored contributions during 2010-2019. On the otherhand, CAI for single authored documents declined from 114.84 in 2010 to 77.67 in 2019. Contrary to this, CAI for double, triple and more than three authored articles increased from 103.54, 82.39 and 81.01 in 2010 to 105.50, 114.70 and 120.50 in 2019 respectively. As per analysis of data, single authorship pattern is decreasing and

other modes of authorship pattern are increasing in this field. The above analysis further justifies the finding of the table 6.4 indicating increasing degree of collaboration among authors.

TABLE IV FORMS OF DOCUMENTS

Sl. No.	Type of Document	No. of publications	% of 3483
1	Scholarly Journals	3221	92.48
2	Dissertations & Theses	154	4.42
3	Trade Journals	70	2.01
4	Magazines	34	0.98
5	Conference Papers & Proceedings	4	0.11
	Total	3483	100.00

Table IV shows classification of publications into five types of documents. There are 3,221scholarly journal articles which form 92.48% of total contributions (3,483), followed by dissertation and theses (154, 4.42%), trade journals (70, 2.01%), magazines(34, 0.98%) and conference papers and proceedings (4, 0.11%).

TABLE VI SUBJECT-WISE DISTRIBUTION OF PUBLICATIONS

Sl. No.	Subject	No. of Publications	% of Publications
1	Information Work	1042	29.92
2	Communications & Information Management	236	6.78
3	Library Science	156	4.48
4	Information Communication	151	4.34
5	Academic Libraries	113	3.24
6	Information Science	113	3.24
7	Bibliometric	92	2.64
8	Business Information	74	2.12
9	Scientometric	74	2.12
10	Information Storage and Retrieval - Networks	60	1.72
11	Informatics	56	1.61
12	Education	48	1.38
13	LIS Professional	43	1.23
14	Records Management	42	1.21
15	Technology	40	1.15
16	Knowledge Management	37	1.06
17	Knowledge Sharing	36	1.03
18	Medicine	34	0.98
19	Schools and Educational Services	34	0.98
20	Research & Development	30	0.86

Ahmed *et al.*, (2018) also found journal article as the dominant form with 3,222 publications, followed by proceeding paper (1,932 publications), review (190 publications), book review (159 publications) and editorial material (108 publications). (p. 37)

The table VII shows top twenty subject categories in which maximum number of research works have been published. However, a total of 675 subject categories have been found contributing KM publications in LIS field indexed in LISA database from 2010 to 2019. Maximum number of publications fall under the subject category 'Information work'(1042 documents 29.92%), followed by Communication and Information Management (236 documents 6.78%), Library Science (156 documents 4.48%), Information Communication (151documents 4.34%), Academic Libraries (113 documents 3.24%) and so on.

TABLE VIII PROLIFIC AUTHORS

Sl. No.	Name of author	No. of publications	Rank
1	Ngulube, Patrick	19	1
2	Akhavan, Peyman	15	2
3	Serenko, Alexander	13	3
4	Bontis, Nick	10	4
5	Dumay, John	9	5
6	Keiser, Barbie E	9	5
7	Corrall, Sheila	8	6
8	Durst, Susanne	8	6
9	Jain, Priti	8	6
10	Kademani, B S	8	6

The table VIII presents the list of top 10 authors who contributed maximum number of publications in the particular area under study during 2010-19. However, the total number of authors contributing 3,483 publications is 6,415. The most prolific author is Patrick Ngulubewith 19 publications, followed by PeymanAkhavan (15 publications), Alexander Serenko (13 publications), NickBontis (10 publications), John Dumay (9 publications), Barbie E. Keiser (9 publications), Sheila Corrall(8 publications), Susanne Durst(8 publications), PritiJain(8 publications), and B.S. Kademani (8 publications).

Ahmed et al. (2018, p. 39) found top ten prolific authors contributing maximum number of writings to the particular area under study, which is based on Web of science database from 1900 to 2017. According to the study, the most prolific author is B. Martin, (114 publications), followed by E. Bolisani (19 publications), A. Serekno(18 publications), A.Y.K. Chua (17 publications), J. Rowley (17 publications), E. Scarso (17 publications), D. Bawden (16 publications), N. Bontis (15 publications), A. Kainto (15 publications), and K.C. Desouza (13 publications).

According to the bibliometric analysis of Journal of Knowledge Management (JKM) by Gaviria-Marin et al. (2018, p. 1669), the names of ten prolific authors are as follows: -A. Serenko (12 publications), N. Bontis (11 publications), F.J. Carrillo (9 publications), R.L. Chase8 (publications), K. Metaxiotis (7 publications),P.Y.T. Sun (6 publications), K. Ergazakis (6 publications), P. Massingham (6 publications), G.Schiuma (5 publications), and A. Kianto (5 publications).

Some of the common authors in KM field that can be observed from the above table and references are A. Serenko, N. Bontis, A.Y.K. Chua etc.

TABLE IX RANKING OF COUNTRIES (TOP 20)

Sl. No.	Name of Country	No. of publications	%	Rank
1	United Kingdom	1081	31.04	1
2	United States	943	27.07	2
3	England	326	9.36	3
4	Singapore	178	5.11	4
5	India	143	4.11	5
6	Netherlands	113	3.24	6
7	Spain	92	2.64	7
8	Brazil	89	2.56	8
9	South Africa	87	2.50	9
10	Canada	60	1.72	10
11	China	56	1.61	11
12	Scotland	37	1.06	12
13	Germany	36	1.03	13
14	Malaysia	36	1.03	13
15	Iran	35	1.00	14
16	France	30	0.86	15
17	Italy	17	0.49	16
18	Egypt	16	0.46	17
19	Nigeria	10	0.29	18
20	Pakistan	9	0.26	19

The Table IX presents the ranking of toptwenty countries (out of total 45 countries)contributing maximum number of publications based on KMin LIS field during the study period. United Kingdom is ranked one with 1081 documents (31.04% of 3483), followed by United States 943 (27.07%), England 326 (9.36%), Singapore 178 (5.11%) and India 143 (4.11%) securing second, third, fourth and fifth rank respectively. The sixth position occupied by Netherlands with 113 publications (3.24%), followed by Spain 92 (2.64%), Brazil 89 (2.56%), South Africa 87 (2.50%) and Canada 60 (1.72%) occupying seventh, eighth, ninth and tenth position respectively and so on. Another bibliometric study based on KM in LIS field found USA (23.90%) as the leading country, followed by England (21.41%), Canada (26.44%), Peoples R. China (19.67%), and Australia (22.35%) and so on. (Ahmadi and Nazim 6). Also, the study of Khurshid Ahmad, Zheng Jian Ming and Muhammad Rafi showed USA (23.005%) as the highest contributing country, followed by England (9.475%), China (6.437%), Australia (5.222%) and Spain (4.893%). (37)Based on the present study and other similar studies, it could be deduced that the developed countries like US, UK, England etc. are major contributors of literature on KM (as discipline) as well as KM in LIS field

Findings of the Study

1. A total of 3,483 documents have been published during 2010-2019. The average number of documents published each year is 348.30. 2011 is the highest productive year with 468 documents (13.44%) and 2016 is the lowest productive year with 228 documents (6.55%) respectively. The fluctuating growth trend has been observed during the given time period. The value of average AGR is -4.95 which implies the decreasing growth trend in general.
2. RGR decreases from 0.74 in 2011 to 0.07 in 2019. And the doubling time (Dt) increases from 0.93 in 2011 to 9.46 in 2019. Average RGR is 0.23 and Dt is 5.17 during these years, which indicates slow rate of growth.
3. Single authorship pattern is in dominance with 1,155 documents (33.63%), followed by double authorship (1,116, 32.50%), triple authorship (721, 21%) and more than three authorships (442, 12.87%).
4. Degree of collaboration (DC) increases from 0.61 to 0.74 during the study period and the average degree of collaboration value is 0.67 reflecting positive trend of collaboration of authors in this particular field of study.
5. The value of CI increased from 2.05 in 2010 to 2.38 in 2019 and of CC also increased from 0.36 in 2010 to 0.45 in 2019. And the average values of CI and CC are 2.23 and 0.41 respectively, which denote rising rate of collaborative research during the study period.
6. The declining CAI for single authored documents from 114.84 in 2010 to 77.67 in 2019 and increasing CAI for double authored documents (from 103.54 to 105.50), triple authored documents (from 82.39 to 114.70) and more than three authored articles (from 81.01 to 120.50) reflect the increasing collaboration trend of authors.
7. Scholarly journal article is the dominant form of publications with 3,221 publications, followed by dissertation and theses with 154 publications (4.42%), trade journals with 70 publications (2.01%), magazines with 34 publications (0.98%) and conference papers and proceedings with 4 publications (0.11%).
8. The top five subject categories having maximum number of publications are 'Information work' (1042 documents 29.92%), Communication and Information Management (236 documents 6.78%), Library Science (156 documents 4.48%), Information Communication (151 documents 4.34%), and Academic Libraries (113 documents 3.24%) respectively.
9. The top three most prolific authors are Patrick Ngulube (19 publications), Peyman Akhavan (15 publications), and Alexander Serenko (13 publications).
10. The top five countries contributing maximum publication in the particular research area under study are United Kingdom with 1081 documents (31.04% of 3483), followed by United States 943 (27.07%), England 326 (9.36%), Singapore 178 (5.11%) and India 143 (4.11%).

Conclusion

The inevitable importance of KM in LIS field in the modern knowledge society led to the increasing number of scientific literatures during recent years. These literatures discuss different aspects of the relationship between KM and LIS which makes it important for scientific community to map this particular newly emerging field of study that has attracted the interest of both academicians and practitioners. The present study is based on studying the global research productivity and collaboration of KM literature in LIS field indexed in LISA database during 2010-19. Several bibliometric methods have been used such as chronological, geographical, forms of documents and subject-wise distribution of publications, year-wise authorship pattern, prolific authors and the computation of relative growth rate (RGR), doubling time (Dt), degree of collaboration (DC), co-authorship index (CAI), collaborative index (CI) and collaborative coefficient (CC).

The study reflects the fluctuating growth trend of publications during 2010-2019 and 2011 is the highest productive year and 2016 is the lowest productive year. The relative growth rate (RGR) declined and the doubling time (Dt) increased over ten years' period of study. The average values of DC, CI and CC are 0.67, 2.23 and 0.41 respectively indicating positive collaboration trend among authors. The CAI for single authored documents has declined and for other modes of authorship increased which further justifies the increasing collaboration trend. Scholarly journal articles are maximum in number followed by dissertation and theses, trade journals, magazines and conference papers and proceedings. The top five subject categories include: Information work, Communication and Information Management, Library Science, Information Communication, and Academic Libraries. Patrick Ngulube, Peyman Akhavan, and Alexander Serenko are top three most prolific authors. The top five countries contributing maximum number of publications on KM in LIS field are United Kingdom, United States, England, Singapore and India respectively.

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Knowledge Management in Higher Education Institutions

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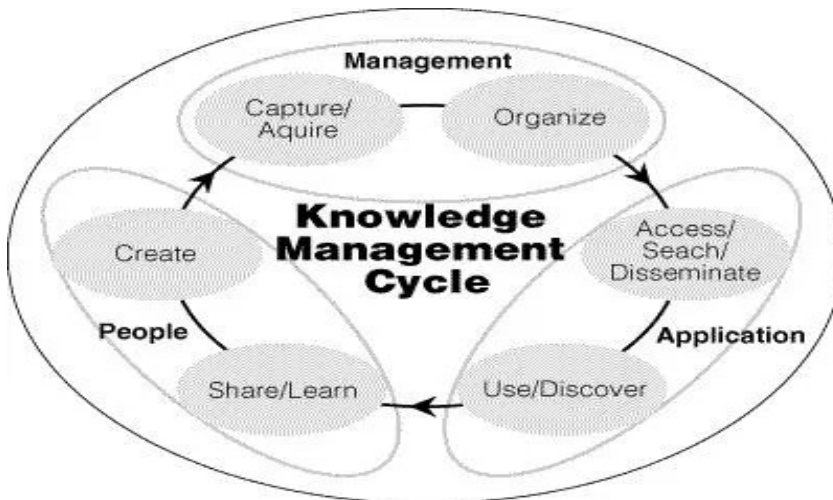
Abstract - Higher education is a centre of knowledge creating, delivering, and learning for society. On international level too knowledge sharing policies between two and more countries are going on. For the development of nation, it is must. Discussions and exchange of information is very common among staff, students and scholars now days. This is the base for the generation of innovative concepts. Through open access movement everyone is able to access the information through internet. But at local and institutional level attempts are required for capturing tacit knowledge of individuals and sharing for new vision. In today's open access system every researcher and user are getting information at their finger tips. For the development of country all western countries have already taken initiative to share the knowledge online which helps in avoiding repetitive work and better products are coming out. Open Access initiative is boon to researchers and if at every organizational level the better management, use and sharing of available resources/knowledge both explicit and tacit occur it leads to overall development of educational system and nation at fast speed. Knowledge plays a crucial role in the progression of institutions.

Keywords: Knowledge, Management, Information, Education, Innovation.

Introduction

Knowledge management is not a new terminology anymore. It is old and has been studied by academicians, philosophers and practiced for decades, however knowledge management concept has come into the picture in the starting of nineteen centuries. In the 21st century knowledge is important for all the business fields. Why, because knowledge is like a light, weightless and intangible, it travels very easily in any part of the world, at the time of traveling it enlightens the lives of the people everywhere and empower the knowledge to human. These days the world has become very intellectual in all fields of business, especially higher education has become very competitive. To meet this competition, higher education process requires best quality education. Thus the higher education universities should be like centre point of science, arts, technology and research, continuous learning and lifelong learning is taking places. The nation's productivity and prosperity can be measured through the quality of higher education. As a whole the environment of nation such as social, political, technology and economics modernization and reforms are possible only through quality of higher education. Knowledge based new innovations at all levels of learning process is a new philosophy of higher education. Knowledge management facilitates innovations to survive in the present information world. Knowledge management is a well defined system to provide learning process, innovation process and sharing of knowledge to achieve strategic goals of an organization. In addition to that knowledge management core aim is to transform individual knowledge into organizational knowledge through acquiring, sharing, storage, disseminating, exploitation and innovation of knowledge. It ensures that the organization shows best performance and stand in good competitive position with their competitors. Most of the companies have accepted knowledge management and identified it as a resource. In the theoretical point of view knowledge management process involves the following ways of knowledge identification, knowledge collection, knowledge organizing, knowledge sharing, knowledge applying, knowledge evaluating, knowledge utilization and knowledge creation. Knowledge management is mainly concerned with knowledge gathering, storing, sharing, reuse and creating of the knowledge for the development of the knowledge assets in the organization, for

achievement of the organizations mission, goals and objectives. Few studies states that business organizations, universities and other higher education institutions are highly involved in knowledge capturing, knowledge storing, knowledge sharing, knowledge diffusion and learning.



Knowledge management in Higher education

Knowledge management in higher education institutes are better able to increase student retention and better graduate rates, works to analyse the cost effective use of technology, to meet more enrolment, transform existing transaction based system to provide information and compete in an environment where institutions cross state and national borders to meet student needs continuously anytime/anywhere. The present complex knowledge society requires the institutes to be constantly evolving, innovating, investigating, analysing, predicting and responding to opportunities and threats. All organizations store, access, and deliver knowledge in a unique manner; the differing factor is the way that value is added to the products and services they deliver by the effective use of the knowledge capital. Universities have to avoid unrelated activities of knowledge and their staff have to recognize and respond to their changing role in a knowledge based society. knowledge assets, and to recognize the value of their intellectual capital to their continuing role in society, and in a wider global marketplace for higher education (Kok, A). Higher Education Institutions have many challenges in the knowledge economy, renew economic and social systems, extend knowledge and specialist skills, engage effectively in knowledge production, be interconnected with industry, research centres and other institutions, and produce top quality graduates (Kok, A), (Abdullah, R., Selamat, M. *et al.*). Universities are the main instruments of society for the constant pursuit of knowledge. Knowledge management in educational institutions should provide a set of matters for linking people (students, teachers, researchers, business and industry external entities) to processes of technologies. It also focuses on how organizations can promote strategies and practices that help the different actors to share, manage and apply their knowledge (Yeh, Y). We can distinguish two perspectives of knowledge management in higher education institutions (Yeh, Y), (Kok, A), i) academic knowledge, resulting from learning and teaching activities, the primary purpose of universities; ii) organizational knowledge, which refers to knowledge of the overall business of an institution: its strengths, weaknesses, strategies, critical factor of success, relationships with research centers, etc. Knowledge management activities, such as discovery or acquisition (research), dissemination or share (teaching), application knowledge and their preservation (libraries, repositories). On the other hand, these issues miss their

importance, if the institution does not have a strategy and a culture of creating, sharing and collaboration between the various actors across the organization, (Suciu, M., Piciorus, L. and Imbrisca, C), (Fritzche, A., Germany,C). Knowledge management method in higher education can be classified into five main categories, such as the benefits on the i) research processes, ii) the curriculum development processes, iii) student and alumni services, iv) administrative services, and v) strategic planning (Kidwell, J.J., Vander Linde, M.K., Johnson, L.S.). Knowledge management practices can also benefit management education institutions in other ways such as faculty development, research process, curriculum development, student teaching and learning process, overall control of the institutional processes like library, computer lab, recruitment, etc strategic planning like institute marketing, placements/corporate interface etc. To meet the growing requirement of curriculum design and curriculum delivery to meet the twin objective of relevance and quality of human resource development and to ensure that teaching learning processes create an environment conducive for creativity and innovations, it becomes necessary to adopt knowledge management techniques in curriculum development (Agarwal S., Sharma P.B. and Kumar M). Research, which is one of the primary assignments of an institution, is the media for knowledge creation and knowledge diffusion. The Higher Education Institutions provide knowledge to the students, manage and archive the existing knowledge for future reference. Motivating and encouraging the academic community including faculty members, staff, students and parents etc. To share and contribute in the higher learning institutions are the key enablers for a successful knowledge management in the Higher learning institutions. The outlook, enthusiasm, and actions are the facilitators for effective application of knowledge management strategy, along with organizational strategy. Technology also plays an important role in knowledge transfer; it facilitates effective distribution of the tacit and explicit knowledge

Research Objectives

Specifically, the objectives of the study are to

1. Elucidate the importance lecturers attach to knowledge management.
2. Identify the levels of knowledge management implementation in the higher education institutions.
3. Determine the relationship between importance attached to knowledge management and knowledge management implementation.
4. Elucidate the differences in the importance attached to knowledge management based on gender and educational levels.
5. Elucidate the differences in levels of knowledge management implementation based on gender and educational levels.

Knowledge management in universities and research

The knowledge based institutions facilitate excellent characteristic of knowledge workers, they demonstrate strategic, managerial and operational traits. Knowledge workers do knowledge gaining practices such as collect the knowledge from various sources; share the knowledge, distribution of the knowledge, knowledge storing, reuse the knowledge and knowledge innovations. Therefore, higher education institutions have to cultivate and encourage research oriented curriculum to the students. If higher education institutions incorporate this mechanism in their curriculum, the higher education institutions can produce knowledge workers.

The knowledge workers construct the following characteristic to the higher education institutions.

1. Knowledge workers demonstrate good thinking, managerial skills and analytical power skills which it converts into innovative and creativity skills.

2. Knowledge workers do continuous learning it create awareness about the demand of future changing environment and they implement those strategies which organization stand and sustain.
3. Knowledge workers built trust among the workers and believe in team spirit, collaborations, cooperation and coordination.
4. Knowledge workers calculate the risks and are ready to face risks as well as they are emotional intelligent people.
5. Knowledge workers share their knowledge, skills and ideas with others and at the same time they learn from others.
6. Knowledge workers highly motive and produce best performance for the organizational development through productivity (knowledge oriented students), quality (in terms of education), innovations and intellectual property.
7. Knowledge workers keep the organization as source of value creation, strategic facilitator and competitor.
8. Knowledge workers facilitate the good services to the students, alumni, staff and faculty members.
9. Knowledge workers deliver best & foremost quality of research.

Benefits from Knowledge Management

Knowledge management facilitates following benefits to the higher education institutions.

1. It improves services to the students, staff, faculty members, alumni and internal and external constituents.
2. It minimize turnaround time for the research activities
3. It encourages the institute into interdisciplinary research activities
4. It enhances competitiveness and responsiveness for research proposals, funds, collaborations and new business opportunities.
5. It concentrates on quality of research at institutional level which will cultivate future scientists.
6. It enhance the competitiveness and responsiveness for research scholar
7. It minimize time spent for research and reduces administrative cost
8. It facilitates interdisciplinary research
9. It enhance the quality in updating and revising the curriculum
10. Knowledge management develops the capabilities of human capital, customer capital (students), organizational capital, innovation capital & intellectual property and financial capital. Findings - Although participants were able to discuss knowledge management, none of the universities had a knowledge management strategy. Moreover, more barriers than enablers to knowledge management were identified. Barriers included: a lack of policies and reward mechanisms, resources, data, funding and time for research, coupled with frequent leadership changes, a lack of a knowledge-sharing culture and research repositories and weak industry-academia linkages. Enablers were perceived to be: qualified and experienced academic staff in public HEIs, IT infrastructure and library/ digital library and some incentives for knowledge

Discussion

Knowledge management is one of the key factors to success in and organizational setting. Knowledge Management is important not only in business but also in educational organizations. In the context of higher education institutions, these institutions also need to practice knowledge management to enhance the efficacy of their courses, degrees and research. Thus, this study will look at the importance lecturers attach to knowledge management, their level of knowledge management implementation, the relationship between the importance attached to knowledge

management and level of knowledge management implementation, and differences in knowledge management implementation based on gender and educational level.

Conclusion

In India knowledge management is still in its infancy. Few Indian organizations have initiated knowledge management programs. Nonetheless, the importance of knowledge management has been emphasized by the Minister of Human Resource, Therefore, organizations in India and in particular institutions of higher learning should move towards implementing knowledge management to improve their capacity to compete, innovate and excel in the global markets. In addition, more research should be carried out to investigate the extent of the implementation and effectiveness of knowledge management in Indian organizations and institutions of higher learning.

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Importance of Knowledge Management in Higher Education Institutions

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Abstract - *Knowledge management is a systematic process by which knowledge needed for an institution to succeed is created, captured, shared and leveraged. Nowadays, the pace of evolution has entered a rapid speed, and those who can't learn, adapt, and change from moment to moment simply won't survive. Today higher education institutes recognize their valuable intelligences and have adopted their changing role in a society. The main goal of knowledge management is to improve an institutions efficiency and save knowledge or we can say that knowledge management is the main key for the Institutions to stay competitive. The aim of this paper is to give an overview of knowledge, knowledge management and its importance in higher education institutions.*

Keywords: *Knowledge, Knowledge Management, Importance of Knowledge Management.*

Introduction

Knowledge management is a new immerging field in the academic environment. It is now becoming popular in Education field due to need to disclose the intellectual power available in institution for sharing experiences. It has great potential and should have equal and even greater significance for education sector. Knowledge builds on knowledge and past events helps in generating new knowledge. The main source of generation of knowledge is human efforts which are developed through conducting good educational activities, research activities and generating innovative concepts in the area of interest. Knowledge management helps to create and propagate information and knowledge. It also provides a sufficient, effective and efficient use of knowledge in order to provide a strategic competitive advantage for institutions. Knowledge is an important success factor that helps the organizations to gain a sustainable competitive advantage. (Lee & Lan, 2011; Liu & Deng, 2015). The development of competencies and knowledge within the organizations has been increasingly recognized as the key to achieve sustainable competitive advantages (Fierro *et al.*, 2011; Suresh, 2012). Knowledge management can be one of the main organizational strategies as it helps to create new business processes to enhance the organizations' performance (Wu & Chen, 2014). Through the use of the knowledge management activities including creation, storage, distribution and dissemination of knowledge, universities in a changing society can reach their goals. Maponya (2004) The Wisconsin centre for education research examined how educational institutions could improve the efficiency and effectiveness of their operations through Knowledge Management and demonstrated how Knowledge Management objectives could be applied in an educational setting. The educational examples included creating curriculum aids, creating knowledge repositories, transforming information into knowledge to improve access to the created knowledge, and enhancing the knowledge environment by providing innovative technical solutions for the use and reuse of resources (Thorn, 2001). Rowli (2000, Mamta (2005) states Knowledge management is absolutely necessary to Higher educational institutions for the following reasons:

1. It can create innovative relationship and link between work and education
2. It can help students more closely match their talents with current workplace demands
3. It can contribute to the adaptation and assimilation of new knowledge with the existing
4. It can contribute to the re-connection of learning with experience, so that a curriculum

5. reflects the \ real time”, \real place” and \real problems”; work can no longer be seen as something that happens at a later stage in life.

Knowledge

Knowledge is a powerful and important part of our life. A famous Sanskrit verse says that ‘an educated person is honoured everywhere’. Knowledge has equipped man with limitless power that can dominate over beings who are much stronger than him in strength. Knowledge accounts for the success of the people. The more knowledgeable you are; the more advantage you have over other people. Power of knowledge should not be used for a destructive purpose. Knowledge is the ability to use the information into executing specific task. Knowledge is a fluid mix of framed experience, values, contextual information, expert insight and grounded intuition that provides an environment and framework for evaluating and incorporating new experiences and information. It originates and is applied in the minds of knower. In organisations, it often becomes embedded not only in documents or repositories but also in organisational routines, processes, practices, and norms (Davenport & Prusak 1998). Knowledge Management is a system that manages the corporate knowledge that is generated throughout the organization. This knowledge base includes both corporate tacit and explicit knowledge. Knowledge Management system is a spiraling process that first identifies knowledge, validates the knowledge, stores the validated knowledge, provides a knowledge filter, and provides the user knowledge access. The critical key is that Knowledge Management system should be accessible to the users of the knowledge so that the knowledge can be used, transformed, and enhanced (Henrie & Hedgepeth 2003). When we talk about knowledge, it is of two types. One is explicit knowledge and other is tacit knowledge.

Explicit Knowledge

Explicit can be expressed in words and numbers and shared in the form of data, scientific formulae, product specifications, manuals, universal principles, and so on. This type of knowledge can be readily transmitted across individuals formally and systematically.

Tacit knowledge

Tacit knowledge is highly personal and hard to formalize, making it difficult to communicate or share with others. Subjective insights, intuitions and hunches comes under this category of knowledge. Or we can say that tacit knowledge is deeply rooted in an individual's action and experience, as well as in the ideals, values or emotions he or she embraces. Polanyi (1958) first distinguished between tacit and explicit knowledge. Nonaka and Takeuchi (1995) point out the often-overlooked asset of companies are intangibles like insights, intuitions, hunches, gut feelings, values, images, metaphors, and analogies. Tacit knowledge is usually in the domain of subjective, cognitive, and experiential learning, whereas explicit knowledge deals with more objective, rational, and technical knowledge (data, policies, procedures, software, documents, etc.). Explicit knowledge is typically both well documented and accessible. Polanyi (1966), in differentiating the two types of knowledge, states “We can know more than we can tell.” In essence, he suggests that it is difficult to put tacit knowledge into words. Traditionally, IT has focused on using explicit knowledge. However, organizations now understand the need to integrate both types of knowledge to perform their jobs effectively. Hence, institutions are now beginning to recognize and are developing specific methodologies to convert tacit knowledge into explicit knowledge that can be codified and therefore captured, stored, transmitted, used and be acted upon by others. This is the goal of knowledge management, to convert tacit knowledge to explicit knowledge and diffuse it effectively. This powerful concept has fuelled the development of Knowledge Management methodologies, tools, and applications

Knowledge Management

It is creation of new skills, capabilities, competencies and sharing the use of this knowledge by organisational members. In other words, it is a process of creating an interactive learning environment where people transfer and share what they know, internalize it and apply it to create new knowledge. The term knowledge management is very comprehensive and encompasses different components from identification of knowledge to making available the right knowledge at right time to the right users. Knowledge Management as the process of adapting existing knowledge in order to solve current business challenges and create new solutions by studying patterns in existing knowledge. (McAdam, 2000). Knowledge management is based on human activities, processes, social interactions, experiences and cognitive interpretation of information (Holsapple, 2005). Some researchers believed that knowledge management is not just about processes, but it is greatly hinged on human activities. In nut shell we can say that above definitions present diverse concepts of defining Knowledge Management, however all these definitions commonly highlight the need to effectively utilize or harness knowledge, in a manner that will provide insight, proffer solutions based on existing knowledge. In conclusion knowledge management can be simply defined as the processes of utilizing both past and current knowledge, in a manner that is understandable to end user. Knowledge management involves knowledge-focused activities, which are given below:

1. Generating new knowledge.
2. Accessing valuable knowledge from outside sources.
3. Using accessible knowledge in decision making.
4. Embedding knowledge in processes, products or services.
5. Representing knowledge in documents, data-bases and software.
6. Facilitating knowledge growth through culture and incentives.
7. Barbara Friehs (2000) mentioned following assignments for effective knowledge management
8. Mobilize the hidden implicit/tacit knowledge
9. Integrate knowledge from organization and make it accessible to all
10. Identify the missing knowledge
11. Create new knowledge
12. Make knowledge more accessible and usable
13. Create knowledge sharing culture to experiment and learn
14. Evaluate and reflect learning processes
15. Codify new knowledge.

Knowledge Management in Higher education institution

Knowledge management is a relatively young corporate discipline and a new approach to the identification, harnessing and exploitation of collective organizational information, talents, expertise and know-how." Office of the e-Envoy, 2002 Higher education institutions are said to be in the knowledge business since they are involved in knowledge creation, dissemination and learning. Higher education institutes aim to prepare new generations with the skills, cultural and scientific literacy, flexibility, and capacity for critical inquiry and moral choice necessary to make their own contribution to society. Knowledge management is becoming a very important issue in higher education, which drives the ability of collect and analyse information, transform knowledge and apply novelty. Educational Institutes are challenged to keep pace with changes in the global business environment including the increased demands of stakeholders. In review of literature, we found many important points to ponder. The benefits of the use of Knowledge Management method in higher education can classified into five main categories, such as the benefits on the research process, the curriculum development processes, student and alumni services,

administrative services, and strategic planning (Kidwell, Linde and Johnson 2000). Three areas in which IT contributes to Knowledge Management are: information resources management, creating knowledge bases, and collaborative technologies (Skyrme, 2000). There has been little discussion of knowledge management as a strategy for improving organizational practice, program implementation and teaching and learning. The idea of knowledge management has been recognized in the business world but the literature regarding information management to support education learning is scarce (Petrides and Guiney, 2002). It is time for educational administrators to look for information system to assist in creating effective learning environment, which in turn supports teaching and learning. The use of Knowledge Management method in education enables the encouragement of the greater intelligence, practical know how, and effectiveness of education institution management (Petrides and Nodine, 2003). It is necessary to point out the valuable knowledge, create a methodology for receiving and consolidating knowledge, to perform spread of knowledge among the students and staff, and to generate new knowledge and innovation through knowledge sharing. knowledge has become a key strategic resource, necessary to prosperity and competitiveness (Bloch). Higher education institution will experience intensified pressure, influenced by the knowledge economy and also the globalization, with more interconnected entities and where knowledge, creativity and innovation are the essential elements for competitiveness. Kidwell et al. argue that Knowledge management is vital to higher education institution bringing crucial benefits such as research, curriculum development, student and alumni services, administrative services and strategic planning. Higher learning institutions, in recent years, have been called as a part of the knowledge society. In view of the fact that, in the global market as a highly competitive arena, only those organizations can survive to not only quickly create knowledge, but also to acquire and apply knowledge quickly. This is because such natural activity is the key source for development and sustainable growth. Hence, to increase the main source of knowledge and create knowledge in higher education, the role of knowledge management is considered critical. To this end, in the workplace, knowledge must be updated in organizations continuously to improve performance and achieve and maintaining social assets. To achieve this advantage, higher learning institutions must take into consideration to plan according to the process of knowledge management as an essential component at universities.

Knowledge management facilitates following benefits to the higher education institutions

1. It improves services to the students, staff, faculty members, alumni and internal and external constituents.
2. It minimizes turnaround time for the research activities
3. It encourages the institute into interdisciplinary research activities
4. It enhances competitiveness and responsiveness for research proposals, funds, collaborations and new business opportunities.
5. It concentrates on quality of research at institutional level which will cultivate future scientists.
6. It enhances the competitiveness and responsiveness for research scholar
7. It minimizes time spent for research and reduces administrative cost
8. It facilitates interdisciplinary research
9. It enhances the quality in updating and revising the curriculum
10. Knowledge management develops the capabilities of human capital, customer capital (students), organizational capital, innovation capital & intellectual property and financial capital
11. It enhances Better return on investment
12. It enhances Better bibliographic control of tacit knowledge
13. It enhances Better dissemination of organizational goals and practices
14. It helps in providing value added services

15. It helps in Sharing valuable knowledge among different types of users and develop collaborative practices Avoid reinventing the wheel
16. It helps in Solving problems using the literature Generation of new knowledge

Conclusion

Knowledge management in institutions of higher learning is becoming more strategically importance day by day. Higher education institutions must focus on creating and developing knowledge workers that can succeed and excel in a competitive global environment. Therefore, Higher education institutions must identify the knowledge dimensions needed to provide quality research-based programs that develop students into knowledge workers. Additionally, Higher education institutions need students and faculty members committed to lifelong learning in order to sustain and improve their knowledge capital. Higher education institutions have to concentrate on the strategic knowledge, procedural and enhancement of metacognitive knowledge, the process of understanding, applying, evaluating, and creating of ideas in order to develop knowledge workers. Those who have these qualities in them, they are demand forever. Application of Knowledge Management practices in Higher Education Institution will improve the standards of all the institutions, develop the performance of students in all faculties and facilitate the progress of a nation. Knowledge management refers to a range of practices used by organizations to identify the higher levels of innovations in education. The sharing of knowledge in industry, colleges, universities and, almost any institution in this country will make reference to the capturing of knowledge. It is expected that through Knowledge Management initiatives in Higher Education Institutions, the country may benefit as a nation to compete more effectively in the global Academic marketplace.

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Identifying Critical Success Factors of Knowledge Management: A Literature Review

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Abstract - In Today's global marketplace, organizations would not get competitive advantage exclusively from efficient methods of production and delivery. Many researchers have highlighted the importance for organizations to manage and develop their knowledge assets as a source of competitive advantage. To implement a sound knowledge management system, organizations must identify its own Critical Success Factors for knowledge management. The main objective of this desk research is to identify Critical Successes Factors (CSF) in past literature pertaining to Knowledge Management (KM). In this study 20 research publications were selected through Google Scholar. The literature review shows the CSF are diverse in nature and depends on the context of the study. Even though different studies have been carried out in their own and unique contexts, certain factors such as organizational leadership, Culture and IT systems act as common to many studies irrespective of the context. However, there are certain factors such as K Map, K audit, K team and Organizational Chart are unique in specific contexts. The significance of identification of appropriate CSFs is that organizations can better preserve and develop their CSF to gain sustainable competitive advantage, because they are difficult to imitate by competitors.

Keywords: Critical Success Factors (CSF), Knowledge Management (KM), Sustainable Competitive Advantage (SCA).

Introduction

In 1980s Strategic Management research came across a shift with the development of Resource Based View (RBV) (Wernerfelt, 1984) and with introduction of VRIN resources (Barney, 1991). As an extension of RBV, Grant (1996) came up with the idea of Knowledge based view of the firm (KBV) which looked at the significance of Knowledge as a strategic resource for an organization. Since then, Knowledge Management (KM) became an interesting research area among academics and practitioners. Massive progress in science and technology has intensified the competition among companies (Kunthi et al., 2018) and technology no longer serves as a source of sustainable competitive advantage for an organization. Aligning with the concept of 'Knowledge economy' which stormed all over the world, it is of paramount importance for modern and globalized organizations to manage and develop its knowledge assets as a 'source of wealth' as well as to gain competitive advantage (Davenport et al., 1998; Gupta et al., 2002; Sveiby, 1996, Davenport & Prusak, 1998). As highlighted by Wei et al., (2006), knowledge management is an important concept not only for organizations but for a country to prosper.

In such global marketplace, organizations would not get competitive advantage exclusively from efficient methods of production and delivery, and therefore organizations must focus on their knowledge resources to develop and maintain sustainable competitive advantage (Kunthi et al., 2018, Yen et al., 2021). As quoted by Farzin et al., (2014), to achieve and sustain competitive advantage in the e- economy, the implementation of strategic knowledge management is the key. KM brings many advantages for an organization such, they would be able to reduce operating costs, expedite product development cycles and improve customer service (Saida et al., 2014). As explained by Wei et al., (2006), KM is not confined to business entities, but is a requirement for a country as well. In align with CSF approach of Harvard, researchers came up with the idea of

Knowledge Management Critical Success Factors. According to Rockart (1979), for any business there are few areas which contribute directly for the success of the organization. These areas needed to be identified, understand, and monitor closely because they ensure competitive success for an organization. Critical Success Factors for KM is an important emerging concept and considered to be the building blocks of KM. According to many authors huge number of such factors are available (Zaky & Soliman, 2017). Literature shows KMCSF are diverse in nature and context dependent. Under these circumstances, to implement an effective and efficient KM system within an organization, it is of paramount importance to identify CSF relevant to KM. The objective of this desk study is to identify Critical Successes Factors in past literature relevant to Knowledge Management (KM) in organizations.

Methodology

A desk research was carried out to identify CSF related to KM. Research articles were selected using the Google Scholar for the study from 2000 to 2021. Further, important articles were also identified and reviewed from references. Then the literature was reviewed to find commonalities among them.

Literature Review

Knowledge Management

Phelps et al. (2012), interpreting results of his survey carried out among business executives, mentioned, majority of respondents (69%) had assured that they have identified the importance and have plans to use KM as a tool for the organization growth. This shows the importance of implementing KM to maximize the use of inherent knowledge within organizations (Kunthi *et al.* 2018). KM is a complex field comprise with crucial activities that needs to be effectively exercised by organizations (Saida *et al.*, 2014). As highlighted by Zaky & Soliman (2017) providing 'one single definition' to KM is not easy because of its 'multi-faced and controversially' nature. Organizations implement KM to maximize the use of inherent knowledge within their organizations (Kunthi *et al.* 2018). Organizations would be able to reduce operating costs, expedite product development cycles and improve customer service through a properly managed knowledge (Saida *et al.*, 2014). The KM cycle comprises at least of four areas, Knowledge acquisition, Knowledge conversion, Knowledge application and Knowledge preservation (Zaky & Soliman, 2017).

Critical Success Factors

The concept of 'Critical Success Factors' emerged with "Management Information Crisis" by Daniel (1961). According to that explanation in any business there are few areas which contribute directly for the success of the organization, and these areas needed to be understood and monitor closely because they ensure competitive success for the organization (Rockart, 1979). Rockart (1979) explains the importance of CSF as, "...a company's information system must be discriminating and selective. It should focus on 'success factors.' In most industries there are usually three to six factors that determine success; these key jobs must be done exceedingly well for a company to be successful" (Rockart, 1979).

Accordingly, the future of an organization is determined by the ability in identifying and using its success factors successfully by the organization (Wong & Aspinwall, 2005). When an organization determined to capitalize on its knowledge assets, it is important to look at CSF relevant to knowledge management. According to Lehner and Haas (2010), Klotz & Strauch (1990) has defined the CSF for KM as; "The concept of critical success factors implies that in each branch and in each area, a limited number of factors exist which definitely determine the success of companies" (Lehner &

Haas, 2010). The CSFs for KM are the building blocks of the development of effectiveness of KM in organizations (Zaky & Soliman, 2017).

Similar idea has been put forward by Yeh *et al.*, (2006), referring the quote by Zaky & Soliman (2017), “knowledge management enablers..., should be clear in an organization, because not only they create knowledge, but they also prompt people to share their knowledge and experiences with others” (Zaky & Soliman, 2017). Referring the work by Ranjanand Bhatnagar, Kunthi *et al.*, (2018) has also highlighted the importance of CSF as ‘parameters or key factor for the success of the organization’, and further has stressed the requirement of continual attention on them to gain high performance. Similar ideas are stated by Zaky and Soliman (2017) as well.

As mentioned by Yeh *et al.*, (2006), “Critical success factors should be clear in an organization, because not only they create knowledge, but they also prompt people to share their knowledge and experiences with others” (Zaky & Soliman, 2017). Zaky and Soliman (2017) has expanded the field to knowledge creation and knowledge sharing aspects and explained Knowledge management critical success factors as instruments for the organization to advance, stimulate creation, sharing and protection of knowledge within the organization.

When analyzing 20 random articles in different contexts, various measuring variables were observed. Highly cited article by Davenport and Prusak (1998) has identified Culture, Leadership, Technology, and Measurement as broadly accepted KM strategies. Considering the broadness of the study area, Lehner & Haas (2010) has categorized KM success factors into three ‘Dimensions’, Human being, Organization and Technology in their study.

In two articles it was observed that two measuring instruments have been used. Study by Gunasekera and Chong (2018) who intended to measure KM for construction organizations in Sri Lanka, primarily has identified internal and external factors separately and another study by Zagzoog & Alserehiy (2020) has used two sets of factors to study Knowledge Sharing and Innovation. Another study conducted in Vietnam construction industry by Vãn and Thi (2010) found, KM strategy, Culture, Technology, Leadership and People as CSF and they showed they can be concentrated to 3 CSF as, KM Strategy, KM Social Capability and KM Process as they named them. In 2014, a research carried out in Iran by (Farzin *et al.*, 2014) has identified, 24 CSFs which are appropriate in the study.

Through a literature survey on management of knowledge implementation Kunthi *et al.*, (2018) has identified Organizational Culture, Organizational Structure, Information Technology Infrastructure, Top management support and Human Resources as Critical Success Factors in Knowledge Management Implementation. Empirical study by Saida *et al.*, (2014) found, with respect to ‘information Security’, Culture, Top management support, Reward and Incentive, and Organization structure as KM success factor.

A study done by Margilaj & Bello (2015) aiming Albania Business Organizations has found 7 CSF as, Culture, Leadership in Management, Organizational structure, Human Resource Management, Information Technology, The Measuring System and Organizational Strategy. Yen *et al.*, (2021) found Benchmarking, Teamwork, Culture, Empowerment, Innovation, Leadership, Rewards and Training are CSF for KM in Saudi Arabia’s telecommunications industry in a study to identify factors that influence the successful implementation of KM and organizational performance. Zaky and Soliman, (2017) attempted to identify and discuss the critical success factors that related to the KM in banking sector in Egypt. They discovered six CSF in their study. They are Leadership, Culture, IT, Strategy, Process, HR Practices. A study done at Saudi Arabian

Telecommunication industry by Yen *et al.*, (2021) found KM factors consist of Training, Empowerment, Teamwork, Leadership, Reward, Benchmarking, Culture and Innovation.” (Yen *et al.*, 2021).

Complexity of Knowledge Management Critical Success Factors

KM CSF are important for the implementation of KM effectively within the organization and vast amount of such factors are available (Zaky & Soliman, 2017). Meckl&Sodeik (2007) and Helm *et al.*, (2007) has established that KM CSFs are diverse in nature and has been carried out on different ‘intentions and contexts. Some researchers have argued that CSFs as critical areas of management planning and practices (Zaky & Soliman, 2017). Similarly, it is accepted that KM practices are context specific (Farzin *et al.*, 2014). Therefore, it is important to note that, though Organization’s benefit by understanding the factors that are critical to the success of KM CSF (Wong, 2005) they diverge across industries and should be handle with extreme caution (Wong, 2005, Kunthi *et al.*, 2018).

KPMG recorded 80% of larger organizations all over the world practice KM. KPMG, (2000) indicates, the sufficiency of those ‘success factors’ has not been systematically studied and verified (Lehner&Haas, 2010, Chong *et al.*, 2007).In support to above argument, as reportedby Yenetal., (2021) many authors (Černe *et al.*, 2014; Connelly *et al.*, 2012; Paulin&Suneson, 2015; Wang *et al.*, 2010) that have identified the fact that, though many studies have identified important CSFs, many of those studies were done at a narrow scope.

Analysis and Discussion

Numerous studies have been done to identify CSF in the field of KM. Many of them has been carried out using different combination of factors. The summary of the CSF used by different studies were tabulated in Table 1. When analyzing the measuring scales, it was observed most of the scales contain similar factors. Out of 22 instruments (two studies contain two scales each), the leadership has been identified as a prominent variable or factor (17 out of 22). Secondly most used variable is Culture (16 out of 22). Thirdly is the IT (13 out of 22).

It was observed Leadership, Culture, IT, Strategy, HRM, Measurement, structure, People, Process and incentives has been common for more than 5 scales. Another important characteristic to be noted is that the number of variables in each scale ranged from 3 to 24. The highest frequencies were 4 and those contain 4 and 5 variables. The second highest frequency is 3 and those instruments have 6 variables. This is in line with the observations of Rockart (1979).

It is interesting to observe that Gunasekera & Chong (2018) has used a completely a different set of variables. They include Managerial, Technological and Resource as internal factors of influence and Social, Political, Environmental, Economic, Industry and Construction technology as external influencing factors. Wei *et al.*, (2006) who conducted a KM implementation in Malaysian telecommunication industry an empirical analysis on the ‘KM implementation in Malaysian telecommunication industry has identified special variables such as K team, K audit and K map as critical to KM apart from Business strategy and Organizational structure. They are specifically designed to measure some important characteristic relevant to Malaysian knowledge implementation programs.

TABLE I CSF USED IN VARIOUS STUDIES AND THEIR FREQUENCY.

Author	Year	No. of Factors	Communication	Culture	HRM	Incentives	Infrastructure	IT	K Audit	K Map	K Measurement	K Team	Leadership	Learning	Motivation	org chart	People	Practice	Process	Resources	Strategy	Structure	Team Work	Training	Matching Factors	Non Matching Factors
Chong et. al.,2007	2001	4		X				X					X												4	0
Wong,2005	2005	11		X	X		X	X			X		X		X				X	X	X			X	11	0
Wei et. al., (2006)	2006	5							X	X		X									X	X			5	0
Senevirathna & Perera (2009)	2009	4		X				X			X		X												4	0
Fernandez & Sabherwal, 2010	2010	7		X									X					X	X						4	3
Lehner and Haas (2010)	2010	13		X	X			X					X		X		X		X						7	6
Văn, L and Thi, C. H.,2010	2010	5		X				X					X				X				X				5	0
Mehregan, et. al., 2012	2012	8	X	X									X												3	5
Farzin, et. al.,2014	2014	24	X	X									X				X				X				5	19
Saida et. al., 2014	2014	4		X		X							X									X			4	0
Atapattu & Jayakody, 2014	2014	3				X								X									X		3	0
Koloniari, et. al.,2015	2015	6		X	X			X													X	X			5	1
Margilaj and Bello, 2015	2015	7		X	X			X			X		X								X	X			7	0
Dasanayaka & Kuruppuge, 2015	2015	4					X	X					X	X											4	0
Zaky & Soliman, 2017	2017	6		X	X			X					X						X		X				6	0
Kunthi, et. al., 2018	2018	5		X	X			X					X									X			5	0
Gunasekera & Chong ,2018 (Int)	2018	3																							0	3
Gunasekera & Chong ,2019(Ext)	2018	6																							0	6
Daradkeh et. al.,2020	2020	5		X				X			X		X			X									5	0
Zagzoog & Alsereihy, 2020 (KS)	2020	12		X	X	X		X					X				X		X					X	8	4
Zagzoog & Alsereihy, 2021 (Inv)	2020	11	X			X		X			X		X				X				X	X			8	3
Yen, et. al., 2021	2021	8		X		X							X										X	X	5	3
Frequency			3	16	7	5	2	13	1	1	6	1	17	2	2	1	5	1	5	1	8	6	2	3		

Source: Author Compilation

Conclusion and Future Work

This study intends to discuss the importance of KM CSF for an organization, its complexity and highly effective CSF. It has been observed with available literature, depending on the context and the requirement of the study, researchers have used various CSFs. However, it is also observed most researched have used common factors, Top Management support, Culture and IT infrastructure, Strategy, HRM, Measurement, structure, People, Process, and incentives as CSF in their studies. Further it has been noted that these CSF are abstracts and needed to operationalize. When operationalizing, there may be overlaps amongst constructs. It is important to verify these CSF empirically in different contexts. All the studies reviewed were conducted to identify CSF relevant to KM at a defined time, and future studies can be extended to identify how the significance of these CSF change with time.

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User Satisfaction of Library Services and Facilities by the Students and Faculty Members of PDCE and GKCE Engineering College Libraries: A Study

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Abstract - This research has been undertaken to identify and level of satisfaction with the services and facilities provision by Priyadarshini College of Engineering (PDCE) and Gokulakrishna College of Engineering (GKCE) college libraries in Sullurpet. The study found out that the majority of the users (76.89%) visit the library daily, most of the users (94.14%) of PDCE and GKCE satisfied with the working hours of the library, majority of the users (71.37%) are visiting the library for referring books, most of the users of (88.62%) PDCE and GKCE satisfied about the arrangement of books and other materials in the library and most of the users (83.10) of PDCE and GKCE feel satisfied about the money paid for photocopying.

Keywords: Engineering College Library, Services, Facilities, PDCE, GKCE.

Introduction

Engineering graduates today require not only adequate technological ability and problem-solving skills but must also be endowed with soft skills like cooperative working, communication and presentation skills, business ethics, and inter-personal relationships. They must also possess a deep commitment to the safety, reliability, quality, and sustainability of all engineering activities in which they take part. Engineering Institutions have now a new responsibility to provide opportunities to every student to acquire these abilities in addition to their technological knowledge. Excellent engineering colleges are essential to prepare engineers with good knowledge and skills in engineering. Faculty members, laboratories, and libraries are important components in providing good engineering education. Engineering college libraries have to serve a special type of user. Unless these libraries have adequate resources such as finance, building, furniture, etc., they may not render necessary services to their users. Hence, the present study has been undertaken to examine the existing conditions of engineering college libraries so that the necessary measures can be undertaken to improve their sources, services, and facilities.

Review of Literature

Mathisekaran and Lawrence Mary (2008) carried out a study on the usage of library resources in Manonmaniam Sundaranar University, Tamil Nadu. The areas covered are the purpose of library visits, satisfaction level, problems faced while searching the electronic information, and usage of print and electronic journals. The study was based on the primary data collected from sixty faculty members. The study revealed that a high percentage of the faculty members (46.67%) use OPAC, and 10 percent use content page services, and very few members use reprographic services. It was also found that 60 percent of the respondents use both print and electronic journals, followed by print journals (23.33%) and electronic journals (16.67%). The study recommended that the library should establish a campus network to browse the catalog and the library should arrange awareness programs/services to the users and concluded that the collection of the library should meet the needs and requirements of the end-users.

Ayyanar and Kanakaraj (2012) studied and compared the library infrastructure, information services, and satisfaction of users of four selected constituent colleges of Vinayaka Mission

University in Tamil Nadu. The study revealed that users rate high-level satisfaction with respective to Internet services followed by CD-ROM services.

Kaushal (2013) studied the library services and its users in MM Engineering College Library at MM University, Mullana, Haryana. This study examined several aspects of library use, including the frequency of visiting the library and the use of computer-based services. The study revealed that 54 percent of respondents visited the library daily, followed by weekly (42%) and fortnightly and monthly (2%). A majority of respondents (64%) preferred both manual and online search approaches followed by preferred manual mode (31%), and only 5 percent used the online search of information. A high percentage of users (35%) preferred books as a major source of information followed by Internet (24%), reference books (21%) and periodicals, and online information resources (6%). Some suggestions are also provided based on the study for enhancing user satisfaction.

Felcy and Mallaiah (2014) studied the use of information resources by the students, faculty members, and research scholars in the engineering college libraries of Dakshina Kannada and Udupi Districts of Karnataka. The questionnaire was used as the data collection tool. The analysis showed that respondents do experience the inadequacy of information resources in their college libraries. Results showed that there were significant differences in the satisfaction level of availability of information resources among the respondents of various categories. There was a need to evaluate the library resources, facilities, and services regularly to meet the changing needs of the users.

Kumaraswamy Reddy Kothapati and Muralimohan Reddy (2018) conducted a survey of selected two-three engineering college libraries located in Hyderabad and Ranga Reddy district, Telangana with respect to the physical environment. The study is conducted through a survey using the structured questionnaire by the librarians. The study highlights the available physical infrastructure and the current status of physical facilities in these libraries. Results showed that the majority of the libraries (56.52%) are housed in some part of the college building; most of the libraries (95.65%) are have adequate standard furniture and equipment; the majority of the librarians (78.26%) are satisfied with the present physical facilities.

Objectives of the Study

The objectives of the study are

1. To assess the engineering college libraries with regard to their working hours.
2. To know the users' opinions towards library services and facilities.
3. To identify the differences, if any in their satisfaction with regard to library services and facilities.

Need and Purpose for the Present Study

The purpose of the present study is to know the existing conditions of the engineering college libraries in Sri Venkateswara University area with regard to their resources, services, and facilities. It is intended to study in detail the information needs of users, their satisfaction with the various services and facilities of the libraries concerned, and to assess the drawbacks in the provision of these services. So, the present survey has been undertaken by the investigator.

Data and Methodology

The study was carried out in two purposively selected engineering college libraries in Sullurpet in Nellore district: namely: the library of Priyadarshini College of Engineering and Gokulakrishna College of Engineering.

The questionnaire was personally distributed among the samples of the study by the library users. Total numbers of 300 questionnaires are distributed, and 290 questionnaires were received properly. The collected data were analyzed both quantitatively and qualitatively by users' satisfaction of services and facilities of PDCE, GKCE libraries.

Data Analysis and Interpretation

Academic status

The various academic statuses of users in the sample and their responses are presented in Table I.

TABLE I DISTRIBUTION OF RESPONDENTS ACCORDING TO THEIR ACADEMIC STATUS

Academic Status	Respondents			
	In the Population	Population Percentage	In the Sample	Sample Percentage
Students	2000	91.75	200	68.97
Faculty Members	180	08.25	90	31.03
Total	2180	100	290	100

Table I shows that in the total population, 91.75 percent are students and the remaining 08.25 percent are faculty members. It is also obvious from it that 68.97 percent of the respondents in the sample are students, and the remaining 31.03 percent are faculty members.

Frequency of Visit to the Library

The distribution of users, according to the frequency of visits to the library, is presented in Table II.

TABLE II DISTRIBUTION OF USERS ACCORDING TO THEIR FREQUENCY OF VISITING THE LIBRARY

Frequency	PDCE, Sullurpet			GKCE, Sullurpet			Cumulative Total		Grand Total
	Students	Faculty Members	Total	Students	Faculty Members	Total	Students	Faculty Members	
Daily	72 (72)	24 (9.6)	96 (68.57)	85 (85.0)	42 (84.0)	127 (84.67)	157 (78.5)	66 (73.4)	223 (76.9)
Twice in a week	18 (18)	9 (3.6)	27 (19.28)	1 (1.0)	3 (6.0)	4 (2.66)	19 (9.5)	12 (13.3)	31 (10.69)
Once in a week	5 (05)	2 (0.8)	7 (5)	6 (6.0)	1 (2.0)	7 (4.67)	11 (5.5)	3 (3.3)	14 (4.83)
Occasionally	5 (05)	5 (0.2)	10 (7.14)	8 (8.0)	4 (8.0)	12 (8.0)	13 (6.5)	9 (10.00)	22 (7.58)
Total	100 (100.00)	40 (100.00)	140 (100.00)	100 (100.00)	50 (100.00)	150 (100.00)	200 (100.00)	90 (100.00)	290 (100.00)

(Note: Numbers in parentheses indicate percentages)

χ^2 - PDCE (STU VS TEA) : 03.15 df :3 TV : 7.815NS at 0.05 level

χ^2 - GKCE (STU VS TEA) : 03.15 df :3 TV : 7.815 NS at 0.05 level

χ^2 - PDCE VS GKCE (STU VS STU): 17.0702 df :3 TV: 7.815 Sig at 0.05 level

χ^2 - PDCE VS GKCE (TEA VS TEA): 07.4905 df :3 TV: 7.815 Sig at 0.05 level

χ^2 - Cumulative Total (STU VS TEA) : 03.5408 df :3 TV : 7.815 Sig at 0.05 level

It is evident from Table II that most of the users (76.89%) visit the library daily. It is also evident from it that 10.69% of them visit the library twice in a week, 4.83% of them visit once in a week, and 7.59% of them visit occasionally.

It can also be seen from the table that there is no significant difference in satisfaction between the students and faculty members of Priyadarshini College of Engineering regarding the frequency of visiting the library. It is evidenced by the Chi-square value, which is not significant at 0.05 level with 3 degrees of freedom. It is obvious from the table that there is no significant difference in satisfaction between the students and faculty members of Gokula Krishna College of Engineering regarding the frequency of visiting the library. It is evidenced by the Chi-square value, which is not significant at 0.05 level with 3 degrees of freedom.

It is cleared from the table that there is a significant difference in satisfaction between the students of PDCE and GKCE regarding the frequency of visiting the library. It is proved by the Chi-square value, which is significant at 0.05 level with 3 degrees of freedom. It means that the students of GKCE visiting the library more frequently compared to the students of PDCE. It also further reveals that there is a significant difference in satisfaction between the faculty members of PDCE and GKCE regarding the frequency of visiting the library. It is evidenced by the Chi-square value, which is significant at 0.05 level with 3 degrees of freedom. It means that the faculty members of GKCE visiting the library more frequently than the faculty members of PDCE.

It can be noticed from the table that there is no significant difference in satisfaction between the students and faculty members (Cumulative Total) of PDCE and GKCE regarding the frequency of visiting the library. It is evidenced by the Chi-square value, which is not significant at 0.05 level with 3 degrees of freedom.

Purpose of Visit to the Library

The distribution of users, according to the purpose of visit to the library is presented in Table III.

TABLE III DISTRIBUTION OF USERS ACCORDING TO THE PURPOSE OF
VISITING THE LIBRARY

Purpose	PDCE, Sullurpet			GKCE, Sullurpet			Cumulative Total		Grand Total N=290
	Students N=100	Faculty Members N=40	Total N=140	Students N=100	Faculty Members N=50	Total N=150	Students N=200	Faculty Members N=90	
Borrow Books	76 (76.0)	11 (27.5)	87 (62.14)	71 (71.0)	10 (20.0)	81 (54.0)	147 (73.5)	21 (23.33)	168 (57.93)
Refer Books	76 (76.0)	30 (75.0)	106 (75.71)	81 (81.0)	20 (40.0)	101 (67.33)	157 (78.5)	50 (55.55)	207 (71.37)
Periodical & News Papers	42 (42.0)	20 (50.0)	62 (44.28)	63 (63.0)	20 (40.0)	83 (55.33)	105 (52.5)	40 (44.44)	145 (50.0)

(Note: Numbers in parentheses indicate percentages & Users are permitted to tick more than one answer)

χ^2 - PDCE (STU VS TEA): 09.5654 df :2 TV: 5.991Sig at 0.05 level
 χ^2 - GKCE (STU VS TEA) : 03.7907 df :2 TV : 5.991 Sig at 0.05 level
 χ^2 - PDCE VS GKCE (STU VS STU) : 03.4602 df :2 TV : 5.991NS at 0.05 level
 χ^2 - PDCE VS GKCE(TEA VS TEA) : 0.9670 df :2 TV : 5.991 NS at 0.05 level
 χ^2 - Cumulative Total (STU VS TEA) : 12.1656 df :2 TV : 5.991 Sig at 0.05 level

It is evident from Table III that most of the users (71.37%) are visiting the library for referring books. This is followed by borrowing books (57.93%) and referring to periodicals and newspapers (50%). It can also be seen from the table that there is a significant difference in satisfaction between students and faculty members of PDCE regarding the purpose of visiting the library. It is evidenced by the Chi-square value, which is significant at 0.05 level with 2 degrees of freedom. It

means that the students of PDCE visit the library more frequently than the faculty members to borrow books (76%) followed by the refer books (76%) periodical and newspapers (42%). It is obvious from the table that there is a significant difference in satisfaction between the students and faculty members GKCE regarding the purpose of visiting the library. It is evidenced by the Chi-square value, which is not significant at 0.05 level with 2 degrees of freedom. It means that the students of GKCE visit the library more frequently than the faculty members to refer books (81%) followed by the borrow books (71%), periodical and newspapers (63%). It is cleared from the table that there is no significant difference in satisfaction between the students of PDCE and GKCE regarding the purpose of visiting the library.

It is proved by the Chi-square value, which is not significant at 0.05 level at 2 degrees of freedom. It also further reveals from the table that there is no significant difference in satisfaction between the faculty members of PDCE and GKCE regarding the purpose of visiting the library. It is evidenced by the Chi-square value, which is not significant at 0.05 level at 2 degrees of freedom. It can be noticed from the table that there is a significant difference in satisfaction between the students and faculty members (Cumulative Total) of PDCE and GKCE regarding the purpose of visiting the library. It is evidenced by the Chi-square value, which is significant at 0.05 level at 2 degrees of freedom. It means that the students of PDCE and GKCE are using library services more as compared to the faculty members.

Satisfaction with the working hours of the library

The distribution of users, according to satisfaction with the working hours of the library, is presented in Table IV.

TABLE IV DISTRIBUTION OF USERS ACCORDING TO THE SATISFACTION WITH THE WORKING HOURS OF THE LIBRARY

Level of Satisfaction	PDCE, Sullurpet			GKCE, Sullurpet			Cumulative Total		Grand Total
	Students	Faulty Members	Total	Students	Faculty Members	Total	Students	Faculty Members	No
Satisfied	95 (95.0)	35 (87.5)	130 (92.9)	90 (90.0)	48 (96.0)	138 (92.0)	185 (92.5)	88 (97.8)	273 (94.14)
Not - Satisfied	5 (5.0)	5 (12.5)	10 (7.1)	10 (10.0)	2 (4.0)	12 (8.0)	15 (7.5)	2 (2.2)	17 (5.86)
Total	100	40	140	100	50	150	200	90	290

(Note: Numbers in parentheses indicate percentages)

χ^2 - PDCE (STU VS TEA) : 02.4231 df :1 TV : 3.991 NS at 0.05 level

χ^2 - GKCE (STU VS TEA) : 01.6304 df :1 TV : 3.991 NS at 0.05 level

χ^2 - PDCE VS GKCE (STU VS STU) : 01.801 df :1 TV : 3.991 NS at 0.05 level

χ^2 - PDCE VS GKCE (TEA VS TEA) : 02.2384 df :1 TV : 3.991 NS at 0.05 level

χ^2 - Cumulative Total (STU VS TEA) : 03.1330 df :1 TV : 3.991 NS at 0.05 level

It is evident from Table IV that most of the users (94.14%) of PDCE and GKCE satisfied with the working hours of the library, and the remaining 5.86% of users are dissatisfied. It can also be seen from the Table that there is no significant difference in satisfaction between the students and faculty members of PDCE regarding the working hours of the library. It is Proved by the Chi-square value, which is not significant at the 0.05 level with a degree of freedom. It is obvious from the table that there is no significant difference in satisfaction between the students and faculty members of GKCE regarding the working hours of the library. It is evidenced by the Chi-square value, which is not significant at 0.05 level with 1 degree of freedom.

It is cleared from the table that there is no significant difference in satisfaction between the students of PDCE and GKCE regarding the working hours of the library. It is evidenced by the Chi-square value, which is not significant at 0.05 level with 1 degree of freedom. It also further reveals from the table that there is no significant difference in satisfaction between the faculty members of PDCE and GKCE regarding the working hours of the library. It is evidenced by the Chi-square value, which is not significant at 0.05 level with 1 degree of freedom. It can be noticed from the table that there is no significant difference in satisfaction between the students and faculty members (Cumulative Total) of PDCE and GKCE regarding the working hours of the library. It is evidenced by the Chi-square value which is not significant at 0.05 level with 1 degree of freedom.

Satisfaction with the classification system adopted by the library

The distribution of users, according to satisfaction with the classification system adopted by the library, is presented in Table V.

TABLE V DISTRIBUTION OF USERS ACCORDING TO THE SATISFACTION WITH THE CLASSIFICATION SYSTEM ADOPTED BY THE LIBRARY

Level of Satisfaction	PDCE, Sullurpet			GKCE, Sullurpet			Cumulative Total		Grand Total
	Students	Faculty members	Total	Students	Faculty members	Total	Students	Faculty members	
Satisfied	78 (78)	39 (97.5)	117 (83.57)	84 (84)	45 (90)	129 (86)	162 (81)	84 (93.33)	246 (84.83)
Not Satisfied	22 (22)	1 (2.5)	23 (16.43)	16 (16)	5 (10)	21 (14)	38 (19)	6 (6.67)	44 (15.17)
Total	100 (100.00)	40 (100.00)	140 (100.00)	100 (100.00)	50 (100.00)	150 (100.00)	200 (100.00)	90 (100.00)	290 (100.00)

(Note: Numbers in parentheses indicate percentages)

χ^2 - PDCE (STU VS TEA) : 07.9130df:1TV:3.841 Sig at 0.05 level

χ^2 - GKCE (STU VS TEA) : 00.9967 df:1 TV:3.841 NS at 0.05 level

χ^2 - PDCE VS GKCE (STU VS STU): 01.1696 df:1TV:3.841 NS at 0.05 level

χ^2 - PDCE VS GKCE (TEA VS TEA) : 02.0089 df:1 TV:3.841 NS at 0.05 level

χ^2 - Cumulative Total (STU VS TEA) : 07.3357df:1TV:3.841 Sig at 0.05 level

It is evident from table V that most of the users (84.83) of PDCE and GKCE are satisfied with the classification system adopted by the library. It is also evident from it 15.17% of them dissatisfied with the classification system adopted by the library. It can also be seen from the table that there is a significant difference in satisfaction between the students and faculty members of PDCE about the library classification system adopted by the library. It is evidenced by the Chi-square value, which is significant at 0.05 level with 1 degree of freedom. It means that the faculty members of PDCE satisfied more (97.5%) than the students (75%) with the classification system adopted by the library.

It is obvious from the table that there is no significant difference in satisfaction between the students and faculty members of GKCE regarding the library classification system adopted by the library. It is evidenced by the Chi-square value, which is not significant at 0.05 level with 1 degree of freedom. It is cleared from the table that there is no significant difference in satisfaction between the students of PDCE and GKCE with the classification system adopted by the library. It

is evidenced by the Chi-square value, which is not significant at 0.05 level with 1 degree of freedom. It also further reveals that there is no significant difference in satisfaction between the faculty members of PDCE and GKCE about the library classification system adopted by the library. It is evidenced by the Chi-square value, which is not significant at 0.05 level with 1 degree of freedom. It can be noticed from the table that there is a significant difference in satisfaction between the students and faculty members (Cumulative Total) of PDCE and GKCE. It is evidenced by the Chi-square value, which is significant at 0.05 level with 1 degree of freedom. It means that most of the faculty members (93.33%) of PDCE and GKCE are satisfied than the students (81%) with the classification system adopted by the library.

Consult the Library Catalogue

The distribution of users, according to the consult the library catalog is presented in Table VI.

TABLE VI DISTRIBUTION OF USERS ACCORDING TO THE CONSULT THE LIBRARY CATALOG

Level of Satisfaction	PDCE, Sullurpet			GKCE, Sullurpet			Cumulative Total		Grand Total
	Students	Faculty members	Total	Students	Faculty members	Total	Students	Faculty members	
Difficult	10 (10)	2(5)	12 (8.57)	21(21)	2 (4)	23 (15.33)	31 (15.5)	4 (4.44)	35 (12.07)
Not Difficult	90 (90)	38(95)	128 (91.43)	79(79)	48 (96)	127 (84.67)	169 (84.5)	86 (95.56)	255 (87.93)
Total	100 (100.00)	40 (100.00)	140 (100.00)	100 (100.00)	50 (100.00)	150 (100.00)	200 (100.00)	90 (100.00)	290 (100.00)

(Note: Numbers in parentheses indicate percentages)

χ^2 - PDCE (STU VS TEA) : 00.9115 df:1 TV:3.841 NS at 0.05 level

χ^2 - GKCE (STU VS TEA): 07.4204 df:1 TV:3.841 Sig at 0.05 level

χ^2 - PDCE VS GKCE (STU VS STU) : 04.6192 df:1 TV:3.841 Sig at 0.05 level

χ^2 - PDCE VS GKCE(TEA VS TEA) : 00.0523 df:1TV:3.841 NS at 0.05 level

χ^2 - Cumulative Total (STU VS TEA) : 07.1486df:1 TV:3.841 Sig at 0.05 level

It is evident from Table VI that most of the users (87.93%) of PDCE and GKCE do not feel difficult to consult the library catalog. It is also evident from it that 12.07% of them feel difficult to consult the library catalog.

It can also be seen from the table that there is no significant difference in satisfaction between the students and faculty members of PDCE about consult the library catalog. It is evidenced by the Chi-square value, which is not significant at 0.05 level with 1 degree of freedom.

It is obvious from the table that there is a significant difference in satisfaction between the students and faculty members of GKCE about consult the library catalog. It is evidenced by the Chi-square value, which is significant at 0.05 level with 1 degree of freedom. It means that most of the faculty members (96%) of GKCE do not feel difficulty in consulting the library catalog compared to the students (79%).It is cleared from the table that there is a significant difference in satisfaction between the students of PDCE and GKCE with regard to consulting the library catalog. It is evidenced by the Chi-square value, which is significant at 0.05 level with 1 degree of freedom. It means most of the students (90%) of PDCE do not feel difficulty in consulting the library catalog compared to the students of GKCE (79%). It also further reveals that there is no significant

difference in satisfaction between the faculty members of PDCE and GKCE with regard to consulting the library catalog. It is evidenced by the Chi-square value, which is not significant at 0.05 level with 1 degree of freedom.

It can be noticed from the table that there is a significant difference in satisfaction between the students and faculty members of (Cumulative Total) of PDCE and GKCE with regard to consulting the library catalog. It is evidenced by the Chi-square value, which is significant at 0.05 level with 1 degree of freedom. It means that most of the faculty members (95.56%) of PDCE and GKCE do not feel difficulty in consulting the library catalog compared to the students (84%).

Satisfaction with the arrangement of books and other materials in the library. The distribution of users, according to the consult the library catalog is presented in Table VII.

TABLE VII DISTRIBUTION OF USERS ACCORDING TO THE SATISFACTION WITH THE ARRANGEMENT OF BOOKS AND OTHER MATERIALS IN THE LIBRARY

Level of Satisfaction	PDCE, Sullurpet			GKCE, Sullurpet			Cumulative Total		Grand Total
	Students	Faculty members	Total	Students	Faculty members	Total	Students	Faculty members	
Satisfied	83 (83)	39 (97.5)	122 (87.14)	90 (90)	45 (90)	135 (90)	173 (86.5)	84 (93.33)	257 (88.62)
Not Satisfied	17 (17)	1 (2.5)	18 (12.86)	10 (10)	5 (10)	15 (10)	27 (13.5)	6 (6.67)	33 (11.88)
Total	100 (100.00)	40 (100.00)	140 (100.00)	100 (100.00)	50 (100.00)	150 (100.00)	200 (100.00)	90 (100.00)	290 (100.00)

(Note: Numbers in parentheses indicate percentages)

χ^2 - PDCE (STU VS TEA) : 05.3616 df:1 TV:3.841Sig at 0.05 level

χ^2 - GKCE (STU VS TEA) : 00.0000 df:1 TV:3.841 NS at 0.05 level

χ^2 - PDCE VS GKCE (STU VS STU): 02.0981 df:1 TV:3.841 NS at 0.05 level

χ^2 - PDCE VS GKCE (TEA VS TEA): 02.0089 df:1 TV:3.841 NS at 0.05 level

χ^2 - Cumulative Total STU VS TEA) : 02.8740 df:1 TV:3.841 NS at 0.05 level

It is evident from table VII that most of the users of (88.62%) PDCE and GKCE satisfied with the arrangement of books and other materials in the library. It is also evident from it that 11.88% of them dissatisfied with the arrangement of books and other materials in the library. It can also be seen from the table that there is a significant difference in satisfaction between the students and faculty members of PDCE with regard to the arrangement of books and other materials in the library. It is evidenced by the Chi-square value, which is significant at 0.05 level with 1 degree of freedom. It means that the faculty members of PDCE mostly satisfied (97.5%) than the students (83%) with the arrangement of books and other materials in the library.

It is obvious from the table that there is no significant difference in satisfaction between the students and faculty members of GKCE regarding the arrangement of books and other materials in the library. It is evidenced by the Chi-square value, which is not significant at 0.05 level with 1 degree of freedom. It is cleared from the table that there is no significant difference in satisfaction between the students of PDCE and GKCE with regard to the arrangement of books and other materials in the library. It is evidenced by the Chi-square value, which is not significant at 0.05

level with 1 degree of freedom. It also further reveals from the table that there is no significant difference in satisfaction between the faculty members of PDCE and GKCE with regard to the arrangement of books and other materials in the library. It is evidenced by the Chi-square value, which is not significant at 0.05 level with 1 degree of freedom. It can be noticed from the table that there is no significant difference in satisfaction between the students and faculty members (Cumulative Total) of PDCE and GKCE regarding the arrangement of books and other materials in the library. It is evidenced by the Chi-square value, which is not significant at 0.05 level with 1 degree of freedom.

Photocopying service

The distribution of users according to their satisfaction with the money paid for photocopying is presented in Table VIII.

TABLE VIII DISTRIBUTION OF USERS ACCORDING TO THE SATISFACTION WITH THE MONEY PAID FOR PHOTOCOPYING SERVICE

Level of Satisfaction	PDCE, Sullurpet			GKCE, Sullurpet			Cumulative Total		Grand Total
	Students	Faculty members	Total	Students	Faculty members	Total	Students	Faculty members	
Excess	4 (4)	2 (5)	6 (4.29)	4(4)	2(4)	6 (4)	8 (4)	4 (4.44)	12 (4.14)
Satisfied	78 (78)	35 (87.5)	113 (80.71)	82 (82)	46(92)	128 (85.33)	160 (80)	81 (90)	241 (83.10)
Better to supply freely	18 (18)	3 (7.5)	21 (15)	14 (14)	2(4)	16 (10.67)	32 (16)	5 (5.56)	37 (12.76)
Total	100 (100.00)	40 (100.00)	140 (100.00)	100 (100.00)	50 (100.00)	150 (100.00)	200 (100.00)	90 (100.00)	290 (100.00)

(Note: Numbers in parentheses indicate percentages)

χ^2 - PDCE (STU VS TEA) : 02.4861 df:2TV:5.991 NS at 0.05 level

χ^2 - GKCE (STU VS TEA) : 05.5156 df:2 TV:5.991 NS at 0.05 level

χ^2 - PDCE VS GKCE (STU VS STU) : 00.6000 df:2 TV:5.991 NS at 0.05 level

χ^2 - PDCE VS GKCE (TEA VS TEA) : 02.0988 df:2 TV:5.991 NS at 0.05 level

χ^2 - Cumulative Total (STU VS TEA) : 06.9856df:2 TV:5.991 Sig at 0.05 level

It is evident from Table VIII that most of the users (83.10) of PDCE and GKCE feel satisfied with the money paid for photocopying. It is also evident from it that 12.76% of them feel better to supply freely, and 4.14% of them feel excess.

It can also be seen from the table that there is no significant difference in satisfaction between the students and faculty members of PDCE regarding the cost charged for photocopying service. It is evidenced by the Chi-square value, which is not significant at 0.05 level with 2 degrees of freedom. It is obvious from the table that there is no significant difference in satisfaction between the students and faculty members of GKCE regarding the money charged for photocopying service. It is evidenced by the Chi-square value, which is not significant at 0.05level with 2 degrees of freedom. It is cleared from the table that there is no significant difference in satisfaction between the students of PDCE and GKCE regarding the cost charged for photocopying service. It is evidenced by the Chi-square value, which is not significant at 0.05 level with 2 degrees of freedom.

It also further reveals that there is no significant difference in satisfaction between the faculty members of PDCE and GKCE regarding the money charged for photocopying service. It is evidenced by the Chi-square value, which is not significant at 0.05 level with 2 degrees of freedom. It can be noticed from the table that there is a significant difference in satisfaction between the students and faculty members (Cumulative Total) of PDCE and GKCE regarding the money paid for photocopying service. It is evidenced by the Chi-square value, which is significant at 0.05 level with 2 degrees of freedom. It means that the faculty members of both colleges feel satisfied more (90%) than the students (80%).

Maintenance of the library

TABLE IX DISTRIBUTION OF USERS ACCORDING TO THE SATISFACTION WITH THE MAINTENANCE OF THE LIBRARY

Level of Satisfaction	PDCE, Sullurpet			GKCE, Sullurpet			Cumulative Total		Grand Total
	Students	Faculty members	Total	Students	Faculty members	Total	Students	Faculty members	
Satisfied	94 (94)	39 (97.5)	133 (95)	94 (94)	47 (94)	141 (94)	188 (94)	86 (95.56)	274 (94.48)
Not Satisfied	6 (6)	1 (2.5)	7 (5)	6 (6)	3 (6)	9 (6)	12 (6)	4 (4.44)	16 (5.52)
Total	100 (100.00)	40 (100.00)	140 (100.00)	100 (100.00)	50 (100.00)	150 (100.00)	200 (100.00)	90 (100.00)	290 (100.00)

(Note: Numbers in parentheses indicate percentages)

χ^2 - PDCE (STU VS TEA) : 00.7368 df:1 TV:3.841 NS at 0.05 level

χ^2 - GKCE (STU VS TEA) : 00.0000 df:1 TV:3.841 NS at 0.05 level

χ^2 - PDCE VS GKCE (STU VS STU) : 00.0000 df:1 TV:3.841 NS at 0.05 level

χ^2 - PDCE VS GKCE (TEA VS TEA) :00.6410 df:1 TV:3.841 NS at 0.05 level

χ^2 - Cumulative Total (STU VS TEA) : 00.2881 df:1 TV:3.841 NS at 0.05 level

It is evident from table IX that most of the users of PDCE and GKCE satisfied with the maintenance of the library. It is also evident from it that 5.52% of them dissatisfied with the maintenance of the library. It can also be seen from the table that there is no significant difference in satisfaction between the students and faculty members of PDCE regarding the maintenance of the library. It is evidenced by the Chi-square value, which is not significant at 0.05 level with 1 degree of freedom. It is obvious from the table that there is no significant difference in satisfaction between the students and faculty members of GKCE with the maintenance of the library.

It is evidenced by the Chi-square value, which is not significant at 0.05 level with 1 degree of freedom. It is cleared from the table that there is no significant difference in satisfaction between the students of PDCE and GKC regarding the maintenance of the library. It is evidenced by the Chi-square value, which is not significant at 0.05 level with 1 degree of freedom. It also further reveals that there is no significant difference in satisfaction between the faculty members of PDCE and GKCE regarding the maintenance of the library. It is evidenced by the Chi-square value, which is significant at 0.05 level with 1 degree of freedom. It can be noticed from the table that there is no significant difference in satisfaction between the students and faculty members (Cumulative Total) of PDCE regarding the maintenance of the library. It is evidenced by the Chi-square value, which is not significant at 0.05 level with 1 degree of freedom. All the users of

PDCE and GKCE are positively replied that they are satisfied with the ventilation facility, furniture, and electrical fittings in their libraries.

Study hall/cubicles and drinking water facilities

The distribution of users according to their user's satisfaction with study hall/cubicles and drinking water facilities etc.

TABLE X DISTRIBUTION OF USERS ACCORDING TO THE SATISFACTION OF THE USERS WITH THE STUDY HALL/CUBICLES AND DRINKING WATER FACILITIES PROVIDED IN THE LIBRARY

Level of Satisfaction	PDCE, Sullurpet			GKCE, Sullurpet			Cumulative Total		Grand Total
	Students	Faculty members	Total	Students	Faculty members	Total	Students	Faculty members	
Satisfied	74 (74)	33 (82.5)	107 (76.43)	80 (80)	47 (94)	127 (84.67)	154 (77)	80 (88.89)	234 (80.69)
Not Satisfied	26 (26)	7 (17.5)	33 (23.57)	20 (20)	3 (6)	23 (15.33)	46 (23)	10 (11.11)	56 (19.31)
Total	100 (100.00)	40 (100.00)	140 (100.00)	100 (100.00)	50 (100.00)	150 (100.00)	200 (100.00)	90 (100.00)	290 (100.00)

(Note: Numbers in parentheses indicate percentages)

χ^2 - PDCE (STU VS TEA) : 01.14585 df:1 TV:3.841 NS at 0.05 level

χ^2 - GKCE (STU VS TEA) : 05.00325 df:1 TV:3.841Sig at 0.05 level

χ^2 - PDCE VS GKCE (STU VS STU) : 00.01640 df:1 TV:3.841 NS at 0.05 level

χ^2 - PDCE VS GKCE (TEA VS TEA) : 02.97560 df:1 TV:3.841 NS at 0.05 level

χ^2 - Cumulative Total (STU VS TEA) : 05.63500 df:1 TV:3.841Sig at 0.05 level

It is evident from Table X that most of the users (80.69%) of PDCE and GKCE satisfied regarding the study hall/cubicles and drinking water facilities. It is also evident from it that 19.31% of them dissatisfied. It can also be seen from the table that there is no significant difference in satisfaction between the students and faculty members of PDCE regarding the study hall and drinking water facilities provided in the library. It is evidenced by the Chi-square value, which is not significant at 0.05 level with 1degree of freedom. It is obvious from the table that there is a significant difference in satisfaction between the students and faculty members of GKCE regarding the study hall and drinking water facilities in the library. It is evidenced by the Chi-square value, which is significant at 0.05 level with 1 degree of freedom. It means that the faculty members of GKCE satisfied more (94%) than the students (80%) regarding the study hall and drinking water facilities.

It is cleared from the table that there is no significant difference in satisfaction between the students of PDCE and GKCE regarding the study hall and drinking water facilities provided in the library. It is evidenced by the Chi-square value, which is not significant at 0.05 level with 1 degree of freedom. It also further reveals that there is no significant difference in satisfaction between the faculty members of PDCE and GKCE regarding the study hall and drinking water facilities provided in the library.

It is evidenced by the Chi-square value, which is not significant at 0.05 level with 1 degree of freedom. It can be noticed from the table that there is a significant difference between the students and faculty members of PDCE and GKCE regarding the study hall and drinking water facilities provided in the library. It is evidenced by the Chi-square value, which is significant at 0.05 level

with 1 degree of freedom. It means that the faculty members of PDCE and GKCE satisfied more (88.89%) than the students (77%) regarding the study hall and drinking water facilities provided in the library.

Findings of the Study

1. The majority of the users (62.07%) are satisfied with the number of books issued at a time. It is also evident that 37.93% of the users are dissatisfied.
2. Most of the faculty members of PDCE (85%) are satisfied when compared to the students with regard to the number of books issued at a time.
3. Most of the faculty members of GKCE (96%) are satisfied when compared to the students (58%) regarding the number of books issued at a time.
4. The majority of the students of GKCE (58%) are satisfied when compared to the students of PDCE (40%) with regard to the number of books issued at a time.
5. The majority of the users (83.45%) are satisfied with the circulation procedure followed by the library. It is also evident that 16.55% of them are dissatisfied.
6. Most of the students of GKCE (87%) are satisfied when compared to the faculty members (60%) regarding the circulation procedure followed by the library.
7. The majority of the users (76.21%) are satisfied with the loan period followed by the library. It is also evident that 23.79% of them are dissatisfied.

Most of the faculty members of PDCE (87.5%) are satisfied when compared to the students with the loan period followed by the library.

Conclusion and Recommendation

The studies also revealed that the majority of the users are dissatisfied with the number of books issued at a time. Hence, the authorities concerned can increase the number of books issued to the students & faculty members and make necessary provision for issue and return of books on all the working days in a week. Most of the users are not satisfied with the loan period. Hence, the authorities should take necessary steps to increase the loan period and also collect overdue charges from the users if they fail to return the books within the due date.

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Perception of Seeking Information among Students of Hospitality Studies

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Abstract - The study explored the perception of seeking information in students of hospitality studies. The study revealed that, students refer books very frequently to acquire information. In this digital era, though we find a tremendous shift in printing era i. e. print to electronics, students prefer to read print as well as e-resources. Their major source of collecting information is Internet. They can search information from Google efficiently. They use online databases to gather the information. The survey shows that students are seeking information from various subjects for different purposes like Food Production, Food & Beverage Service Techniques & Management used by most of the students for preparing university examination followed by preparation for competitive examinations and selection of career. The study shows that highest numbers of students make use of books, journals display and exhibition services provided by library followed by reading room service. Very frequently the students make use of subject search to collect the information. Maximum number of students feels that librarian should organize training for use of information.

Keywords: Information, Information Seeking Behaviour, Undergraduate students, Hospitality Studies.

Introduction

Information is very important resource without which one can't survive. In each and every stage of life human being requires proper information. Getting right information at right time saves lots of time and energy of human being. This paper tries to find the perceived information seeking among students of hospitality studies.

Problem Statement

Technology has changed the publication environment. Today's world is moving towards electronic version than the print one. Government has also taking initiative in many digital projects and coming up with lot of online resources which are available free of cost like National Digital Library of India, SWAYAM etc.

Considering these developments, the researcher sought to find out the perception of information seeking among students of hospitality studies.

Scope of the Study

This study is limited to the two colleges in Pune offering Bachelor of Hospitality Studies (B.Sc. H.S.) course, namely, M. A. Rangoonwala Institute of Hotel Management and Research, and, Dr. Arvind B. Telang Institute of Hotel Management.

Objectives of the Study

1. To study the Information resources preferred by the students.
2. To understand the purpose of visiting the library.
3. To identify the purpose of seeking information.
4. To know the services and facilities provided by the library.
5. To gather information about the search strategy used by the students.

6. To find out the need of user education programme.
7. To identify the difficulties faced in seeking information.

Methodology

Researcher has used descriptive method for the study and used questionnaire as a tool for collecting the data from respondents.

Population and Sample of the Study

The researcher distributed questionnaire among the entire population (120 students) available across the two institutions. The response rate was 34%.

Information

“Encyclopaedic Dictionary of Library and Information Science” defined information as, “Information is obtained from the processing of data. i.e. information is obtained from the assembly, analysis or summarising of data into a meaningful form.”

According to the Harrod’s librarians’ glossary and reference book, ‘information is an assemblage of data in a comprehensible form, recorded on paper or some other medium, and capable of communication’.

Information Seeking Behaviour

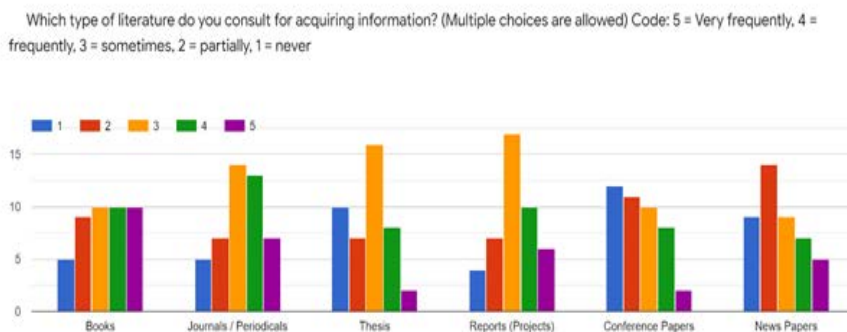
Chen (1982) defines information seeking as ‘the paths pursued by the individual in the attempt to resolve a need’. While Kumar (1986) opines that information seeking behaviour is mainly concerned with who needs what kind of information for what reason; how information is found, evaluated and used.

Literature Review

1. Walker, C. G. (2009) identified the parents of young children’s use and understanding of information while seeking it. Researcher interview 33 parents and come up to conclusion that the parents main source of information seems the trusted peoples in their personal contacts, they prefer to take people’s opinion which comes out through their experiences.
2. Viviers and Calof (2002) studied the information seeking behaviour of South African exporters and found that the most important information for them is related to market access conditions and market intelligence to identify buyers. They also found that publications, customers, suppliers and trade partners were the most important sources of information, while, interpreting the acquired information and finding English language material were the principal problems encountered.
3. Shaheen, Arif and Naqvi (2013) studied the information seeking among women parliamentarians. It was found that the parliamentary research staff was the most favoured contact to get information. Women issues / rights, human / minority rights, foreign affairs, etc. Were the subjects on which information was sought, particularly for debates, speeches and responding to inquiries. The National assembly library was the preferred source of information. The respondents were satisfied with the library staff for their cooperation and help.
4. Clark (2014) explored in his study the information seeking experiences of mature students. According to the researcher practitioners can guide students more effectively by identifying their emotions of information seeking, mediators’ influence on them and the practical constraints. This research provides the guidance to the librarians with more effective strategies for teaching mature students to navigate the information.

5. Niemand (2010) found that majority of the respondents at the Hacettepe University, Ankara, Turkey, need information for their research and course work. Around 40% respondents use internet as the primary source of information, while majority of the respondents prefer information in electronic format.
6. Talip (2015) studied information seeking behaviour of IT professionals who use Twitter for professional purposes by gathering data through online observation and interview. The findings of the study were categorized into 5 themes – information sharing behaviour, social and professional networking, online identity, image, profile, presence, development of weak-tie to strong-tie relationship and relationship between professional networking and information transfer.
7. Fatima and Ahmad (2008) surveyed the students at Ajmal Tibbiya College by circulating a questionnaire to find the purpose, awareness about and usage of library resources, and most chosen information sources, their usefulness and sufficiency. It was found that the student users needed assistance in using the library resources and services, textbooks and journals were the most preferred information sources.
8. Singh and Satija (2007) used a structured questionnaire to study the information seeking behaviour of agricultural scientists with particular reference to their information seeking strategies. They found that the agricultural scientists greatly depend on their institutional library and information centres to fulfil their information needs, followed by their personal collection as well as that of their supervisors and colleagues. And, journals are the preferred source to keep up-to-date professionally.
9. Kumar, Satish (2011) discovered the strategies of information seeking by life scientists, information sources referred by them and the problems faced by them. Researcher used structured questionnaire to collect the data.
10. It seemed that most of the scientists are depend on library as their first preference to collect the required information. Scientist gave first rank for journals as a preferred information resource. Life scientist pointed out the necessity of professional library staff to solve their problems in seeking information and to serve them better.
11. Bilawar and Pujar (2016) studied the impact of e-information literacy on information seeking behavior of university teachers. They also reviewed the need of guidance to seek the pinpointed information and highlighted that the teachers can able to search the e-resources in much better after undergoing the training for user education.

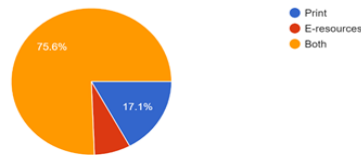
Consultation of Literature to Acquire Information



It is found that books are most preferred source of information with the students using them frequently to very frequently. The students also use journals / periodicals, reports(projects) to acquire information. While the conference papers are seldom used by the students.

Preference given to the form of literature

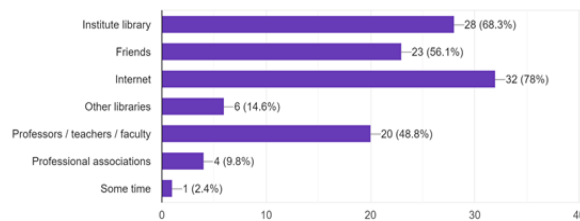
Which form of literature / information source do you prefer?



It is found that a vast majority of students (75.6%) make use of either forms (print and electronic) of resources. This indicates that the print resources are still preferred and not relegated.

Sources of information

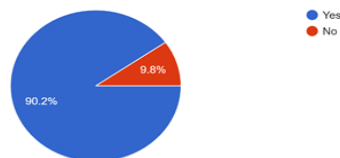
From where do you collect the required information? (Multiple choices are allowed)



Maximum number of students has given preference to internet to collect the required information followed by institute library, friends, Professors / Teachers / Faculty and other libraries. Students are friendlier in handling mobile. Internet connection is easily accessible in their mobiles, so students make use of it easily.

Purpose of visiting the library

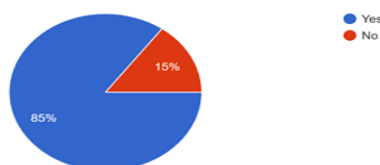
Can you search information from Google efficiently?



The graph shows that 90.2% of the students are efficient in using Google. Today's generation is fast forwarder in using the technology powerfully. It seems that the technology is easily accessible to them.

Use of online databases

Are you using online databases for gathering information?



Most of the students are using online databases it is really a good sign of using the technology for the upcoming and betterment.

Purpose of visiting the library

Purpose of visiting the library	Always	%	Frequently	%	Rarely	%	Never	%
Issue / return / reservation of reading material	16	40	10	24	10	24	5	12
Books	21	51	13	32	5	12	2	5
Journals	15	37	17	41	2	5	7	17
Theses	8	19	13	32	11	27	9	22
Project Reports	11	27	11	27	14	34	5	12
Newspapers	6	15	14	34	13	32	8	19
To access e-resources	9	22	17	41	9	22	6	15
Browsing / Navigation internet	11	27	11	27	9	22	10	24
To prepare Home work / notes / assignments/project work etc.	14	34	12	29	8	20	7	17
Inter Library Loan demand	5	12	10	24	13	32	13	32
Photocopy	7	17	10	24	9	22	15	37
General Reading Purpose	11	27	15	37	7	17	8	19
Reference literature consultation	8	20	19	46	7	17	7	17
Updating information on subjects / projects	12	29	13	32	9	22	7	17
For publications	7	17	16	39	7	17	11	27
Preparing for various competitions	8	19	15	37	9	22	9	22

Greater number of students are always visiting the library for circulation i. e. issue and return of books and reserving the reading material. The study shows that the students are always visiting the library for referring the books, frequently for journals and thesis. They rarely visit the library for referring project reports.

Students frequently use the library for referring the newspapers to access e-resources, to browse the internet and to prepare home work, notes, assignments, project work etc. Students rarely make use of library for inter library loan facility. They don't make use of photocopy facility in the library. Users frequently use the library for general reading purpose, updating information on their subjects and projects, for consultation of reference literature, for publications and for preparing for various competitions.

Purpose of seeking information in terms of particular subject area

The students primarily seek information for preparation of university exams of various subjects such as Food Production, Food & Beverage Service Techniques & management, Accommodation, Operations techniques, etc.

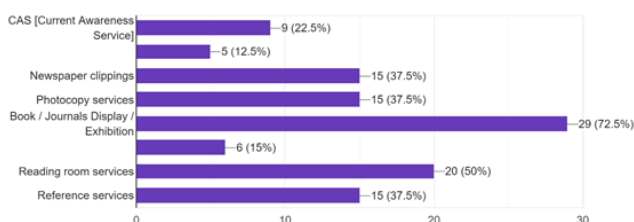
Purpose to seek information on particular subject area	Preparation for university exams	Preparation for competitive exams	Selection of career
Food production	30	12	12
Food & Beverage Service Techniques and Management	30	13	13
Accommodation Operations techniques and Management	32	12	8
Hotel Accounting Procedures	36	9	3
Hospitality Marketing Management	31	12	7
Hotel Law Practices	33	9	6
International Cuisine	29	10	11
Total Quality Management	28	11	9
Human Resource Management	28	12	10
Entrepreneurship Development	28	10	10

Information sources used to get information from library

Information sources used to get information from library	Always	Frequently	Rarely	Never
Books	29	6	4	2
Journals	25	7	5	4
Dictionaries and Encyclopedia	17	11	5	8
Dissertations / Theses	7	14	12	8
Biographies, autobiographies	9	14	6	12
Government documents, statistical data, research reports	8	19	6	8
indexing sources	10	15	6	10
Abstracting sources	7	17	6	10
Audio / visual literature	15	8	10	8
Databases	14	13	9	5
Newspapers	12	13	7	9
E-resources	16	10	8	7
Internet	19	9	7	6

Usage of library services

Which of the following services do you use provided by libraries? (Multiple choices are allowed)



The study shows that highest numbers of students make use of books, journals display and exhibition services provided by library followed by reading room service. It gives the impression that the students are using the library optimum.

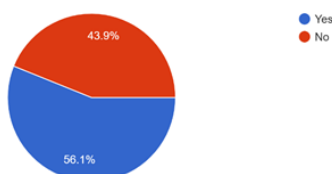
Preference given while searching the information

Preference for types of search	5 = Very Frequently	4 = Frequently	3 = Sometimes	2 = Partially	1 = Never
Author search	10	10	8	8	6
Title search	7	11	7	8	10
Subject Search	7	7	5	10	13
Key word search	6	10	9	9	8
Year wise search	6	12	12	5	8
Boolean search or combination search [AND, NOT, OR]	7	12	11	8	3

Methods used by the users to search the information: Most of the students prefer the search by subject followed by title, author, key word, Boolean and year wise search. They also use multiple search options to find out requisite information.

Need of user education programme

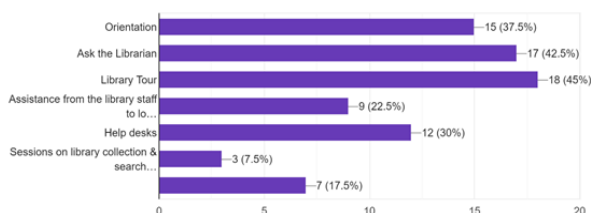
Do you feel that Library / Librarian should organize training for use of information?



Majority respondents feel the need for training in use of information. The organization of training programmes for students would lead to better use of library resources and facilities.

Preference given by the students to different kind of assistance to be provided for using the library more effectively

What type of assistance you will prefer from the librarian to use the library more effectively?
(Multiple choices are allowed)



Most of the students gave preference for library tour to assist in using the library more effectively followed by ask the librarian, library orientation, help desks, assistance from the library staff,

conduct webinars on relevant databases and sessions of library collection and search strategies to locate the resources.

Difficulties faced while seeking information

Difficulties faced while seeking information	Strongly Agree	Agree	Neutral	Disagree	Strongly disagree
Information explosion	12	13	12	2	2
Information scattered in many sources	14	14	11	1	1
Find mostly irrelevant information on the web	11	10	19	0	1
Authenticity & Reliability of websites	8	12	17	4	0
Lack of searching skills / tools like OPAC, Index, Bibliographies, Guides etc.	12	10	12	3	4
Lack of awareness about using searching tools	10	12	10	5	4
Lack of knowledge of search strategy	11	10	12	5	3
Inadequate availability of information sources in the library	11	7	15	3	5
Lack of supportive infrastructure	14	6	12	2	7

Most respondents feel that lack of supportive infrastructure is the major difficulty while seeking information. Information explosion, scattering of information and lack of awareness in using searching tools are the other difficulties encountered while seeking information.

Conclusion and Findings

The study explains that students are seeking information from various subjects for different purposes like Food Production, Food & Beverage Service Techniques & Management. These subjects are used by most of the students for preparing university examination followed by preparation for competitive examinations and selection of career. The study shows that highest numbers of students make use of books, journals display and exhibition services provided by library followed by reading room service. Very frequently the students make use of subject search to collect the information. Maximum number of students feels that librarian should organize training for use of information.

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Research Trends in Library and Information Science in North-Eastern Region of India during 2000-2018: A Bibliometric Study

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Abstract - This study is a bibliometric study of eighty-nine (89) awarded doctoral theses by four (4) central universities in the North Eastern Region of India. The theses are collected from the studied university libraries as well as retrieved from Shodhganga. The research community most sought research subject is 'Information System' with twenty-two (22) awarded doctoral theses, follows by 'Information Literacy' twelve (12) theses. There are forty-six (46) (51.685%) theses having appended references in their chapters and forty-three theses (43) (48.314%) having just a bibliography.

Keywords: Bibliometric, North Eastern Region, Central Universities, Doctoral Theses, Year, Subjects, References.

Introduction

One of the growing areas of research in the discipline of library science that is gaining currency is bibliometric study. The term 'bibliometric' was derived from the Greek words 'biblion' which means book and 'metron' which means measure. The anglicised term 'Bibliometric' was first used by Paul Otlet in 1934 and popularised by Alan Pritchard in 1969 and defined as 'the application of mathematical and statistical methods to books and other media of communication' (Thompson & Walker, 2015; Deshmukh, 2019). In other words, a quantitative analysis of publications (Sellen, 1999) to identify and ascertain desired objectives is bibliometrics. However, the concept of quantifying varied types of documents systematically using scientific tools and techniques has begun much earlier. The pioneer groundwork for this mathematical and statistical study of documents was done by F.B.F Campbell in 1896, F.J Coles and N.B Eales in 1917, E.W Hulme in 1923, A.J Lotka in 1926, (Hood & Wilson, 2001; Thompson & Walker, 2015). The advancement and usage of tools of Information, Communication, and Technology (ICT), like computing power and software applications, has profoundly impacted this bibliographic study in nature, scope, and sophistication (Pendlebury, 2010).

The Discipline of Library Science in North-Eastern Region of India

North Eastern Region of India (NER) constitutes (eight) 8 states, namely Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, and Tripura. Out of the eight states, only three states namely Manipur, Mizoram, and Arunachal Pradesh have passed the Public Libraries Act in 1988, 1993, and 2009, respectively, though its implementations are lacking. Gauhati University is the first university to commence the department in 1966 followed by North Eastern Hill University (NEHU) in 1985, Manipur University in 1986, Mizoram University in 2002, and Assam University in 2009 (Lalrempuii, Ngurtinkhuma & Mishra, 2019).

In the region, there are five (5) central universities offering library science courses from certificate-level to Ph.D. levels and at least two (2) state universities, Gauhati University and Dibrugarh University. Some of the library associations in the region are Assam Library Association (estb.1938), Assam College Librarians' Association (estb.1973), Manipur Library Association (MALA) (estb.1987) amongst others (Sinha, 2016)

Limitations

The study is limited to four (4) central universities which provide Ph.D. courses and already awarded at least one Ph.D. degree in library science in the North Eastern Region of India. The names of the 4 central universities are Assam University (AU), Manipur University (MU), Mizoram University (MZU), and North Eastern Hill University (NEHU). The studied period is 2000-2018. Eighty-nine (89) doctoral theses awarded by the studied universities in the field of library science are considered for the bibliometric study. They are taken from libraries of the universities as well as retrieved from Shodhganga.

Objectives of the Study

1. Subject-wise share of awarded theses.
2. Nature of references appended to the awarded theses.

Background Study

The course offered in library science in the North East Region (NER) of India is mostly a two-year integrated master's degree (Panigrahi, 2010; Phuritsabam, Devi & Sagolsem, 2013). The quality of education and research work can be traced by the publications and citations of research works. Especially during the last one or two decades, publications and citations in the discipline of library science India in general and NER, in particular, indicated positive trends (Sahu & Parabhoi, 2020). Singh and Jassal (2018), by studying the publications in PLANNER "Promotion of Planning for Library Automation and Networking in North Eastern Region", had found that Gauhati University was the most productive university, followed by Manipur University, then Assam University, and so on; and most productive authors were Th Madhuri Devi, T. A. V. Murthy, and Ch. Ibohal Singh amongst others (Waghmode & Kulkarni, 2017; Lalrempuii, Ngurtinkhuma & Mishra, 2019).

Mittal (2011) found that the research trends in NER focused on traditional topics such as libraries, library collection, library practice amongst others. Also emerging topics like library technology, information technology, bibliometrics/scientometrics, digital library, networks, world wide web, information-seeking behaviour, online database, electronic publishing, knowledge management, etc were gaining grounds in library science research NER too (Nongrang & Tariatang, 2013; Nongrang & Laloo, 2016). There was an increasing trend of authorship collaboration amongst authors while authoring papers in the discipline of library science (Nongrang, K. (2015). Most of the sources referred to while doing research works were literature from journals, followed by books or book chapters. Also, there was an upsurge in the usage of the web or digital resources (Shukla, Singh & Verma, 2019).

Findings with Tables and Graphs

From Table I and Figure 1, the most sought research subject is 'Information System' with twenty-two (22) awarded doctoral theses under its broad theme.

The next interest subjects are 'Information Literacy' and 'Academic libraries' with twelve (12) and ten (10) awarded doctoral theses, respectively. Modest interesting subjects are 'Information Seeking Behaviour' and 'Library Professionals' with eight (8) theses each, then 'Information Communication and Technology' 'Knowledge Management' and 'Usage of E-Resources' each has six (6) awarded theses. The least research subjects with only one awarded doctoral thesis include 'Digital Libraries', 'Library Economics', 'Information Needs' amongst others.

TABLE I SUBJECT-WISE SHARE OF AWARDED THESES

Subject-Wise Shares of Theses		
Sl. No.	Subject	No. of Theses
1	Academic Libraries	10
2	Bibliometric Study	5
3	Digital Libraries	1
4	Information Communication and Technology	6
5	Information Literacy	12
6	Information Needs	1
7	Information Retrieval Tools	1
8	Information Seeking Behaviour	8
9	Information System	22
10	Knowledge Management	6
11	Library and Information Services	1
12	Library Automation	1
13	Library Economics	1
14	Library Professionals	8
15	Usage of E-Resources	6
	Total	89

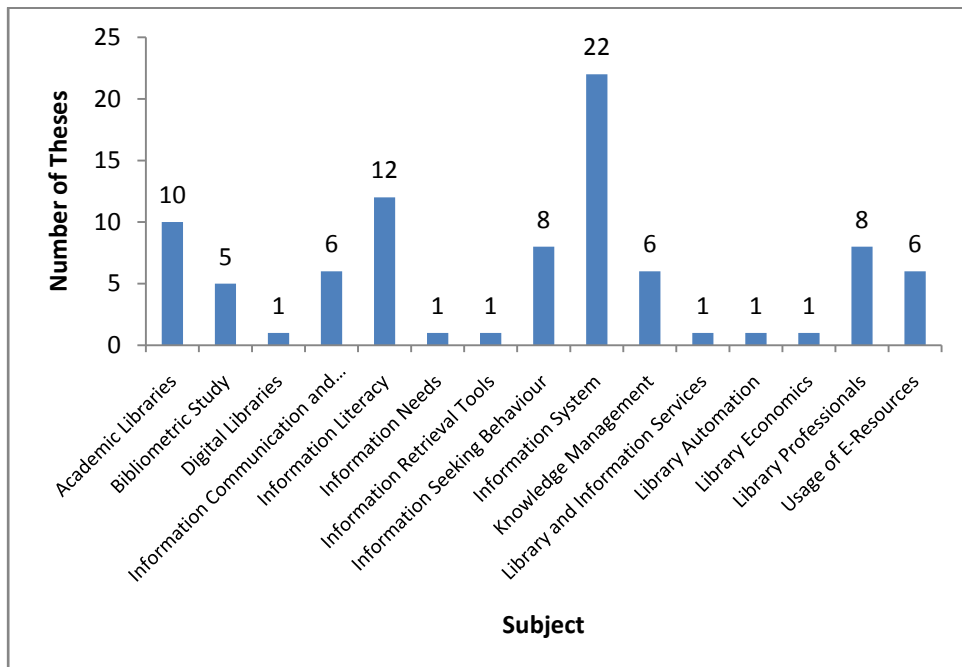


Fig. 1 Subject-wise shares of Theses

TABLE II NATURE OF REFERENCES APPENDED TO THE AWARDED THESES

Nature of References				
Sl. No.	Name of	Number of Theses		Sub Total
	University	Chapter-Reference	No Chapter-Reference	
1	AU	1	9	10
2	MU	21	3	24
3	MZU	20	3	23
4	NEHU	4	28	32
Grand Total		46 (51.685%)	43 (48.314%)	89 (100.00%)

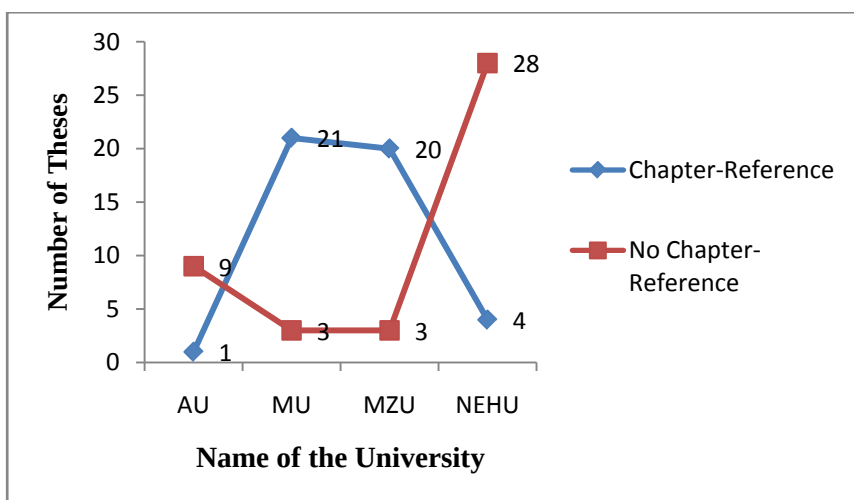


Fig. 2 Nature of References

Table II and Figure 2, shows in the case of Assam University (AU), nine (9) out of ten (10) theses no chapter-wise references. For Manipur University (MU), an overwhelming twenty-one (21) theses out of twenty-four (24) theses have references appended at the end of their chapters.

The same is true with Mizoram University (MZU) in which out of twenty-three (23) theses, twenty (20) of them are appended with chapter-references. While in the case of North-Eastern Hill University (NEHU), nature is the opposite in which twenty-eight (28) out of thirty-two (32) awarded doctoral theses have no chapter-wise references but only bibliography each. On the whole, the number is almost the same wherein forty-six (46) (51.685%) theses have appended references in their chapters and forty-three theses (43) (48.314%) have just a bibliography each, which means no chapter-wise references.

Conclusion

So, library science research in and in the North Eastern Region of India is every dynamic and encouraging. It is dynamic because areas of research interests are varied and encompassing concerning the discipline of library science. It is encouraging because there is a significant increase in publications and citations of research works by the library science community in the region.

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Information Seeking Behaviour in Electronic Environment: A Study of Engineering College Users in West Bengal

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Abstract - *This Research is concerned with the “Information seeking behaviour in Electronic Environment: A Study of Engineering Colleges Users in West Bengal. This analysis is based on the data collected through questionnaire from User’s of the Engineering College of West Bengal. However, this research has also done collection of data for the effective analysis and interpretation by using the required tools and techniques. Moreover, data are using the questionnaire from 3468 Respondents in Engineering Colleges of West Bengal.*

Keywords: *Information Seeking Behaviour, Electronic Environment, Engineering College.*

Introduction

The most important purpose of any library is to make accessible an efficient arrangement of print, non-print, and electronic resources to the users to meet their information requirements thoroughly. It is a fact that the information resources accessible in libraries be used systematically and thoroughly wherein educate the users from time to time is an important activity. Out of all, electronic resources are in performance an important role in information dissemination in up to date librarianship. Therefore, there is required to create a separate electronic resources collection Development policy to access, interface, technical support, and licensing. The growth of electronic resources is also in multifold. The policies would help the Librarians decide on such electronic resources that would be easily accessible and have no licensing problems etc.

An e-resource is a material that requires computer intervention in terms of accessing the content as well as making this useful. Both the online along with off-line resources like CD ROMs are considered as the scope of resources from side to side a computer network. Along with this, the electronic resources familiar as online information resources covering bibliographic databases, electronic reference books, search engines for full-text books, and digital collections of data. They have both the born digital materials that have been produced by online directly. For example, E-journals, print resources and data bases have been digitised and screened. The libraries have not owned electronic journals such as online databases, e-journals as they have their own materials. The “Rights of electronic resources” lie with providers of the resources. Via internet, the electronic resources can be accessed and it can be accessible through fee. As example, magazines, newspaper, articles, journals, and encyclopaedia are mentioned as E-resources. The internet accessible resources can be accessed by such devices like tables, computers and smart phones etc. E-Resources are quickly replacing print resources as the largest consumer of the library and information center. It is compulsory to estimate the usage of electronic resources and integrate the results into their decision making regarding the resource.

Information Seeking Behaviour

Behaviour associated with the accumulation of knowledge is a preferred subject of research by Library and Information Science. Behaviour of gaining knowledge is an important part of user studies which studies the causal relationship between the user of information and the information system. The information seeking behaviour consists of a set of action plans that involves an individual that is taken while expressing information, seeking pertinent information, selection and

evaluation and selection of required information which is used to satisfy their informational needs. It has been observed that for requiring and analysing the new information the individual has to interact with different individuals, analogue tools and computer technology based information systems.

Review of Literature

Information Seeking Behaviour

As per the views of Wilson T.D. (2000), there are many factors that may influence the behaviour of an individual and group while collecting pertinent information. Information seeking behaviour involves personal reasons for seeking information, the kinds of information which are being sought, and the ways and sources with which needed information is being sought (Leckie, Pettigrew & Sylvain, 1996)². Behaviour associated with the accumulation of information is mainly highlighted using different factors. It is enacted through different printed material for the purpose of conducting the experiments as well as other research. Different scholars as well as young people utilise different online media. Abels, (2004) evaluated that the rate of the use of online platform in the year 1998-2000 has enhanced. Different monographs have also enhanced.

Information seeking behaviour is expressed in various forms, from reading printed material to research and experimentation. Scholars, students and faculties actively seek current and more currently, electronic media. Abels, (2004) has mentioned that the frequency of use of Internet in 1998-2000 had greatly increased. At the same time, expenditures on monographs showed steady increase. Moreover, it has been observed that the information seeking (IS) behaviour varies from person to person and the actual information needs. As per the views of Krikelas J, (1981), the relative concept in the mind of the individual has been described as the recognition of the existence of uncertainty.

Use of E-Resources

1. Asemi and Riyahiniya⁵ conducted a survey on usage of digital resources and awareness in the libraries of Isfahan University related to medical science in Iran. As a result, 70% of the entire students of the university are aware of the availability of digital resources in the databases of this university. In this context, 87.2% of the students realise that the availability of the digital resources are precious to provide essential information to them. On a similar note, the authors have concluded that the users of digital library can face several problems such as a lack of improper hardware facilities and low-speed connectivity.
2. Beard, Dale and Hutchins⁶ brought following significant findings: There was considerable growth in the usage of digital resources by the students of the Institute of Health and Community studies. In this context, the usage of digital resources is more by the students of electronics and computer science and communication. This is relevant by nearly three fourth of the participants. The staffs of the School of Conservation Sciences was 75% in number as well as the staff of School of design, Engineering and Computing are 53% in number in terms of the usage of e-resources.

Electronic Library Use

1. It has been seen that Appleton has implemented a case study to explore sharing their experiment with their staff and students for encouraging three separate education colleges by using the Electronic Library Resources. However, the finding of the case study has put an emphasis on using it to various colleges in the Merseyside area of the U.K. Moreover, it has resulted in sharing the valuable conclusions: Electronic Library Resources has a great

scope in future learning and study for programmers; it is also valuable for the students to gain knowledge and education regarding it. The last conclusion is very valuable; it conveys that ELR may be appropriately used for enhancing learning and practices for having better tutorial and educational tutors. However, it is the responsibility of the library staff and teaching staff to ensure that ELR should be taught effectively.

2. It has been observed that the use of digital library services has been increasing based on a case study performed by Kumar and Reddy on 3117 users of NIT library, Warangal.

Selection of Electronic Resources

Referred to the Article of “*Electronic Resources and Academic Libraries, 1980-2000*”, given by Miller, (2000), has described effectively the proper use of collection of pertinent data from the electronic environment. Moreover, it has been observed that over the last twenty years there are dramatic changes within the academic collection development specialist which lead to spreading awareness in the aspects of growth in the electronic environment because of its decreasing purchasing power. However, the management has made necessary changes to meet the changes by adopting revised criteria for choosing the raw materials for the new product development.

As per the views of Davis, (2001), the selection of electronic resources in the libraries consists of two levels, namely, Content and the Presentation and Format. There are many factors that should be considered while selecting electronic resources. Further, along with the presentation and content the infrastructure access method should be taken in consideration. However, it has been observed that prior to making changes in the electronic resource it is crucial to make proper understanding in the required technology. Moreover, the content of the electronic resources is also an important part in its collection development for the required acquisition. Similarly, it has been advised by the respective author to consider the factors such as methods, licensing, limitations, user capability, restrictions, archiving facilities and the contractual obligations.

Objectives of the Study

The objectives of this study are as follows.

1. To examine the types of information sources consulted by users in engineering college of West Bengal.
2. To determine the frequency of using the pertinent information by engineering users.
3. To highlight the purpose and the background of information seeking in the Engineering College user, West Bengal.

Delimitation of the Study (Scope)

This research study highlights the ways to identify the growth and availability of the electronic resource. Moreover, it will also help to study and to adequately use it in the engineering colleges of West Bengal. Availability has to be exploited optimally by the libraries for the benefit of the users. The study needs to be made to assess the provisions made by these colleges to provide access to these e-resources. It is also essential to study their impact on information service to the users to fulfil their needs. While studying the use it is also essential to understand and make plans for optimum use of these resources. The use also depends on many things like needed training for librarians, availability of infrastructure. As part of the access provided the necessary facilities have to be made.

The topic of the research study is “Information seeking behaviour in Electronic Environment: A Study of Engineering Colleges Users in West Bengal.” to collect for this study, faculty members, research scholars, and Engineering College Users of West Bengal. The area of the study focused

on approximately One Hundred Twenty Engineering Colleges of West Bengal. The geographical area of this study is confined only to West Bengal Engineering colleges. This particular study highlights the key importance and the behaviour of information seeking in the electronic environment centres of West Bengal mainly the Engineering College of West Bengal.

Research Methods and Methodology

It has been seen that research methods are crucial for collecting and analysing the pertinent data and information which aims an important function in the economy. Moreover, a design is said to be good and preferable when it is flexible, appropriate, efficient and economical which aims to eliminate the bias and promote the reliability and authenticity of the collected data. The collected data in the for the respective study has been gathered from the different engineering college users from West Bengal and library while the users are the faculty members, professors, students as well as the scholar of different college. The collection of data in this particular study focuses on the both primary as well as the secondary method of data collection from the users of different engineering colleges of West Bengal. However, an organized questionnaire has been presented in the process of collection of relevant data.

The personal interview has been taken of the faculty members, professor, students and the scholar for taking direct personal investigation in various engineering colleges' libraries of the academic institution and its users. Moreover, various articles, journals, textbooks, magazines and college websites are also referred for collecting the secondary method of the data collection. Similarly, random sampling techniques have been proposed while collection of required data from the faculty members, professors, students as well as the scholars of Engineering College Libraries and Engineering College Users.

The aspects of the questionnaire have been designed in an appropriate and relevant method to cover the overall aspect of the context of the subject matter. The questionnaires are sent to various engineering institutions and its users in West Bengal. Unfortunately, within one month of sending the questionnaire it has not responded to it. However, frequent reminders were given and sending of responses is also pursued. Eventually, 66 engineering colleges responded to the questionnaire and 3468 responses of the questionnaire were duly received as per the provided information. Further, the questionnaires are analysed and evaluated in a tabular form to retrieve the overall findings and conclusion from it.

Findings of the Study

TABLE I COLLECTION OF RESPONSES ON THE DEMOGRAPHIC FACTORS

Sl. No.	Demographic factors	Responses from book room	Percentage
1	Male	2148	32.54 %
2	Female	1320	20 %
	Total	3468	52.54 %

Table I reveals that the Engineering College Libraries Out of the 66 Engineering College Libraries respondents The Gender-wise distribution of the overall respondents reveals that, considering their gender, majority are Male 2148(32.54%) as female populace consists of 1320(20%) only.

TABLE II RESPONDENTS POSITION

Sl. No.	Respondents Position	Library Respondents	Percentage
1	Professor	156	0.044
2	Asso. Professor	264	7.61
3	Asst. Professor	320	9.22
4	Student (UG)	2000	57.67
5	Student (PG)	728	20.99
	Total	3468	100

The Table II shows the designations of respondents, which are formal in higher and professional education and from the above table, it can be seen that out of 3468 respondents 156(0.044%) are Professor, 264(7.61%) are Asso. Professor, 320(9.22%) are Asst. Professor, 2000(57.67%) are Students (UG), 728(20.99%) are Students (P.G.).

E-Resources Use in the Engineering College Library

TABLE III FREQUENCY OF VISITS TO THE LIBRARY TO ACCESS E-RESOURCES

Sl. No.	Option	No. of users	Percentage
1	Daily	2226	64.18 %
2	Twice a week	330	9.51 %
3	Weekly	448	12.92%
4	Fortnightly	168	4.84%
5	Monthly	196	5.65 %
6	Occasionally	100	2.90 %
	Total	3468	100

Table III is clear that 2426 (64.18%) out of 3468 respondents visit their college library daily to access to E-Resources, 330 (9.51%) visit their library Twice a week, 448 (12.92%) visit their library weekly, 168 (4.84%) visit their library fortnightly, 196 (5.65%) visit their library monthly and 100 (2.90%) visit their library occasionally when need arises to access E- Resources from the Library.

TABLE IV AVERAGE TIMES SPENT IN USING THE LIBRARY E-RESOURCES

Sl. No.	Time spent in the Library	No. of users	Percentage
1	One Hour	1725	49.74 %
2	Two Hour	1328	38.29 %
3	More than Two Hours	415	11.96%
	Total	3468	100

It is clear from the Table IV that 1725 (49.74 %) out of 3468 respondents spent only one hour in their library to use resources and it might be presumed to browse and scan the reading materials only. It is found that 1328(38.29%) and 415 (11.96 %) spent Two hour and more than Two Hour in using E-Resources in their college Library.

TABLE V LEVEL OF AWARENESS OF USING E-RESOURCES

Sl. No.	Option	No. of users	Percentage
1	Excellent	1459	42.07 %
2	Good	1195	34.45 %
3	Fair	473	13.63%
4	Poor	194	5.60%
5	Very Poor	147	4.25 %
	Total	3468	100

Table V indicates the Level of awareness of using E-Resources towards Library Users among the 1459 (42.07%) Respondents Level of Awareness is Excellent, 1195 (34.45%) Respondents Level of Awareness is Good, 473 (13.63 %) Respondents Level of Awareness is Fair, 194 (5.60 %) Respondents Level of Awareness is Poor and 147 (4.25 %) Respondents Level of Awareness is very poor related to using E-Resources from Engineering College Library in West Bengal.

TABLE VI AWARE ABOUT E-RESOURCES

Sl. No.	Option	No. Of users	Percentage
1	Yes	2961	85.38%
2	No	507	14.61%
	Total	3468	100

Table VI indicates the aware about E-Resources towards Library Users among the 2961 (85.38%) Respondents Aware about E-Resources from Engineering College Library in West Bengal and 507 (14.61%) Respondents are not aware about E-Resources.

TABLE VII SEARCH INTERFACES USED BY RESPONDENTS TO LOCATE E- RESOURCES

Sl. No.	Option	No. of Users	Percentage
1	Search Engines	119	3.44%
2	Library Website	2725	78.57 %
3	Have information on all useful sites	624	17.99%
	Total	3468	100

It can be seen from the above Table No. VII that 119 (3.44%) respondents working and study in engineering college under the study area use search engines to locate E-Resources, while 2725 (78.57%) use library websites and 624 (17.99%) Respondents use other useful sites to locate E-Resources. The respondents are either not familiar with search formulations or other alternative search methods.

TABLE VIII PLACES FOR USE OF E-RESOURCES

Sl. No.	Option	No. of Users	Percentage
1	Department	188	5.42 %
2	Library	530	15.28 %
3	Home	1250	36.04 %
4	Hostel	1130	32.58 %
5	R&D Centre	200	5.76 %
6	Browsing Centre	150	4.32%
7	Any Other	20	0.57 %
	Total	3468	100%

Table VIII reveals that about 188 (5.42%) respondents using Search E- Resource in Department, 530(15.28%) respondents using Search E- Resource in Library, 1250 (36.04%) respondents using Search E- Resource in Home, 1130 (32.58%) respondents using Search E- Resource in Hostel, 200 (5.76%) respondents using Search E- Resource in R&D Centre, 150 (4.32%) respondents using Search E-Resources in Browsing Centre and 20 (0.57%) respondents using Search E- Resource any other.

TABLE IX AWARENESS ABOUT THEIR LIBRARY SUBSCRIBING FOR E-RESOURCES PORTAL

Sl. No.	Option	No. of Users	Percentage
1	Yes	2760	79.58 %
2	No	708	20.42 %
	Total	3468	100

It is found that Table XI 2760(79.58%) out of 3468 respondents are aware that their college library subscribes for E-Resources portal while 708 (20.42%) Respondents are not aware that their college library is subscribing for E-Resources portal. It is quite encouraging and satisfactory.

TABLE X KEEP ABREAST OF CURRENT DEVELOPMENTS IN ENGINEERING FIELD

Sl. No.	Option	No. of Users	Percentage
1	Referring to current issues of journals	1040	30.00%
2	Referring abstracting/ Indexing journals	590	17.03%
3	Personal communication (with Staff and colleagues)	740	21.33 %
4	Attending Conferences/ Seminars/ Workshops	551	15.88%
5	Subscribing to Electronic Discussion Group	435	12.54%
6.	Other	112	3.22%
	Total	3468	100

The above Table X depicts that 1040 (30.00%) out of the 3468 respondents working as teachers and research students from mechanical college of the study region, i.e. West Bengal, of Engineering college refer to different articles for following the current trend in their fields.

The next method is referring abstracting/ Indexing journals 590(17.03%) respondents, 740(21.33%) use personal communication, and the remaining, 551(15.88%) attending Conference/Seminar/ Workshop, 435(12.54%) use subscribing to Electronic discussion and 112 (3.22%) use other services to keep abreast of current developments in their fields.

TABLE XI PURPOSE USE E-RESOURCES IN ENGINEERING LIBRARY

Sl. No.	Option	No. of Users	Percentage
1	Studying	1441	41.55 %
2	Publishing Research Article	560	16.15 %
3	Research/Project	652	18.80 %
4	Exchange of Idea	225	6.50 %
5	Teaching/Guide	269	7.75 %
6	Other	321	9.25 %
	Total	3468	100 %

Every student has different purpose of using E-Resources, Table XI highlights the major purpose of using E-Resources, Respondents have to Study for their daily informational needs so a ratio of 1441 (41.55%) use E- Resources for Studying, 560 (16.15%) use E- Resources for Publishing Research Article and among which 652 (18.80%) respondents are involved in research, Project, 225(6.50%) respondents use E-Resources Exchange of Idea, 269(7.75%) respondents use E-Resources Teaching /Guide and 321(9.25%) respondents use E-Resources any other purpose.

TABLE XII TYPES OF E-RESOURCES USE IN ENGINEERING LIBRARY

Sl. No.	Option	No. of Users	Percentage
1	Website	679	19.57 %
2	E-Journal	551	15.88 %
3	E-Books	726	20.93%
4	Online database	1125	32.43%
5	CD-ROM Database	143	4.13%
6	OPAC	94	2.71 %
7	Other	150	4.35 %
	Total	3468	100

Students use different type of Electronic Resources (ER) to satisfy their Informational needs, from which according to Table XII a large ratio 1125 (32.43%) of respondents use Online Database, 679 (19.57%) respondents use Website, 551 (15.88%) respondents use E-Journal, 726(20.93%) respondents use E-Books, 143(4.13%) respondents use CD-ROM Database, 94(2.71%) respondents use OPAC and 150 (4.35 %) respondents use other Type of E-Resources.

TABLE XIII METHOD ACCESS THE E-RESOURCES

Sl. No.	Option	No. of Users	Percentage
1	Trial and error method	472	13.62 %
2	Suggestions from friend and colleagues	1370	39.50 %
3	Guidance from the Library Staff	467	13.46 %
4	Self-instructions	389	11.22 %
5	Attending Workshop, Training Programs	470	13.55 %
6	Other	300	8.65%
	Total	3468	100

It can be seen from the above Table XIII that 472(13.62%) out of 3468 respondents access E-Resources by Trial and error method, 1370 (39.50%) respondents take suggestions from friends and colleagues to access E-Resources, 467(13.46%) respondents take the help and guidance from the Library staff to access E-Resources, 389(11.22%) respondents self-instructions to access E-Resources, 470(13.55%) respondents have learnt from training programmes and workshops, while 300(8.65%) respondents use other methods to access E-Resources.

TABLE XIV PREFERENCE TO READ THE RETRIEVED INFORMATION (EX. JOURNAL/ARTICLE)

Sl. No.	Option	No. of User	Percentage
1	Print (Hard Copy) only	1150	33.16 %
2	Electronic (Computer) only	1045	30.14 %
3	Both	1273	36.70 %
	Total	3468	100

It can be observed from the Table XIV that 1150 (33.16%) out of 3468 respondents prefer to read print and 1045(30.14%) respondents prefer to read only the electronic version and 1273(36.70%) respondents prefer to read both print as well as the electronic sources of information retrieved.

TABLE XV PROBLEMS FACED WHILE ACCESSING THE E-RESOURCES

Sl. No.	Option	No. of Users	Percentage
1	Lack of availability of computer terminals	292	8.41%
2	Reduction of knowledge for using online platform	1799	51.88%
3	Lack of self-helping guides	677	19.54 %
4	Lack of support from the Library Staff	455	13.11%
5	Others	245	7.06%
	Total	3468	100

It can be seen from the Table XV that 292 (8.41%) out of 3468 respondents in engineering colleges face the problem of lack of availability of computer terminals in their library when they want of access E-Resources, 1799 (51.88%) respondents feel that there are no information on the use of E-Resources in their library, 677 (19.54%) respondents feel that there are no self-helping guides in their library to access E-Resources, 455 (13.11%) respondents felt that enough supports are not coming from the library staffs of their colleges in accessing E-Resources.

Suggestions

The study of the Information seeking behaviour in Electronic Environment. A Study of Engineering Colleges Users in West Bengal has shed some light on the points which require serious awareness, in order to enable sources to meet their information.

1. Proper training regarding the utilisation of the online resources in book room highlights that individuals are accessing online articles on their own.
2. It is also necessary to provide proper training regarding the use of online platform as well as different strategies is also required to be accumulated for adapting it easily.
3. In addition, as people are experience hindrance in accumulating knowledge, the most appropriate steps are required to be implemented for mitigating problems for example, the enhancement of terminals.
4. An initial opportunity should be presented by introducing the electronic document delivery in the respective library. The library management therefore needs to behaviour user study programs to know more about electronic resource needs of users.
5. Library should be equipped with adequate computers for internet surfing and keeping update with journals which make available them innovative knowledge, research, and keep updates for improving teaching schedules and styles.
6. Every one Engineering colleges and its related libraries should be connected through internet.
7. Library should be updated with advanced technologies.
8. Update the library collections and provide internet facilities and extend the time duration of library.
9. Library staff should be skilled with innovative technologies.
10. More sufficient access to online data.
11. Better system of access, to the sources of information in the field of Engineering College.

Conclusion

This particular study was concluded that is very common among the students to determine the behaviour of seeking pertinent information regarding the Electronic Environment. Further, the students are well aware of their given responses along with their educational needs and requirements. However, the need has been satisfied by operating the electronic resources on a regular basis. It has been found that the hindrance of the optimum utilization of the electronic resources for the student is the barrier in its accessibility. It has been observed that the students are satisfied with the retrieved data and information. Moreover, this particular survey has been conducted to highlight the advantages as well as disadvantages of behaviour of individuals for information seeking. Further, it has been observed that the students are extremely satisfied by the use of electronic resources as it is helpful, easy to access, time saving as well as up-to-date. It becomes easy for the student to retrieve relevant and useful data within less time. But everybody has dissimilar perception so some students think accurate opposite of these compensation and they stated that information on E-Resources is not genuine, it is time Consuming, it has limited information and E-Resources is a major reason of eye sightedness, laziness and less usage of printed material.

In addition, results of this study established that majority of students didn't get any training related to Electronic Environment but they are not enthusiastic to get trained. Some of them are enthusiastic to get trained for some precise contents like to enhance their searching skills and for using E-Resources in a better way. Engineering Respondents use a variety of widely distributed approaches to complete their information needs. Today Information technology has developed quickly and has a great influence on access to information and information seeking behaviour. The aim of the study was to determine, the information need and Information seeking behaviour of Engineering Respondents to investigate their motive for seeking information and to study and determine their awareness concerning various channels of information.

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Library Services through Distance Education in Private Universities

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Abstract - *This paper will examine the issues related to role of Distance Education Libraries, and library user services Library professionals in distance education system. The exceptional expansion of distance-learning programs at colleges and universities has remarkable implications for providing library services to distance students. The Distance education of the UGC in its norms and guidelines clearly states that all distance education courses that are recognized for the purpose of employment to posts and services under the distance education course the central Government of India. Students should therefore make the sure that the distance education course the intend to pursue is duly recognized and approved by UGC. This article reviews the literature and presents an overview of distance-learning services offered by academic libraries. The focus is on examining additional responsibilities, opportunities, and challenges encountered by academic librarians in serving distance learners. Also detailed are a number of new paradigms that distance librarianship has introduced into the profession of librarianship. The results revealed that a greater proportion of the respondents were not aware of the library services. Distance learners had no remote access to library services and SLM related to subject and electronic resources and other databases and therefore did not strongly agree to the provision of information needs through social media services. It was also evident that information needs of respondents were mostly not adequately provided for. Awareness creation of library resources, user education on information literacy of library resources, encouraging the use of social media platforms, training/user education and initiation of borrowing of library resources.*

Keywords: *Distance Education, Distance University, Academic Library Services, Distance Learners, Information Needs, Distance Education Library, Distance Education Technology, Accessibility, Awareness of Library Services.*

Introduction

Distance education, also called distance learning, is the education of students who may not always be physically present at a school. This usually involved correspondence courses wherein the student corresponded with the school via mail. Today, it involves online education. A distance learning program can be completely distance learning, or a combination of distance learning and traditional classroom instruction and offering large-scale online courses interactive participation and open access through the world wide web or other network technologies, are recent education modes in distance in distance education a number of other terms (distributed learning , e-learning, e-learning, m-learning, online, virtual class room etc.) are used roughly synonymously with distance Library Services for Distance University users Local academic libraries certainly provide more appropriate collections for post-secondary study than public libraries, but access can be problematic: “there are much resentment when one university’s students try to use another private distance university library Inter-institutional agreements are required to allow non-registered students any but the most casual Historical figures access to another institution’s collections and services. Registered student for multi-user access to online services, News already confusing enough, is even further complicated when off-site access comes into play. Uncategorized Students without such access to local public or academic libraries have traditionally had to rely on the telephone and the postal or courier system for their information needs.

Locating and ordering books over the telephone is time-consuming, and delivery is even more so. Items, once they arrive, may not be as useful as their bibliographic citations would make them seem, since article and book titles are often fanciful, misleading or inadequate; this inability to immediately evaluate an item's usefulness greatly slows the research process for distance education learners

Historical Context of Distance Education

The origins of distance education can be traced back to the early 18th century, when Caleb Phillips began offering shorthand lessons to individuals living anywhere in the country via the postal service, claiming by this method they would be as well-instructed as individuals receiving instruction in person. During the 1800s the Lyceum and the Chautauqua movements offered self-directed and continuing education programs to adults. One of the first instances of institutionalized distance education in America was created by William Rainey Harper at the University of Chicago during the 1890s. Though this department of correspondence education was separate and distinct from the university proper, it began a trend which would soon be emulated by other institutions across the country. From this point until the 1960s, the methods of instructional delivery progressed as technological formats became more common, moving from mail delivery to also include radio and television delivery. By the Fall of 1963, it is estimated that 272,000 students were enrolled in extension courses leading to a college degree. The proliferation of off-campus programs and concerns about the inferior quality of some of them led accrediting associations to seek to establish measures of control over this type of education. Regional accrediting agencies created policies and regulations which, on the one hand, might be viewed as bureaucratic but on the other hand provided the oversight necessary to bring off-campus programs into the mainstream of higher education.

The History of library Services to Distance Education learners

Included in the plans by accrediting agencies and states to bring oversight to extension education was discussion of standards for the academic support of the students and faculty participating in these courses and programs. An important aspect of this was the provision of library services to remote students. In 1965, Arthur Hamlin, then the University Librarian at the University of Cincinnati, presented a report entitled "Library Services for College Extension Programs" at Hearings held by the Subcommittee on Education of the United States Senate's Committee on Labor and Public Welfare. In his report Hamlin pointed out that despite the growth in distance education offerings, library services in support of them had not been adequately addressed by institutions and their funding agencies. He argued library services are an essential supplement to instruction, regardless of class location, and the services offered to off-campus learners should be equivalent to those offered to main campus students.

A failure to do so creates a double standard. One year later, the Committee on Standards of the Association of College and Research Libraries (ACRL) submitted a document entitled Guidelines to Library Services to Extension Students to the ACRL Board of Directors, which approved it on July 14, 1966. The committee had been working toward the guidelines since 1963. In July of 1965, the committee sponsored a conference in Detroit called "Library Services for College Extension Centers," which further helped solidify its ideas around remote library services. The report by Arthur Hamlin served as the working paper for the meeting. Out of this work came the Guidelines, which were intended to provide college and university libraries, librarians, and individuals involved with extension education with a template for providing excellent library support to the growing field of extension programs. In 1980 the ACRL Standards and Accreditation Committee began a review of the 1967 Guidelines to see a revision was warranted in light of subsequent changes in higher education.

Feedback was solicited from the ACRL membership and other sources and hearings were held during the 1981 American Library Association (ALA) Midwinter Conference. After further revision by the Committee the draft was submitted to and approved by the ACRL Board of Directors on January 26, 1981.

Again, the new Guidelines for Extended Campus Library Services were not intended to be prescriptive, but to articulate the conditions and management practices required for excellent library support to distance programs (American Library Association, 1982). At the same time these guidelines were being created, the idea of a professional organization devoted to extended campus library services was forming. At the same time the Guidelines for Extended Campus Library Services being published the ACRL Board of Directors created the Extended Campus Library Services Discussion Group. This group would serve as the official entity within ALA to address issues related to library services for extension and off-campus students. Throughout the 1980s the group gained members and off campus library services became a more integral part of the profession. In 1990, the ACRL Board of Governors established the Extended Campus Library Services Section (ECLSS) and dissolved the Extended Campus Library Services Discussion Group. The first Chair of the Executive Committee of the ECLSS was Barton Lessen, who played a key role in the creation of the Off-Campus Library Services Conference.

Growth of Distance Education in India

Distance Education for higher education in India was initiated in the form of Correspondence Courses in 1962, in response to the ever-increasing demand for higher education which could not be met by the conventional system. The Delhi University established a School of Correspondence Courses and Continuing Education in 1962. Encouraged by the success, the Education Commission (1964-66) recommended the expansion of correspondence education for various purposes. Consequently, the University Grants Commission (UGC) formulated guidelines for introducing correspondence courses in Indian Universities. Three more Institutes of Correspondence Studies were established in the late sixties. Twenty-one more universities introduced correspondence programs during the seventies. In the early eighties seven more universities started institutes of correspondences studies. At present there are 45 universities including four deemed universities offering correspondence programs in the country.

The establishment of the Open University in the United Kingdom, in 1969 encouraged several countries to deliberate on the new concept and its potential in making higher education more accessible, flexible and innovative. India was one of those countries which examined the possibility of establishing an open university in the early seventies. This influenced a few universities like University of Mysore and Andhra University to adopt open admission policies in the mid-seventies by relaxing formal qualifications for entry to undergraduate and post-graduate courses. This seemingly minor innovation provided impetus to efforts towards greater access to higher education for larger segments of the population especially those adults who could not complete school education. Andhra Pradesh government gave a lead to the country by setting up the Andhra Pradesh Open University (now renamed as Dr. B.R. Ambedkar Open University) at Hyderabad in 1982. In 1985, the Govt. of India, through an Act of Parliament established the Indira Gandhi National Open University (IGNOU) which is responsible for determining and maintaining standards of distance education and bringing about coordination among all distance education institutes including the open universities all over the country in addition to functioning as University for open learning and distance education programs. Library Services in Distance Education System: In Indian Context 3 The establishment of IGNOU at New Delhi in 1985 has proved to be a significant milestone in the development of distance education in India. It provides

a central Organization for guiding and coordinating the activities of all distance education institutes and state open universities in the country.

It has popularized the concept of open learning system resulting in the establishment of three more state open universities in the late eighties viz. - Kota Open University in Kota (Rajasthan), Yashwant Rao Chavan Maharashtra Open University at Nasik (Maharashtra) and Nalanda Open University at Patna (Bihar). States of Madhya Pradesh and Karnataka have also established Open Universities recently. "From just a handful of students in 1962-63 the enrollment in correspondence courses rose to about 65, 000 students in 1975-76. During the last fifteen years the annual growth rate of enrollment in open universities and the institutes of correspondence studies attached to conventional universities has been appreciably higher than in the conventional universities and in 1990-91 it was approximately 600, 000. The proportion of students enrolled in distance education has steadily increased from 2.6% of the enrollment in higher education in 1975-76 to 11.5% in 1990-91. During 1992-93 the enrollment for distance education programs was over eight lakhs".

Library Services for Distance Learners – Information Science Today

Local academic libraries certainly provide more appropriate collections for post-secondary study than public libraries, but access can be problematic: "there are much resentment when one university's students try to use another university library on a regular basis.⁴ Inter-institutional agreements are required to allow non-registered students any but the most casual Historical figures access to another institution's collections and services. Licensing agreements for multi-user access to online services, News already confusing enough, are even further complicated when off-site access comes into play. Uncategorized Students without such access to local public or academic libraries have traditionally had to rely on the telephone and the postal or courier system for their information needs. Locating and ordering books over the telephone is time-consuming, and delivery is even more so. Items, once they arrive, may not be as useful as their bibliographic citations would make them seem, since article and book titles are often fanciful, misleading or inadequate; this inability to immediately evaluate an item's usefulness greatly slows the research process for distance learners Although technology is beginning to have an effect on services to remote learners, much service is still provided by traditional means such as depository collections and books-by-mail programs.

"The immediate effect of the new technologies seems to be to support these programs rather than supplant them."⁵ For instance, the development of online catalogues over the last few decades have been a great boon to distance learners trying to locate resources; but it in no way addresses the problem of getting the materials, once found, to the student. For the most part, technologies such as fax, e-mail and the World Wide Web have merely decreased the time it takes to find and retrieve resources, and have done little to increase the actual availability of resources. Despite much talk about full-text databases and digital libraries, only a small percentage of library materials are available in their entirety in electronic form. Text-digitizing initiatives such as Project Gutenberg have made thousands of "e-texts" available on the Internet, and many current journals publish in electronic form, but it may be years before smaller, older, or highly- specialized indexes and publications are digitized — if indeed they ever are at all. One concern is that the availability of current information and the convenience of full-text digital formats may deter students, both distance and on-campus, from seeking relevant older or report this ad printed information that could provide valuable context and historical perspective. Purpose: it does not strike them as central to their mission." He finds that attitude reflected in the staffing devoted to off- campus library services: staff "may be part-time and not be professionally qualified," and "off-campus service may be only part of their duties."

Another is adamant that the existence of at least one full-time academic librarian assigned exclusively to remote services is a “vital prerequisite” for the provision of adequate services, and indeed for the provision of adequate courses and programs. “Librarians can complain with righteous justification that distance learning programmers should never have been set up without prior resorting of new library services aimed at supporting them,” he insists.⁷ A third agrees that the same cooperation that should exist between faculty and librarians when planning on-campus courses and programs should exist for planning off-campus courses and programs: “libraries need to be a highly visible and active partner in the planning and implementation processes....close communication between teaching faculty and librarians is essential to establish realistic expectations, and university administration must be committed to provide funding for libraries as well as for teaching.”⁸ Expense is another formidable barrier to the provision of remote library services: expense for both the student and the library.

At the University of Alberta, students can pay an extra distance education fee of \$110 per term that allows them unlimited access to document delivery, interlibrary loan, and extended reference service. Otherwise, the costs are \$5 per item by document delivery and \$5 per article and \$15 per book by interlibrary loan. Expense is also an issue in the delivery of electronic materials: not only can the actual cost of items to the library be higher (electronic journals are frequently more expensive than their print counterparts), but expensive equipment and datelines are required at both ends of the transaction. It is ironic that the very key to the success of initiatives such as the Electronic Library Network is also their greatest weakness: their reliance on technology. Estimates of the percentage of post-secondary students with computer access differ, but those estimates drop drastically for distance learners when one takes campus computer labs out of the equation. Whatever the improvements that technology has made to library services for distance learners, the many students without access to computers are not assisted in the least, and are in fact put at more of a disadvantage as their connected peers raise the ante for achievement. Furthermore, the effort, attention and funds going into developing electronic library services may well be drawing away from the resources going into maintaining and improving non-electronic library services for distance learners.

Accessing library services in distance learning

Distance learners access library and educational resources and services in various ways (Sacchanand, 2002). Access can be direct e.g. face to face, or mediated by printed material, e.g. manuals, brochure or mediated by technology, using a variety of media such as telephone, radio, the Internet etc. Successful direct access is characterized by flexibility, reliability, availability, user-friendly, portability, efficiency and service ability (Sacchanand, 2002). Kavulya (2004) in his study of distance education in four universities in Kenya opined that some of the students have little or no exposure to library use and this affects their access to library resources. Effective and appropriate services to distance learning communities may differ from, but must be equivalent to those services offered on a traditional campus (ACRL, 1998). According to Molefi (2008), library support services in distance learning are systems or procedures that are purposefully created and effectively utilized by a higher learning institution to support and or facilitate teaching and learning at a distance. Tong (1994) also regards support services as essential in helping students overcome difficulties that affect the quality of academic work.

This gives students the confidence that they are not being left on their own but the institution is interested in their progress. Mirtz (2010) views student support as more overreaching involving the ‘entire setting in which learning takes place...the disciplines that provide the knowledge learning support, the learners and the arrangements made for them, the teaching and learning process, and the assessment of learning, institution and programs’.

Identifies three roles that support services in DE play: first, support services encourage the cognitive (learning) development of students; secondly, support enhances the self-esteem of students therefore building their confidence; thirdly, support for students is systematic in helping students meet the required standard expected of them so that they do not fall behind or redraw from school. Notwithstanding the above views, this study seeks to present library services as a student and learner support for DE students. As Cullen (2004) stated librarianship has grown and changed in many aspects because of the different approaches that have to be taken to provide library and information services to those who learn at a distance. These changes have impacted not only on the delivery of library and information services to those who learn at a distance but also on the delivery of library services to other clients. Thus, these changes have led to the development of new professional paradigms within the field of librarianship.

Generally, the emphasis in the literature on library services for distance learning has shifted dramatically in recent years from access to physical libraries and print materials to access to electronic libraries and electronic resources. Tait (2003) revealed that off-campus library services in London have been discussed. Among the findings included developing appropriate collections in various disciplines to meet the needs of the clientele of the libraries, providing reading, lending, reference, information and documentation facilities to all categories of staff and students; developing a special collection of distance education books and journals at the libraries, Circulation service including Inter Library Loan, Reference & Referral, User guidance, Bibliographies/Indexes, Online Public Access Catalogue (OPAC). Others included CD-ROM search, Microform search, Online Databases, Reprography and Lamination & Spiral binding (Tait, 2003).

Provide the Library Services in Distance Education System

Services recommended for Distance Education Learners by a Library General Information.

1. Distance Learning Guide Services
2. Interlibrary Loan
3. Ask-a-Librarian
4. Subject Specialists
5. Course Reserves Tools
6. Lib Guides Subject Guides
7. Libraries' Catalogue
8. Databases
9. E-Journal Search
10. E-Book Collections
11. Reference Works

Technical Help

1. Login Problem Report
2. Online Course Help
3. Help Desk
4. Networking and Computer support
5. E Learning Student Tutorials

Conclusion

Private university signed a memorandum of understanding with public libraries to deposit some study materials in the libraries to be accessed and utilized by ODL students. This arrangement has been very effective in supporting ODL students because public libraries are widely spread across the country and almost all students can access them. Through this relationship, students have been

able not only to access the study materials but also get access to other services in the public library. These include reading space, computers, Internet, and supplementary reading materials from the shelves and also online resources from the databases they subscribe to. However, the study also found out that the study materials deposited in these libraries are outdated and no longer very helpful to the students. This could have been because, over time, the working relationship between the two institutions has become weak, mainly due to a failure to renew the contract, making it difficult to deposit any further study materials at the public libraries. Students' ignorance about the facilities and services at the public libraries may also be reattributed to poor public relations or a breakdown in communication between the university staff and the students.

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Status of Indian Council of Agricultural Research (ICAR) Institute Libraries in Uttar Pradesh: A Survey

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Abstract - *The study examines the status of ICAR institutes libraries in the State of Uttar Pradesh. With the object of various aspects relating to these libraries such as collection, personnel, automation and services are discussed. The aspects related to application of information & communication technologies (ICTs) in the libraries under study are presented. Questionnaire and survey method were used for data collection.*

Keywords: *Indian Council of Agricultural Research, Institute Libraries, Uttar Pradesh.*

Introduction

India is continuously building advanced agricultural research systems. The Indian National Agricultural Research System (NARS) is the largest agricultural system in the world. It has established appropriate research infrastructure and scientific manpower to develop appropriate technologies. The effective functioning of this system has contributed greatly to the rapid development of agriculture. The current agricultural research system has been developed by the Indian Council of Agricultural Research. It coordinates and controls agricultural research and education activities across the country. It mainly conducts research on agricultural problems of national importance through its institutions. The Indian Council of Agricultural Research (ICAR) is an autonomous organization under the Department of Agricultural Research and Education (DARE), Ministry of Agriculture and Farmers Welfare, Govt. of India. Formerly known as Imperial Council of Agricultural Research, it was established on 16 July, 1929 as a registered society under the Societies Registration Act, 1860 in pursuance of the report of the Royal Commission on Agriculture. The ICAR has its headquarters at New Delhi. The Council is the apex body for coordinating, guiding and managing research and education in agriculture including horticulture, fisheries and animal sciences in the entire country.

ICAR Institute Libraries

An agricultural library is a special library oriented to serve agriculture. The library is called the heart of the Agricultural Research Institute. The library has an important role in agricultural education, research, extension and determination of agricultural projects, programs and planning activities. Library resources are always the foundation for researchers, scientists and agronomists to pursue their research. Agricultural libraries provide maximum service for agricultural research, teaching, learning and extension. Agricultural libraries receive, classify, index and maintain all available books, journals, pamphlets and bulletins in various disciplines of agricultural science for reference and study by research and technical staff. The libraries of agricultural institutions provide statistical data related to the formulation and implementation of agricultural schemes across the country [1].

The ICAR assessed the status of its agricultural libraries by Shaw and Krishna Rao Committee (1956), Dr. Randhawa Committee (1957), Cummings Committee (1960), Dorothy Parker Committee (1968) Ramaiah Committee (1969), ICAR Regional Agricultural Library Survey and Study Teams (1973) and Dr. R.S. Paroda Committee (2011) constituted committees.

All the above committees / team surveys have defined the poor condition of ICAR institute libraries in terms of collections, equipment and physical facilities, manpower and other financial resources to meet the information needs of agricultural researchers [4]. The present survey has been conducted to know the present status of ICAR institute libraries of Uttar Pradesh in the changing information environment and applications of information & communication technologies (ICTs) in these libraries.

Literature Review

Naqvi, T. H. (2017) [5] said that compilation of reference material, research report, thesis, book review and progress report of seminar, conference, workshop organized from time to time are more useful for the students and researchers. Library services such as photocopying, CD-ROM databases, online, catalogs, indexing and amortizing, CAS, bibliography, references and lending / circulation were the most commonly used among PG students and research scholars. Naqvi, T. H.(2014) [6] revealed in his study that CD-ROM databases such as AGRIS, AGRICOLA, CAB Abstract and Agricultural e-Journals were highly used e-resources by GBPUAT students and research scholars.

Singh, K. P. (2012) [7] discusses the salient recommendations of the various committees and commissions and their leading to the expansive growth and development of agricultural education, research, and libraries in India. The study also highlights the role of ICAR towards the growth and development of agricultural research, extension, education and libraries. Singh and Bebi (2012) [8] study finds that the demand and usages of electronic journals is increasing. The study suggests that for the optimum utilization of e-journals, libraries should undertake the orientation programme on regular basis for their users.

Singh Neena (2005) [9] agriculture libraries have been far behind in adopting the new technologies due to lack of funds, training of staff, etc. There is need for the library professionals to look at Agriculture Library Resource Development to cope with the changing role of library services. Jain and Gorla (2001) [3] evaluate the status of ICAR Agricultural Libraries. This study is based on the analysis of Library Collection, budget, professional staff, users and mechanized information services existing in the agricultural libraries.

Objective of the Study

The main objectives of the study are

1. To assess the library collections of these institutes.
2. To evaluate the various ICT facilities available in these libraries.
3. To ascertain the staff strength of ICAR institute libraries.

Scope of the Study

The present study is limited to the libraries of ICAR institutes in the state of Uttar Pradesh. Uttar Pradesh has the following fourteen ICAR institutes.

1. Indian Institute of Sugarcane Research(IISR), Lucknow
2. Indian Institute of Seed Science(IISS), Mau
3. Indian Grassland and Fodder Research Institute(IGFRI), Jhansi
4. Indian Institute of Pulses Research(IIPR), Kanpur
5. National Bureau of Agriculturally Important Microorganisms(NBAIM), Mau
6. Central Institute of Subtropical Horticulture(CISH), Lucknow
7. Indian Institute of Vegetable Research(IIVR), Varanasi
8. Indian Institute of Farming Systems Research(IIFSR), Modipuram

9. Central Agroforestry Research Institute(CARI Jhansi), Jhansi
10. Central Avian Research Institute(CARI Bareilly), Bareilly
11. Indian Veterinary Research Institute(IVRI), Izatnagar
12. Central Institute for Research on Goats(CIRG), Mathura
13. Central Institute for Research on Cattle(CIRC), Meerut
14. National Bureau of Fish Genetic Resources(NBFG), Lucknow

Methodology

The study is based on primary data collected from libraries of ICAR institutes in Uttar Pradesh. A structured questionnaire was designed to elicit data from the Library Personnel of the ICAR institutions under study. The data hence received was reduced to statistical tables and simple table analysis done to draw conclusions.

Data Analysis & Interpretation

The information collected from libraries with regard to their establishment, users, collection, ICT status, services and staff has been analyzed and presented under the following heads.

ICAR Institutions in Uttar Pradesh: An Overview

At present there are 101 ICAR research institutes including 4 deemed universities, 64 institutes, 14 national research centers, 6 national bureaus and 13 directorates / project directorates. The state of Uttar Pradesh has the highest number of ICAR institutes from all over the country. It has 5 Crop Science, 6 Animal Science, 2 Horticulture Science, 2 Natural Resources Management and 1 Fisheries Institute. All ICAR institutes libraries are funded by the Indian Council of Agricultural Research. IVRI is the oldest and maximum library user among all these 14 institutions. IVRI Izatnagar Institute of Crop Science has been granted deemed university status in 1973 by University Grants Commission. The IVRI Library is known as the National Library of Veterinary Sciences. It is the oldest library in the subject of Veterinary Sciences in the South Asia region [2].

TABLE I ICAR INSTITUTIONS IN THE STATE OF UTTAR PRADESH

Name of the Institutions	Discipline of Institute	Year of Establishment	Library Users
IISR Lucknow	Crop science	1952	240
IIS Mau	Crop science	2004	75
IGFRI Jhansi	Crop science	1962	300
IIPR Kanpur	Crop science	1978	269
NBAIM Mau	Crop science	2004	87
CISH Lucknow	Horticulture Science	1972	138
IIVR Varanasi	Horticulture Science	1999	134
IIFSR Modipuram	Natural Resources Management	2009	125
CARI Jhansi	Natural Resources Management	1988	97
CARI Bareilly	Animal Science	1939	101
CIRG Makhdoom	Animal Science	1979	234
IVRI Izatnagar	Animal Science	1889	990
CIRC Meerut	Animal Science	1987	122
NBFG Lucknow	Fisheries	1983	114

Library Personnel

Information about the number of professional and non-professional staff working in these fourteen libraries under study has been assessed through questionnaires. Table II shows the number of professional and non-professional employees working in the libraries of these institutions. IVRI Izatnagar, IISR Lucknow and NBFGR Lucknow Libraries have more than one professional staff. Interestingly, there is no professional staff in the library of IISS Mau. Libraries that have no professional staff are under the supervision of any scientific or technical officer. IVRI Izatnagar and IISR Lucknow Library have more than one non-professional staff. Non-professional staff is employed in the library as clerical or photocopy machine operators.

TABLE II LIBRARY PERSONNEL

Name of the Institutions	Library Personnel	
	Professional	Non-Professional
IISR Lucknow	4	2
IISS Mau	0	1
IGFRI Jhansi	1	1
IIPR Kanpur	1	1
NBAIM Mau	1	1
CISH Lucknow	1	1
IIVR Varanasi	1	1
IIFSR Modipuram	1	1
CARI Jhansi	1	1
CARI Bareilly	1	1
CIRG Makhdoom	1	1
IVRI Izatnagar	8	8
CIRC Meerut	1	1
NBFGR Lucknow	2	1

Library Collection

Table III presents the collection of libraries including Book, Back Volume Journal, Subscription Indian and Foreign Journal, Theses and CD ROM. The comparative study in Table III shows that IVRI and IGFRI have a much richer collection of books as both are very old Institutions. IIFSR and CIRG have less collection of books as these institutes are newly established. IVRI and IISR have the highest and CIRG Library has lowest back volume journal collections. IVRI has subscribed maximum Indian and Foreign Journal and CARI Bareilly has the least. IVRI has Theses and CD ROMs collection is rich as compared to other libraries. Books are the mainstay of the collection of all libraries, followed by current journals. Current journals are indispensable for academic research and study. Compared to the rest of the institutes, IVRI has a rich collection of reference sources, standards, theses, reports etc. in addition to book and journal.

Library Classification, Cataloguing and Circulation System

Catalogs, classification schemes and circulation systems are considered to be the backbone of all library services. This not only helps in organizing information and knowledge but also helps in its timely retrieval. Table IV presents the access catalog, classification scheme and circulation system used in the library. IGFRI and IVRI library providing catalog services through WEB OPAC other

libraries providing catalog services through OPAC. CARI Jhansi, IGfRI and CARI Bareilly are using UDC classification scheme, other libraries are using DDC classification scheme. Interestingly, in all libraries circulation is being done by BARCODE reader.

TABLE III LIBRARY COLLECTION

Name of the Institutions	Book	Back Volume Journal	Subscribe Indian Journal	Subscribe Foreign Journal	Theses	CD ROM
IISR Lucknow	7666	10000	35	48	42	120
IISS Mau	2100	4529	22	19	12	425
IGfRI Jhansi	10968	6330	34	44	94	135
IIPR Kanpur	4069	7435	47	14	47	84
NBAIM Mau	1960	3140	22	30	42	104
CISH Lucknow	3112	7458	26	36	51	121
IIVR Varanasi	2800	7212	31	27	39	212
IIFSR Modipuram	1019	4226	25	20	14	146
CARI Jhansi	8924	7761	15	23	28	72
CARI Bareilly	5587	8415	8	8	34	241
CIRG Makhdoom	1222	112	35	15	35	87
IVRI Izatnagar	59237	202108	70	55	6137	793
CIRC Meerut	1982	4552	16	6	33	434
NBFGR Lucknow	5113	7096	22	34	46	242

TABLE VI LIBRARY CLASSIFICATION, CATALOGUING AND CIRCULATION SYSTEM

Name of The Institutions	Access Catalogue	Classification Scheme	Circulation System
IISR Lucknow	OPAC	DDC	BAR CODE
IISS Mau	OPAC	DDC	BAR CODE
IGfRI Jhansi	WEB OPAC	UDC	BAR CODE
NBAIM Mau	OPAC	DDC	BAR CODE
IIPR Kanpur	OPAC	DDC	BAR CODE
CISH Lucknow	OPAC	DDC	BAR CODE
IIVR Varanasi	OPAC	DDC	BAR CODE
IIFSR Modipuram	OPAC	DDC	BAR CODE
CARI Jhansi	OPAC	UDC	BAR CODE
CARI Bareilly	OPAC	UDC	BAR CODE
CIRG Makhdoom	OPAC	DDC	BAR CODE
IVRI Izatnagar	WEB OPAC	DDC	BAR CODE
CIRC Meerut	OPAC	DDC	BAR CODE
NBFGR Lucknow	OPAC	DDC	BAR CODE

Bibliographic Database

Almost all ICAR institute libraries under study are procuring bibliographic database in CD ROM form. Table V gives information about the bibliographic database available in these institutes' libraries. Cab abstract database is available in all Libraries. The AGRIS database is not available in IISS, IIVR, IIFSR, CARI and CIRG libraries. The AGRICOLA database is available only in IGFRI and IVRI libraries. Derwent Biotechnology Abstract Database is available in IIVR, IISS and IVRI libraries. The Indiaagristat database is not available in IGFRI, CISH, IIFSR, CIRC and CARI Bareilly libraries. The VET database is available in IVRI, CIRC and CARI Bareilly libraries. The BEAST database is available in IVRI, CIRC and NBFGR libraries.

TABLE V BIBLIOGRAPHIC DATABASE

Name of the Institutions	AGRIS	AGRICOLA	CAB Abstract	Derwent Biotechnology Abstract	India agristat	VET	BEAST
IISR Lucknow	√	X	√	X	√	X	X
IISS Mau	X	X	√	√	√	X	X
IGFRI Jhansi	√	√	√	X	X	X	X
IIPR Kanpur	√	X	√	X	√	X	X
NBAIM Mau	√	X	√	X	√	X	X
CISH Lucknow	√	X	√	X	X	X	X
IIVR Varanasi	X	X	√	X	√	X	X
IIFSR Modipuram	X	X	√	√	X	X	X
CARI Jhansi	√	X	√	X	√	X	X
CARI Bareilly	X	X	√	X	X	√	X
CIRG Makhdoom	X	X	√	X	√	X	X
IVRI Izatnagar	√	√	√	√	√	√	√
CIRC Meerut	√	X	√	X	X	√	√
NBFGR Lucknow	√	X	√	X	√	X	√

Libraries Automation

The details furnished in table VI provide information regarding the computerization of libraries. It shows whether the institutional libraries have automated their house keeping operations or not. Automation of libraries increases the efficiency, avoids duplications of efforts and thus facilitating improved library services to the users. IISR, NBAIM, IIVR, IIFSR, CIRG and CARI Bareilly are having their library partially computerized and all the remaining institutions have completed computerization of their library operations. This may be due to lack of proper manpower and funds. Koha Library automation software is being used by IISR, IIPR, IVRI, CARI Jhansi and CARI Bareilly libraries. E-Granthalaya Library automation software is being used by IGFRI, NBAIM, IIVR, IIFSR and CIRC libraries. Libsys Library automation software is using CISH, CIRG and NBFGR libraries. Interestingly, there is TLSS Library automation software use in the single one IISS Mau library. IISR, IVRI and CARI Jhansi libraries are creating institutional repository using D Space Digital Library software.

Membership of E-journal Gateway, AGRICAT, KRISHIKOSH, KRISHIPRABHA and CeRA

Sky-rocketing prices of journal, shrinking budgets and paucity of space are only few among many problems faced by libraries today. Consortia, OPAC, Repository promote resources sharing among the libraries through the development of a library network. Table VII presents information about membership of AGRICAT, KRISHIKOSH, KRISHIPRABHA, CeRA and E-journal Gateway in

ICAR institutes libraries. All ICAR institute libraries are member of CeRA Consortia. Current and up-to-date research material is accessed by agricultural scientists through this consortium. It provides an impetus to their research work. All ICAR institute libraries are providing e-journal and database search services through J.Gate. IISR, IGFR, NBFGR, IVRI and CARI Bareilly libraries have membership of the KRISHIPRABHA Doctoral Dissertations repository. KRISHIKOSH is a digital repository of accumulated knowledge in agriculture and allied sciences. IIVR and IIFSR libraries do not have membership of KRISHIKOSH repository. IISR, IGFR, IVRI, NBFGR, CARI Jhansi & CARI Bareilly libraries do not have membership of AGRICAT union catalog.

TABLE VI LIBRARIES AUTOMATION

Name of the Institutions	Computerized		Used Library Automation Software	Used Digital Library Software
	Full	Partial		
IISR Lucknow		√	Koha	D Space
IIS Mau	√		TLSS	-----
IGFR Jhansi	√		E-Granthalaya	-----
IIPR Kanpur	√		Koha	-----
NBAIM Mau		√	E-Granthalaya	
CISH Lucknow	√		Libsys	-----
IIVR Varanasi		√	E-Granthalaya	-----
IIFSR Modipuram		√	E-Granthalaya	-----
CARI Jhansi	√		Koha	D Space
CARI Bareilly		√	Koha	-----
CIRG Makhdoom		√	Libsys	-----
IVRI Izatnagar	√		Koha	D Space
CIRC Meerut	√		E-Granthalaya	-----
NBFGR Lucknow	√		Libsys	-----

TABLE VII E-JOURNAL GATEWAY, AGRICAT, KRISHIKOSH, KRISHIPRABHA AND CERA

Name of the Institutions	E-journal Gateway	AGRICAT	KRISHI KOSH	KRISHI PRABHA	CeRA
IISR Lucknow	E-journal Gateway	√	√	√	√
IIS Mau	J.Gate	X	√	X	√
IGFR Jhansi	J.Gate	√	√	√	√
IIPR Kanpur	J.Gate	X	√	X	√
NBAIM Mau	J.Gate	X	√	X	√
CISH Lucknow	J.Gate	X	√	X	√
IIVR Varanasi	J.Gate	X	X	X	√
IIFSR Modipuram	J.Gate	X	X	X	√
CARI Jhansi	J.Gate	√	√	X	√
CARI Bareilly	J.Gate	√	√	√	√
CIRG Makhdoom	J.Gate	X	√	X	√
IVRI Izatnagar	J.Gate	√	√	√	√
CIRC Meerut	J.Gate	X	√	X	√
NBFGR Lucknow	J.Gate	√	√	√	√

Library Services

Librarianship is a service-oriented profession. A library is known by the services provided to its users. Technological breakthroughs have made it possible to provide library services even in electronic environments. Table VIII shows the library services being provided in various agricultural institutions under study. The table also shows that library services are being provided in manual or electronic form. IISS, IVRI and CARI Jhansi libraries are providing all services in electronic form. All ICAR institute libraries provide current awareness services in electronic form through e-mail. The IGFR, IIFSR, CISH and IIVR libraries are providing maximum services manually. It can be hypothesized that libraries associated with large institutions have more computerized their library services than other institutions. Only IVRI Library provides inter-library loan service in electronic form.

TABLE VIII LIBRARY SERVICES

Name of the Institutions	Reference Services	Current Awareness services	Document Delivery Services	Newspaper Clipping Services	Inter Library Loan
IISR Lucknow	Manual	Electronic	Electronic	Manual	.....
IISS Mau	Electronic	Electronic	Electronic	Electronic	.....
IGFRI Jhansi	Manual	Electronic	Manual	Manual	Manual
IIPR Kanpur	Manual	Electronic	Electronic	Electronic	Manual
NBAIM Mau	Manual	Electronic	Manual		.....
CISH Lucknow	Manual	Electronic	Manual	.....	.....
IIVR Varanasi	Manual	Electronic	Manual	.....	.....
IIFSR Modipuram	Manual	Electronic	Manual	.....	Manual
CARI Jhansi	Electronic	Electronic	Electronic	Electronic	.....
CARI Bareilly	Manual	Electronic	Electronic	Manual	.....
CIRG Makhdoom	Manual	Electronic	Manual	.....	.....
IVRI Izatnagar	Electronic	Electronic	Electronic	Electronic	Electronic
CIRC Meerut	Manual	Electronic	Manual	.....	.....
NBFGR Lucknow	Electronic	Electronic	Manual	Electronic	Manual

Conclusion

The outcome of the study shows that the library and information professionals working in Indian Council of Agricultural Research (ICAR) Institutions in Uttar Pradesh are gaining considerable basic skills in ICT, library management and subscription of various types resources. All the institutions having rich collections, but majority of institutional libraries manage by the single personnel's. Libraries are fully automated and providing, BAR coding OPAC and WEB OPAC facilities and AGRIS, CAB abstract, CeRA databases/ e journals manage by them excepting AGRICOLA, VET, BEAST, KRISHIPRABHA etc. Rrequire to concentrate more on network-based services and digital library services institutional repository. In order to enhance the competency skills among library professionals few suggestions are: -Encourage to the library and information professionals for upgrading ICT skills by technological expertise, Library department must change their curriculum to focuses on the needs of the users/organisation will have abundant opportunities in future Professionals should be Support from the top management. For participating various type conferencing and workshops programmes.

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Implementation of RFID System in Libraries: A Case Study

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Abstract - A library is a growing organism. As it grows in size the problems associated with the maintenance and security of the documents also grows. The researchers have always helped the librarian in solving their problems. To solve the problems of arranging documents in order they have given classification schemes. To solve the problems of searching documents they have given cataloguing guidelines. To solve the problems of space and time they have taught librarians to digitize the documents and share over network. To automate the counter activities, they gave us bar-codes. Bar-codes have served the librarians and libraries for a long time, and now it is slowly getting replaced by RFID. This paper given the overview of RFID in Libraries and discussed the methodology, advantages and disadvantages of RFID in Library. Radio Frequency Identification (RFID) is the very important and advanced technology of the 21st century. Now it becomes one of the most controversial technologies in present ICT era. Libraries began using RFID system to replace their barcode system in the late 1990s. RFID help to secure library materials mobilize the circulation process and enhance the user service and reduce theft case. The budget for implementing RFID for an academic library or big Public library is an important issue today. But now the cost of different components of RFID reduces day by day. This study states different aspect of implementing of an RFID system in Library and give an idea of approximate budget for implementing an RFID system.

Keywords: RFID, Academic Library, Library Automation, RFID Components, Inventory Management, Library Management.

Introduction

RFID is an acronym for “radio-frequency identification” and refers to a technology whereby digital data encoded in RFID tags or smart labels (defined below) are captured by a reader via radio waves. RFID is similar to barcoding in that data from a tag or label are captured by a device that stores the data in a database. RFID, however, has several advantages over systems that use barcode asset tracking software. The most notable is that RFID tag data can be read outside the line-of-sight, whereas barcodes must be aligned with an optical scanner.

Radio Frequency Identification (RFID) is the very important and advanced technology of the 21st century. Now it becomes one of the most controversial technologies in present ICT era. Libraries began using RFID system to replace their barcode system in the late 1990s. RFID help to secure library materials mobilize the circulation process and enhance the user service and reduce theft case. The budget for implementing RFID for an academic library or big Public library is an important issue today. But now the cost of different components of RFID reduces day by day. This study states different aspect of implementing of an RFID system in Library and give an idea of approximate budget for implementing an RFID system. Radio Frequency Identification (RFID) refers to a wireless system comprised of two components: tags and readers. The reader is a device that has one or more antennas that emit radio waves and receive signals back from the RFID tag. Tags, which use radio waves to communicate their identity and other information to nearby readers, can be passive or active. Passive RFID tags are powered by the reader and do not have a

battery. Active RFID tags are powered by batteries. RFID tags can store a range of information from one serial number to several pages of data. Readers can be mobile so that they can be carried by hand, or they can be mounted on a post or overhead. Reader systems can also be built into the architecture of a cabinet, room, or building.

Definitions of RFID

Recently, Radio Frequency Identification (RFID) technology has received great attention because of the benefits it can give to the organizations in their day to day operations, supply chain and many other areas. From supply chain operations to shop floor manufacturing, RFID technology can improve information sharing and visibility in the processes (Brewer *et al.*, 1999; Lee *et al.*, 2004; Michael and McCathie, 2005). Every technology coming up in the market has some drawbacks or loopholes. Similarly, even RFID technology which has all the good things comes up with a cost.

One of the barriers in adopting the technology is quantifying the cost-benefit ROI (return on investment) in acquiring the technology, while security and privacy are the other issues associated with the technology (Jones *et al.*, 2004; Boulard, 2005; Stuart and Liu, John, 2006). Though RFID technology may have given a new direction to the supply chain management theory, still it is not reasonable to believe that all firms will adopt it (Reyes and Jaska, 2006).

Objectives of the Study

1. To study the security systems in libraries.
2. To study the different types of electronic security systems in libraries.
3. To know the advantages of RFID technology in libraries.
4. To study the application of RFID technology in library management system.

Scope

This document is intended to provide general information and references regarding the current status of, and potential for, RFID technology in libraries. The information contained will be of value to Library Directors and Managers, and 600 Transforming Dimension of IPR: Challenges for New Age Libraries other library team members who are involved in the process of developing library strategic plans and related budgets.

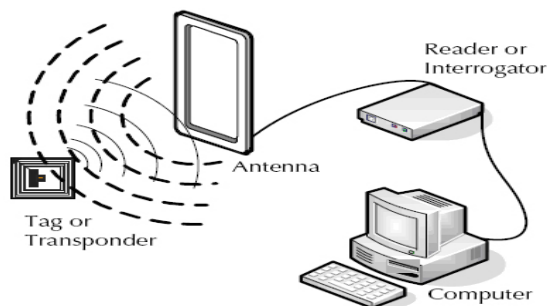
Why RFID

The task of receiving, transporting, sorting and shelving materials has exploded in recent years. Library staff size remains constant at best while circulation and materials management continues to grow. Librarians are now in the business of moving books around rather than practicing librarianship, reference and patron service. RFID provides a solution to automate much of this handling and return staff to the business of customer service.

The use of RFID reduces the amount of time required to perform circulation operations. The most significant time savings are attributable to the facts that information can be read from RFID tags much faster than from bar codes and that several items in a stack can be read at the same time.

Components of RFID

1. A basic RFID system consists of three components: An antenna or coil.
2. A transceiver (with decoder).
3. A transponder (RF tag) electronically programmed with unique information.



The antenna emits radio signals to activate the tag and to read and write data to it. The reader emits radio waves in ranges of anywhere from one inch to 100 feet or more, depending upon its power output and the radio frequency used. When an RFID tag passes through the electromagnetic zone, it detects the reader's activation signal. The reader decodes the data encoded in the tag's integrated circuit (silicon chip) and the data is passed to the host computer for processing. The purpose of an RFID system is to enable data to be transmitted by a portable device, called a tag, which is read by an RFID reader and processed according to the needs of a particular application. The data transmitted by the tag may provide identification or location information, or specifics about the product tagged, such as price, colour, date of purchase, etc. RFID technology has been used by thousands of companies for a decade or more. Typical RFID tag consists of a microchip attached to a radio antenna mounted on a substrate. The chip can store as much as 2 kilobytes of data. To retrieve the data stored on an RFID tag, you need a reader. A typical reader is a device that has one or more antennas that emit radio waves and receive signals back from the tag. The reader then passes the information in digital form to a computer system.

Implementation of RFID in Library System



RFID Tags: RFID tags have been specifically designed to be affixed into library media, including books, CDs, DVDs and tapes. While there are a range of tag types they generally fall into two categories: -

Standard Tags

Standard tags are used on books, magazines, affixed directly to the face of the video (in most cases covering one of the windows) and can be affixed to cases for those CDs and DVDs that have metallic content. RFID tags are not designed to be placed directly on audiocassettes (not an attractive audiocassette cases and audio book albums).

CD/DVD Tags

These form factors are circular tags, which are used on CDs or DVDs. They are also called doughnut. These tags are used because the metallic content of CDs and DVD's may affect the signal of a standard tag. They can be directly affixed to the inner circles of CDs and DVDs that have no metallic content in their inner circles (ie, stored). RFID tags can come in all shapes and sizes, from

thin labels that can be affixed to an asset, to durable labels. The tags can work on metal, wood and plastic, although the type of antenna and tag will vary based on the material you use.

Examples of types of RFID tags include

1. Labels (including thin film options).
2. Windshield tags.
3. Wrist tags.
4. Key fobs.
5. Rearview mirror hanging tags.
6. Credential tags.

RFID Work Station



RFID workstation is a fast and efficient component of an RFID system to programme and verify RFID tags without the ILMS software. It also helps to the issue, return and renew of the multiple documents at a time with the help of ILMS integrated with it. RFID workstation is of three types, they are mobile (Portable and Small), shielded, and USB.

RFID EAS Gate



RFID gate mainly used for security purpose. It protects and secure library collection. It also analyses the library traffic patterns with visible user counters. When anyone takes books without issue and went between this gates it gives the alarm and sends the information to the local administrator through the server. It also acts as an antenna.

RFID Handheld Reader



It is a cordless handheld device mainly used for stocktaking, re-shelving and findings of library documents. It is compact and easy to use. It reads RFID tags of library document simultaneously and quickly. It identifies items, which not check in or out properly and instantly detect materials caused by an alarm.

The Book Drops



RFID book drop allows patrons to automatically return the library documents. A reader installed in a book drop allows reading of RFID tags as patron drops of the documents. It eliminates the labour intensive stapes of check in and deactivation of security protection by the library staff. It automatically checks in the document, takes them off the patron's library account and reactivates the security function.

The Patron Self-Check-Out Station

It is basically a computer with a touch screen and a built-in RFID reader, plus special software for personal identification, book and other media handling and circulation. After identifying the patron with a library ID card, a barcode card, or his personal ID number (PIN), the patron is asked to choose the next action (check-out of one or several books). After choosing check-out, the patron puts the book(s) in front of the screen on the RFID reader and the display will show the book title and its ID number (other optional information can be shown if desired) which have been checked out.



Advantages of RFID Systems

The advantage of RFID is that it does not require direct contact or line-of-sight scanning.

1. **Rapid charging/discharging:** The use of RFID reduces the amount of time required to perform circulation operations. The most significant time savings are attributable to the facts that information can be read from RFID tags much faster than from barcodes and that several items in a stack can be read at the same time. While initially unreliable, the anti-collision algorithm that allows an entire stack to be charged or discharged now appears to be working well.
2. **Simplified patron self-charging/discharging:** For patrons using self-charging, there is a marked improvement because they do not have to carefully place materials within a designated template and they can charge several items at the same time. Patron self-discharging shifts that work from staff to patrons. Staff is relieved further when readers are installed in book drops.
3. **High Reliability:** The readers are highly reliable. Some RFID systems have an interface between the exit sensors and the circulation system to identify the items moving out of the library. Were a patron to run out of the library and not be intercepted, the library would at least know what had been stolen. If the patron card also has an RFID tag, the library will also be able to determine who removed the items without properly charging them. This is done by designating a bit as the "theft" bit and turning it off at time of charge and on at time of discharge.
4. **High-speed inventorying:** Unique advantage of RFID systems is their ability to scan books on the shelves without tipping them out or removing them.
5. **A hand-held inventory reader can be moved rapidly across a shelf of books to read all of the unique identification information.** Using wireless technology, it is possible not only to update the inventory, but also to identify items which are out of proper order.
6. **Automated materials handling:** Another application of RFID technology is automated materials handling. This includes conveyor and sorting systems that can move library materials and sort them by category into separate bins or onto separate carts. This significantly reduces the amount of staff time required to ready materials for re-shelving. Given the high cost of the equipment, this application has not been widely used.
7. **Long tag life:** Finally, RFID tags last longer than barcodes because nothing comes into contact with them. Most RFID vendors claim a minimum of 100,000 transactions before a tag may need to be replaced.
8. **Fast Track Circulation Operation:** The use of RFID reduces the amount of time required to perform circulation operations. The most significant time savings are attributable to the facts that information can be read from RFID tags much faster than from barcodes and that 279several items in a stack can be read at the same time. While initially unreliable, the anti-collision algorithm that allows an entire stack to be charged or discharged now appears to be working well.

Benefits of RFID for the Staff

1. **Less time needed for circulation operations:** Implementing RFID will considerably reduce the amount of time required to issue, receive, transport, sort & shelve library materials.
2. **Efficient Inventory management:** Inventory management can be done using a handheld reader without closing the library and is at least 20 times faster compared to existing barcode based system.
3. **Reducing Repetitive Stress Injuries (RSI):** RFID based system reduces repetitive scanning of individual items at the circulation desk during check in, check out and hence avoids RSI such as carpal tunnel syndrome Taking inventory in a RFID based system doesn't require physical DE shelving& shelving of library materials.

Disadvantages of RFID Systems

1. High cost: The major disadvantage of RFID technology is its cost.
2. Vulnerability to compromise: It is possible to compromise an RFID system by wrapping the household foil to block the radio signal. It is also possible to compromise an RFID system by placing two items against one another so that one tag overlays another. That may cancel out the signals. This requires knowledge of the technology and careful alignment.
3. Removal of exposed tags: The RFID Tags cannot be concealed in either spine or gutter of the books and are exposed for removal. If a library wishes, it can insert the RFID tags in the spines of all except thin books; however, not all RFID tags are flexible enough. A library can also imprint the RFID tags with its logo and make them appear to be bookplates, or it can put a printed cover label over each tag.
4. Exit gate sensor (Reader) problems: While the short-range readers used for circulation charge and discharge and inventorying appear to read the tags 100 percent of the time (Boss 2004), the performance of the exit gate sensors is more problematic.
5. They always don't read tags at up to twice the distance of the other readers. There is no library that has done a before and after inventory to determine the loss rate when RFID is used for security.
6. Lack of Standard: The tags used by library RFID vendors are not compatible even when they conform to the same standards because the current standards only seek electronic compatibility between tags and readers.

How RFID Works

Each RFID tag has a non-powered radio antenna which can be communicated to by powered antenna belonging to a tag reader on a scanner or security gate. Although it is not necessary that the two antennas “see” each other as is needed with a traditional bar code, it is necessary that they be relatively close to one another since the wattage used by the powered antenna is very low for health and safety reasons.



Difference between Barcode and RFID

1. Information can be read from RFID tags much faster than from barcodes.
2. Several items in a stack/counter can be read at the same time using RFID.
3. Items do not have to be handled one-by-one nor removed from the shelves.
4. Inventory-taking is no longer a tedious operation.
5. RFID can stand more than 10,000 read/write.
6. RFID can have theft bit, which can be in two states “ON/OFF”.
7. Shelf verification/rectification can be done on daily basis.
8. More information can be written in the RFID tag on incremental basis.

9. Need not open/remove books to capture information.
10. Items are identified on upper and lower shelves more comfortably.

Conclusion

RFID technology has become an important part of every modern library in the digital age. It has the capability of making our work lives in the library more suitable. However, every new technology comes at cost. To rectify this, efforts must be undertaken for its development and implementation. In this paper we gave approximate budget for implementing RFID in library. Libraries should work to confirm that RFID components are manufactured and used according to well established privacy policies. Library should refuse the unsafe RFID components because they are not suitable. Though it is a quite expensive technology rather than barcode, RFID has become essential for a broad range of information collection and identification of data.

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Application of Internet of Things (IoT) Techniques in Libraries in Purview of Open Access Technology

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Abstract - *The phenomenal impression of Digitization has been recognized in every sector of the society. The notion to identify the digital marks is prevalent even in service institutions like libraries as well. With a major portion drawn towards the application Internet of Things complimented with Open Access Technology in the academic spectrum is well established for the Library users. Augmenting communication and interoperability within the range of digital transmission is termed to be Internet of Things (IoT). The present study is an indication towards applying the IoT techniques to harmonize the resources and services supporting the scope of Open Access Technology.*

Keywords: *Internet of Things (IoT), Open Access, Open Source, Virtual Reference Services, Virtual Information Literacy, Federated Search, Patron Driven Acquisition.*

Introduction

To define the terms 'Internet of Things' in accordance to a combination of value creation and technology would be appropriate. With the evolving technology the philanthropy of IoT has been in concurrence to get connected → communicated → managed with multiple devices at the same time for exchanging the set of instructions or data. Providing enormous set of advantages IoT offers valuable services to connect easily with objects used in our daily routine. (Bahga & Madiseti, 2014) calling it a revolution explains connecting through internet with the physical & virtual objects to set up a 'smarter' connection is IoT. The author further elaborates in the study to connect and activate the endpoints under Internet governed network for Information and knowledge generation. Defining IoT (Waher, 2015) is establishing connection among devices with support of technology over Internet. The revolutionary change in the field of technology the effect of IoT is available in its discoverable form in every discipline beginning from opening a door and extending till economic growth.

Open Access

The present study highlights the application of Open Access and Internet of Things in the Academic libraries. Open Access can be explicitly defined as to use of information and resources under an umbrella term known to be Free compounded with unrestricted access. Open Access allows to promote quality content which can be relied upon (Kamble *et al.*, 2012). Advocating Open Access (Antelman, 2017) indicated towards the convenient prototype of Open Access for the Libraries which supports the sustainable model for maintaining the different resources within the budgetary limitations. The liberal outset provided by Open Access and Application of IoT the services of the libraries has been elevated.

Virtual Resources and Services

During this challenging times the study given by (Nagpal & Kaur, 2019 - Virtual Referencing: A Simulated Version of Libraries, n.d.) Identified that the millennials today are increasingly inclined towards remote access, instant and quick reply which is unbounded along with unhindered.

Predicting well in advance the authors have stated following the ‘Trinity of Libraries’ given by Dr S R Ranganathan as resources in electronic format, visibility of users in form of digital footprints and services/references well supported virtually.

Online Virtual Referencing

The service institutions especially the Academic Libraries may extend Online Reference Service by adopting different means and mechanisms within the scope and combination of Open Access and implication of IoT by introducing

1. The Chatbot
2. Live Chat
3. Phone Call
4. Email

The need to support Virtual Reference Service is clearly evident in the current time where the physical access to the resources is restricted. Hence it is wise to opt for additional support within the leaps and bounds of OA and IoT. There are number of Open access softwares available for extending assistance to the library patrons. The chatbot dialogue box can be mapped on the Library website with the structure offered by IoT by connecting the devices and applications through Internet. For On-Screen direction the libraries may connect with the users to resolve their queries through different platforms known for Web meetings. Common Open Source Live Chat software are listed in the table given sourced by GoodFirms. The live assistance to the user for better communication and connectivity can also be extended through the different web meeting tools like Zoom, MS Teams, WebeX etc.

TOP FREE AND OPEN SOURCE LIVE CHAT SOFTWARE	
Rocket.Chat	rocket.chat
LiveHelperChat	livehelperchat.com
HelpCenterLive	helpcenterlive.com
Odoo Live Chat	www.odoo.com/page/live-chat
LiveZilla	www.livezilla.net
SimpleChat	www.simplechat.support
Bitrix24	www.bitrix24.com/uses/free-live-chat-software-for-website.php
Chat4Support	www.chatonwebsite.com/live_chat.asp
WebsiteChat	websitechat.net/en

GoodFirms
Source: Goodfirms.co

Virtual Information Literacy Workshop & Training for different resources

The libraries may disseminate the set of required knowledge and expertise with the help Virtual Information Literacy Workshops, Virtual Trainings, Webinars using numerous platforms available for Open Access while hosting such events Online in support with Zoom, GoToWebinar, MS Teams and many more. Phone calls and exchange of emails is one of the most common and constantly available service option which helps and supports the patrons with a quick and prompt reply.

User Guides & Video Tutorials

Creating User Guides or Video Tutorials and giving the access through the library website is another unique service to support the users to seamless access to the resources.

Collaborative Project Developing Info Product

Synthesizing the Information Products and promoting all through Open platforms is another suitable mechanism to support the collaborative working with the learners of the academic fraternity.

Project Collaboration & Socialization through Student Engagement

Interlacing Open source and IoT for student engagement while augmenting it with Digital Scholarship over different social media platforms is another significant execution to bring users closer to the Digital world of knowledge. Online Book exhibition, Virtual Author's Talk is yet another addition to Student's Engagement with Libraries.

Technology in Library

Introducing the Technology in libraries (Wang *et al.*, 2018) in the empirical study stated that the technology has a positive effect on the users and by implementing IoT with digital library model the access to information for users opens up variety of channels of access. (Liang, 2019) concluded by giving the Literature review on IoT that a profound effect of technology helps to remodel the structure of services extended to users by libraries. Implementation of RFID i.e. Radio Frequency Identification will substitute human intervention in different ongoing process of Check IN/OUT. This configuration makes the patron more independent. It also enables Ingenious Access and tracking which in real sense involves innovation in the routine operations. The patron can also get equipped to Reserve the Tools (Space) & Resources (books) Online. To the library managers it supports in Generating Survey reports more promptly and accurately. Within the extent which Open Source Content Management Software offer to the library IoT supports a large amount of outlying assistance (Bayani *et al.*, 2017).

IoT and Federated Search

In the present Pandemic Stage reaching out to the users with correct set of information is fundamental for libraries. With the immense amount of information available the libraries are advocating strongly the role of Referencing tools, Institutional Repository and Mobile App within the province of Open Source, IoT and Federated Search. Federated to Library Service Platforms facilitates integrated search to library resources, integration of Library Catalogue for printed books, online databases and repositories and offers One Window Search for Multiple Resources. There are number of platforms offering federated search like Summon – Web Scale Discovery, EBSCO Discovery Service, World Cat Discovery etc at the same time referring to case study given (Parabhoi & Dey, 2017) indicated that Vufind is an open source platform can be mapped with library website to offer single access search window for different types of libraries from public to academic.

Remote Access or Off Campus Access

By offering a connection in between machine and human to access the knowledge and information Remote Access or Off Campus Access offers an optimum and continued utilization of electronic resources of library.

Logging with one-time user id & password for each session the web proxy server grants access by authenticating the user IP address and connecting them with the subscribed set of resources by the library. Using the internet connected device IoT technology supports in authenticating the users and certain Open Source Software like Black light with the help of discovery service administers the ICT enabled unrestricted access to the specialized set of information sources to the faculty and students in the academic set up.

Introduction of Patron Driven Acquisition platforms for recommending E-Books

This efficient model provides a better and a rationalized access to the electronic book the users of same academic community. The patron can explore, discover and read the e-books through the library online public access catalogue through the bibliographic records. Different platforms offer different access models as well. Using a unique id and password patron can select the books send for recommendation to the library to purchase the number of license to make it available. This model saves the time of library staff in procuring the recommended set of books and also helps the users to have easy access in this changing time. (Urbano & Zhang, 2014) With the paradigm shift offering a convenient and automated purchase the Patron Driven Model offers an integrated discovery methods for library staff and users as well.

Conclusion

In conclusion IoT facilitates Gateway to knowledge resources while acclimating it with Open Source/Access both high end and low end demands of the users can be efficiently met. The present nomenclature of IoT and Open Access establishes invariable structure for scholars and researchers. The present study clearly identifies the phenomenal impression of Digitization which augments communication and interoperability amongst Internet of Things (IoT) and application of Open Access. With the robust placement of Virtual Resources and Services, Project Collaboration & Socialization through Student Engagement, Technology in Library, IoT and Federated Search, Remote Access and Patron Driven Acquisition in the technology driven library environment it is predominant that the application of Internet of Things (IoT) Techniques in libraries under purview of Open Access maximizes the user the interaction (Liang, 2019).

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An Analysis of Faculty Members Profiles of Bharathidasan University

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Abstract - Indian Research Information Network System (IRINS) developed by the Information and Library Network (INFLIBNET) Centre in collaboration with the Central University of Punjab which can be used for higher education institution and research institutions to showcase the research activities in single place. The data were taken from Bharathidasan University Faculty Profiles website (<https://bdu.irins.org/>). The objective of the article is to analyze the department wise publications and citations, top ten faculty publications, citations and h-index. It is found that “Department of Physics” has published 674 (21.12%) publications with 43 h-index and received highest number of (10808, (35.45%) citations from Scopus and 9185 (38.23%) citations from CrossRef. It is further found that Prof Muthusamy Lakshmanan (Professor, Centre for Nonlinear Dynamics) has published 315 (9.86%) publications and received 48 h-index.

Keywords: Indian Research Information Network System (IRINS), Research Information System, Bharathidasan University, Faculty Profiles, Research publications.

Introduction

Research information management systems collect and store metadata on research activities and outputs such as researchers and their affiliations; publications, datasets, and patents; grants and projects; academic service and honors; media reports; and statements of impact. RIM systems enable institutions to collect data from different internal systems and to combine it with external information, such as metadata from publications aggregators like PubMed or Scopus, providing a richer view of the research activity for an institution and its subunits.

Indian Research Information Network System (IRINS)

IRINS is web-based Research Information Management (RIM) service developed by the Information and Library Network (INFLIBNET) Centre. The portal facilitates the academic, R&D organisations and faculty members, scientists to collect, curate and showcase the scholarly communication activities and provide an opportunity to create the scholarly network. The IRINS is available as free software-as-a-service to the academic and R&D organisations in India. The IRINS would support to integrate the existing research management system such as HR system, course management, grant management system, institutional repository, open and commercial citation databases, scholarly publishers, etc.

Review of Literature

Castro, P. D., Kimidi, S. S., and Kannan, P. (2020) described the rapid arising of a national-level research information management infrastructure (RIM) in India as a case study for a bottom-up Current Research Information System (CRIS) implementation strategy. Less than a year and a half after its first launch, the Indian Research Information Network System (IRINS) has become a widespread institutional RIM asset with over 180 instances at Indian research-performing organisations. As a result, India is currently leading the classification by number of CRIS per country in the euroCRIS Directory of Research Information Systems (DRIS), followed by Norway and the United Kingdom.

As a background to the case study, the broad international CRIS context is also analysed. The causes for the quick rise of such systems are examined, together with their national-level implementation models in various countries and the differences between CRIS and expert finder systems. Sivakumaren, K. S., & Rajkumar, T. (2020) examined the various Universities/Institutes available in Indian Research Information Network System (IRINS). It also analyses the profile of the faculties/researchers, publications, citations. Totally, it is found that 134 Universities/Institutes and 24088 were available in IRINS.

The Centrally Funded Universities/Institutes were found more in IRINS. Further, the result shows that high number of (81.47%) publications and profiles (62.67%) of Centrally Funded Universities/Institutes were available in IRINS. The publications of the centrally funded Universities/Institutes were received the highest citations. The study has also analysed that Universities/Institutes, which have the highest profiles, publications and citations. It is found that Annamalai University has the highest profiles (1038, 14.87%). Similarly, IISc, Bangalore has been found with the highest publications (29885, 16.04%) and citations (518240, 19.18%) among the Top Ten Universities/Institutes in IRINS. Jeyapragash, B., Muthuraj, A., and Kannan, P. (2019) described Indian Research Information Network System (IRINS) developed by the Central University of Punjab, Bathinda in collaboration with Information and Library Network Centre (INFLIBNET) which can be used for higher education institution and research institutions to showcase the research contribution to the scholarly community.

The data were taken from Indian Research Information Network System (<http://irins.org/irins/>) of 15 instances for the Academic and Research Organisations. The objective of the article is to analyze the faculty members, department and their scholarly publications with citations and its impact. It is found that KL University, Guntur has highest 836 (17.22%) faculty member. The Indian Institute of Technology, Madras has received 278374 (26.28%) highest citations from Scopus and 227686 (22.30%) citations from Cross Ref. Kannan, P. (2016). explained about the semantic technologies such as Resource Description Framework, Web Ontology Language, Open Linked Data. The purpose of this article is to discuss about what is profile management system, how it is used in the scholarly communication, etc. The article emphasis on semantic-based profile management system called: VIVO and its architecture, data integration tools and major features and functionalities, etc.

Research Methodology

The data were collected from Bharathidasan University Faculty Profiles (<https://bdu.irins.org/>). It is found that 177 faculty members published 3192 publications (data as on 11th March 2021) have been collected from Bharathidasan University Faculty Profiles Website. The study is also aimed to analyze department wise publications and citations, various types of scholarly resources, top ten faculty publications and h-index, top ten faculty citations and top ten faculty Google scholar citations and h-index. The Data were analyzed using Excel with simple calculations

Objectives of the Study

These are the major objectives of the study.

1. To find out the department wise publications of Bharathidasan University.
2. To analyze department wise citations from Scopus and Cross Ref.
3. To identify the top ten faculty publications and citations.
4. To find out the top ten faculty Google scholar citation and h-index.

Data Analysis and Interpretation

Department wise publications

TABLE I DEPARTMENT WISE PUBLICATIONS

Sl. No.	Category	Publications	%	h-index	Rank
1	Department of Animal Science	192	6.02	29	6
2	Department of Biochemistry	29	0.91	7	19
3	Department of Bioinformatics	71	2.22	10	14
4	Department of Biomedical Science	86	2.69	21	12
5	Department of Biotechnology	56	1.75	18	16
6	Department of Botany	100	3.13	12	10
7	Department of Chemistry	164	5.14	22	7
8	Department of Commerce and Financial Studies	309	9.68	6	3
9	Department of Computer Science and Engineering	64	2.01	9	15
10	Department of Economics	1	0.03	0	27
11	Department of Education	8	0.25	2	24
12	Department of Educational Technology	3	0.09	1	26
13	Department of English and other Foreign Languages	18	0.56	6	22
14	Department of Environmental Biotechnology	163	5.11	29	8
15	Department of Environmental Management	33	1.03	11	18
16	Department of Geography	220	6.89	10	5
17	Department of Geology	7	0.22	5	25
18	Department of Library and Information Science	227	7.11	4	4
19	Department of Lifelong Learning	13	0.41	7	23
20	Department of Marine Biotechnology	36	1.13	11	17
21	Department of Marine Science	352	11.03	14	2
22	Department of Mathematics	75	2.35	8	13
23	Department of Medical Physics	94	2.94	20	11
24	Department of Microbiology	148	4.64	23	9
25	Department of Physical Education	1	0.03	1	27
26	Department of Physics	674	21.12	43	1
27	Department of Remote Sensing	21	0.66	6	21
28	Department of Social Work	27	0.85	3	20
	Total	3192	100		

Table I shows that department wise publications of Bharathidasan University. It is found that “Department of Physics” has published 674 (21.12%) publications and received 43 h-index have placed first rank and its followed by “Department of Marine Science” has published 352 (11.03%) publications and received 14 h-index have placed second rank. It is further found that “Department of Economics” and “Department of Physical Education” has published least number of (1) publications and received 1 h-index have placed last position.

Resource Impact from various databases

TABLE II RESOURCE IMPACT FROM VARIOUS DATABASES

Sl. No.	Category	Scopus Citations	%	CROSSREF Citations	%	Rank
1	Department of Animal Science	2743	9.00	1758	7.32	3
2	Department of Biochemistry	148	0.49	70	0.29	19
3	Department of Bioinformatics	405	1.33	243	1.01	14
4	Department of Biomedical Science	2093	6.87	1776	7.39	5
5	Department of Biotechnology	1264	4.15	1062	4.42	8
6	Department of Botany	476	1.56	459	1.91	12
7	Department of Chemistry	2184	7.16	1497	6.23	4
8	Department of Commerce and Financial Studies	128	0.42	26	0.11	20
9	Department of Computer Science and Engineering	251	0.82	76	0.32	17
10	Department of Economics	0	0.00	0	0.00	28
11	Department of Education	26	0.09	18	0.07	25
12	Department of Educational Technology	4	0.01	3	0.01	26
13	Department of English and other Foreign Languages	95	0.31	86	0.36	21
14	Department of Environmental Biotechnology	2956	9.70	2360	9.82	2
15	Department of Environmental Management	435	1.43	378	1.57	13
16	Department of Geography	533	1.75	398	1.66	10
17	Department of Geology	477	1.56	431	1.79	11
18	Department of Library and Information Science	58	0.19	30	0.12	23
19	Department of Lifelong Learning	287	0.94	252	1.05	16
20	Department of Marine Biotechnology	381	1.25	286	1.19	15
21	Department of Marine Science	768	2.52	656	2.73	9
22	Department of Mathematics	218	0.72	114	0.47	18
23	Department of Medical Physics	1722	5.65	1505	6.26	7
24	Department of Microbiology	1901	6.24	1302	5.42	6
25	Department of Physical Education	1	0.00	0	0.00	27
26	Department of Physics	10808	35.45	9185	38.23	1
27	Department of Remote Sensing	91	0.30	41	0.17	22
28	Department of Social Work	32	0.10	15	0.06	24
	Total	30485		24027		

Table II indicates that Resource Impact from various databases. Based on Scopus citation researcher has assigned rank. It is found that “Department of Physics” has received highest number of (10808, (35.45%) citations from Scopus and 9185 (38.23%) citations from CrossRef

have placed first position and its followed by “Department of Environmental Biotechnology” has received 2956 (9.70%) citations from Scopus and 2360 (9.82%) citations from Crossref have placed second position. It is further found that “Department of Physical Education” has received least number of (1) citation from Scopus and no citation from CrossRef have placed last position.

Top ten faculty publications and h-index

TABLE III TOP TEN FACULTY PUBLICATIONS AND H-INDEX

Sl. No.	Name of the Faculty and Designation	Department	Publications	%	h-index	Rank
1	Prof. Muthusamy Lakshmanan (Professor)	Centre for Nonlinear Dynamics	315	9.86	48	1
2	Prof. M Selvam (Professor and Head)	Department of Commerce and Financial Studies	172	5.38	6	2
3	Dr. P Santhanam (Associate Professor)	Department of Marine Science	160	5.01	9	3
4	Prof. Manisankar Paramasivam (Vice Chancellor)	Department of Chemistry	139	4.35	28	4
5	Dr. R Ramesh Babu (Associate Professor)	Department of Physics	133	4.17	24	5
6	Prof. S Arumugam (Professor)	Department of Physics	131	4.10	20	6
7	Dr. Murugaian Senthilvelan (Assistant Professor)	Centre for Nonlinear Dynamics	110	3.45	21	7
8	Dr. R Renganathan (Professor)	Department of Chemistry	110	3.45	31	7
9	Prof. K Natarajaseenivasan (Professor)	Department of Microbiology	104	3.26	20	9
10	Prof. S Muthusamy (Professor)	Department of Chemistry	101	3.16	24	10
	Total		3192			

Table III shows that top ten faculty publications and h-index. It is found that Prof Muthusamy Lakshmanan (Professor, Centre for Nonlinear Dynamics) has published 315 (9.86%) publications and received 48 h-index have placed first rank and its followed by Prof M Selvam (Professor and Head, Department of Commerce and Financial Studies) has published 172 (5.38%) publications and received 6 h-index have placed second rank. It is further found that Prof S Muthusamy (Professor, Department of Chemistry) has published 101 (3.16%) publications and received 24 h-index it has placed last position.

Top ten faculty Citations

Table IV investigates that top ten faculty citations. It is found that “Prof Muthusamy Lakshmanan (Professor)” has received 8367 (27.45%) citations from Scopus and 7434 (30.94%) citations from Crossref have placed first position and its followed by “Dr R Renganathan (Professor)” has received 3148 (10.33%) citations from Scopus and 2591 (10.78%) citations from Crossref have placed second position. It is further found “Prof M Selvam (Professor and Head)” has received less number of 117 (0.38%) citations from Scopus and 22 (0.09%) citations from Crossref have placed last position.

TABLE IV TOP TEN FACULTY CITATIONS

Sl. No.	Name of the Faculty and Designation	Scopus	%	Rank	Crossref	%	Rank
1	Prof. Muthusamy Lakshmanan (Professor)	8367	27.45	1	7434	30.94	1
2	Prof M Selvam (Professor and Head)	117	0.38	10	22	0.09	10
3	Dr. P Santhanam (Associate Professor)	292	0.96	9	176	0.73	9
4	Prof. Manisankar Paramasivam (Vice Chancellor)	2410	7.91	3	1980	8.24	3
5	Dr. R Ramesh Babu (Associate Professor)	1595	5.23	6	1143	4.76	6
6	Prof. S Arumugam (Professor)	1335	4.38	8	1203	5.01	4
7	Dr. Murugaian Senthilvelan (Assistant Professor)	1392	4.57	7	1162	4.84	5
8	Dr. R Renganathan (Professor)	3148	10.33	2	2591	10.78	2
9	Prof. K Natarajaseenivasan (Professor)	1601	5.25	5	1067	4.44	7
10	Prof. S Muthusamy (Professor)	1973	6.47	4	947	3.94	8
	Total	30485	100		24027	100	

Top ten faculty's Google Scholar Citations and h-index

TABLE V TOP TEN FACULTY'S GOOGLE SCHOLAR CITATIONS AND H-INDEX

Sl. No.	Name of the Faculty and Designation	Google Scholar Citations	h-Index	i10-index	Rank
1	Prof. Muthusamy Lakshmanan (Professor)	15504	64	264	1
2	Prof. M Selvam (Professor and Head)	1291	17	38	10
3	Dr. P Santhanam (Associate Professor)	1537	20	51	9
4	Prof. Manisankar Paramasivam (Vice Chancellor)	4395	36	114	2
5	Dr. R Ramesh Babu (Associate Professor)	2951	31	81	4
6	Prof. S Arumugam (Professor)	1855	23	56	8
7	Dr. Murugaian Senthilvelan (Assistant Professor)	2341	26	65	6
8	Dr. R Renganathan (Professor)	4133	35	86	3
9	Prof. K Natarajaseenivasan (Professor)	2617	27	60	5
10	Prof. S Muthusamy (Professor)	2169	25	70	7

Table V indicates that top ten faculty's Google Scholar Citations and h-index. Prof Muthusamy Lakshmanan (Professor) has received (15504) citations from Google Scholar with 64 h-index and have placed first rank. It is followed by Prof Manisankar Paramasivam (Vice Chancellor) has received 4395 citations with 36 h-index have placed second rank. It is further found that Prof M Selvam (Professor and Head) has received less number of (1291) citations and received 17 h-index they have placed last rank.

Conclusion

Indian Research Information Network System (IRINS) plays the vital role in higher learning educational institutions to know their research productivity, citations, h-index, collaborations and award etc. In recent scenario many higher learning institutions are facing the problem in collecting the research activities and faculty profiles for the ranking and accreditation purpose. The IRINS helps to solve this problem and gives more information which is required by the ranking and accreditation organizations by national and international. IRINS helps to update the research and faculty details in a simple manner by themselves. Hence this will help the institutions to know about their faculty personal information, publications, awards, honours, educational background, identity and such up-to-date. In Tamil Nadu only few institutes are implemented IRINS and this study recommends that all higher learning institutions to update their academic and research activities in IRINS to have better visibility by the outside world.

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Assessing the Usability of Academic E-Resources in a University Library Milieu: A Study

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Abstract - Now a day's Universities are spending huge amount of money for developing a good collection of e-resources. Students are using these resources for their academic and research purpose. Presidency University Kolkata has a very rich collection of e-resources. The University subscribes a number of e-journals, e-books and databases. Many open access e-resources are also categorized and organized in the university library web page so that users can find their desired information very easily and quickly. This investigation tries to assess the usage pattern of e-resources by the students of various Departments of the University. Data collected from the attendance register of the library e-resource access center. Collected data are then analyzed and graphically represented to find out the result.

Keywords: Usability, E-Resources, University Library Milieu.

Introduction

Now a days Universities are spending huge amount of money for developing a good collection of e-resources. These resources are mostly maintained by the library. All the academic community is using the resources for their academic and research purpose. There are a number of different kinds of e-resources available in a University library. Maintaining and organizing these e-resources is a mammoth work. There are number of publisher who supplies these resources and each of them organizes their own resources in different manner. It's become very difficult for the users to find their desired information within a limited time frame. In this scenario it's become very essential to arrange these resources in a manner so that user can find their information very easily. On the other hand, academic community who are using these resources should remain aware of what are the resources available in their library. To know how much these resources are useful or relevant to the academic that also become very important.

Definitions of e-resource

There are thousands of definitions of e-resources available in many site in internet. Among those two definitions are found relevant to this study. The first definition is taken from SMU (Singapore Management University) Library FAQ page, it says - "Electronic resources (or e-resources) are materials in digital format accessible electronically. Examples of e-resources are electronic journals (e-journal), electronic books (e-book) online databases in varied digital formats, Adobe Acrobat documents (.pdf), Web Pages (.htm, .html, .asp etc) and more".

The IGI Global publisher in their web page defines e-resources as "An electronic resource is defined as a resource which require computer access or any electronic product that delivers a collection of data, be it text referring to full text bases, electronic journals, image collections, other multimedia products and numerical, graphical or time based, as a commercially available title that has been published with an aim to being marketed. These may be delivered on CD ROM, on tape, via internet and so on".

Presidency University e-resources

Presidency University has a very rich collection of e-resources. Since last ten years the University has added over thousands of e-resources.

University has signed a MOU with National Digital Library of India piloting by IIT Kharagpur for complete institutional access to NDLI. Links to the resources are given in the library web page from where users can access these resources. Library is maintaining a separate area with twenty computers dedicated for e-resource searching. Any students or researcher of the University as well as faculty members can use these computers to access the e-resources.

There are a number of purchased e-resources as well as open access e-resource links provided in the Library web page. The subscribed and open access e-resources are grouped separately for easy accessing of the resources. Subscribed e-resources are again grouped separately, like e-book, e-journals and -databases. Links of each resource are given with the name and category of the resource.

A list of these resources is given below.

TABLE I E-RESOURCES

Sl. No.	Category	Name of the resources
1	E-journals	IOP, Sage, Springer, Wiley Blackwell, EPW, JSTOR, OUP, NAS, Science direct, Project Muse, CUP, Springer nature, Taylor & Francis
2	E-books	Proquest E- book central, Cambridge, sage knowledge, oxford ref., oxford scholarship, Taylor & Francis, brills, JSTORE, world e-books
3	E-databases	Scopus, Maths Sc. Net, EPWRF, India stat, NCCO, Early English books online, sage Adam Mathue, drama online
4	Tools for researchers	Mendeley, Zotero, SCImago Journal Rank (SJR indicator) (Based on Scopus database from Elsevier, Google Scholar Metrics Eigen actor (Based on Web of Knowledge database)

Other than these there are a number of open access e-resources. Presidency University library provided links of those open access e-resources which are authentic and reliable and very much relevant for the academic community. The open access resources links are categorized and organized in a very easy and searchable manner. The resources are arranged under five different headings like journals, scholarly archives, e-thesis, e-books, digital library, open courseware & MOOCs

Accessibility of E-resources

Presidency University E-resources are accessible from campuses as well as from anywhere around the world around the clock. Faculties can access e-resources globally through VPN (Virtual private Network) with strong encryption technology. Faculties have their password for accessing the e-resources while the students can access from their mobile or desktop within the campus. There are about twenty computers for students in the library specifically for accessing e-resources.

Objective of the Study

The objective of the study is to

1. Assessing the usage of e-resources by the Undergraduate and Post graduate students of the University.
2. Assessing the usage of e-resources by the students of different Science and Arts subjects.

Limitations

The study is conducted among students of Presidency University only. The study accumulated data of three consecutive years, i.e. 2016, 2017, 2018. Data source used here is attendance register of the library “E-resource access center”

Data Collection

The attendance register of e-resource access center has been used for collection of data. The Columns of the register collected data about students Name, Department, year of study, date, time and purpose of searching etc. Data of three consecutive years from 2016 to 2018 were collected and tabulated.

Data Analysis

To achieve the objective of the study the collected data are scrutinized thoroughly. To find out the results scrutinized data are then analyzed and represented graphically as well as in tabular format, which are as follows

Year Wise Usage of E-Resources

The collected data are tabulated and represented graphically. It is found that during every consecutive year there is an upward trend in the usage of e-resource i.e. the usage of e-resources increased from year 2016 to 2018. In year 2016 about 848 numbers of students searched the e-resources, in 2017 it was 1225 and in 2018 it was 1479. The usage increased almost double from year 2016 to 2018. (Fig. 1, Table II)

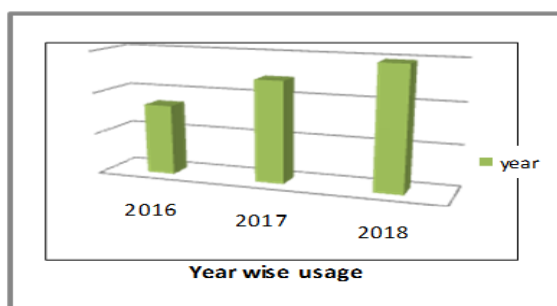


Fig. 1 Year Wise Usage

TABLE II STUDENT WISE USAGE

Year	2016	2017	2018
Student Number	848	1225	1479

Student category wise usage of e-resources

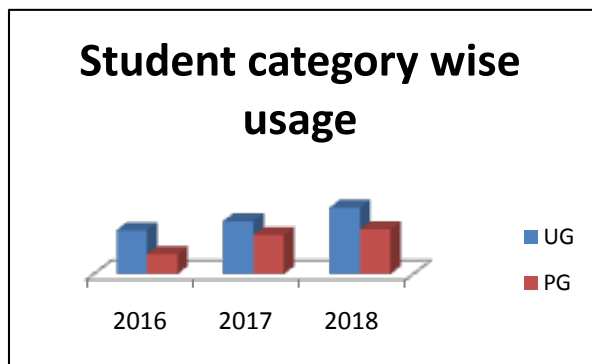


Fig. 2 Student category wise usage of e-resources

TABLE III STUDENT CATEGORY WISE USAGE OF E-RESOURCES

Year	2016	2017	2018
UG	584	705	884
PG	264	520	595

Analysis of data shows that usage of e-resources by the post graduate students increased drastically from 2016 to 2018. Though initially Undergraduate students are more interested in using the e-resources but the number increased gradually in next two years. In the year 2016 about 264 PG students and 584 undergraduate students consulted e-resources from the center. In the year 2018 the number increased to 595 and 884 respectively. (Fig. 2, Table III).

Subject wise usage of e-resources

There are a huge number of increases in usage of e-resources among the science subject Students then Arts subject students as per the data. Usage of e-resources increased to double during 2016 to 2018 among the Science students. On the other hand number of usage among the Arts students remains almost equal in three years. (Table IV, Fig. 3)

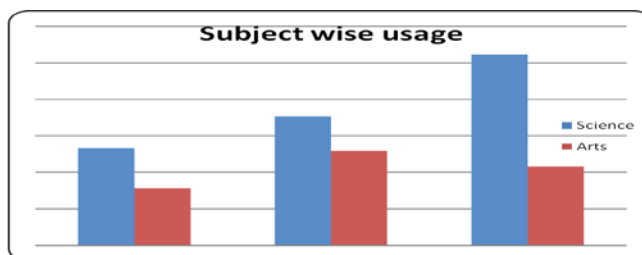


Fig. 3 Subject wise usage

TABLE IV SUBJECT WISE USAGE

Year	Science	Arts
2016	534	314
2017	707	518
2018	1047	432

Science Stream Subject wise usage of e-resources

After scrutinizing all the collected data of it is found that among all the Science subjects usage of e-resources is highest among the Biological science students. In all the consecutive three years Biological students usage of e-resources increased sharply.

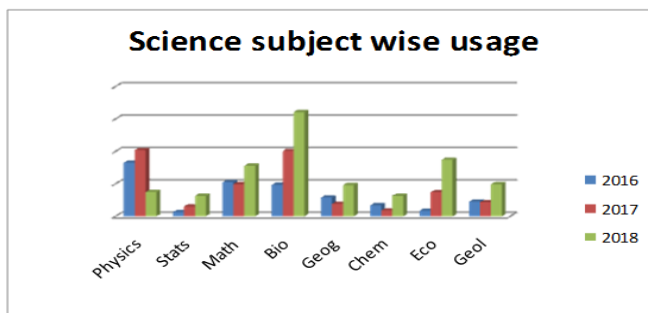


Fig. 4 Science Stream Subject wise usage

TABLE V SCIENCE STREAM SUBJECT WISE USAGE

Year	Physics	Stats	Math	Bio	Geog	Chem	Eco	Geol
2016	165	13	105	97	58	34	17	45
2017	204	30	99	201	38	18	74	43
2018	75	63	156	321	96	63	174	99

While Statistics, mathematics, geography Geology, Chemistry and Economics student's usage increased steadily along with the passing years. But surprisingly the usage of Physics students decreased along with the year. (Fig. 4, Table V)

Arts Stream Subject wise usage of e-resources

Arts stream subject wise analyzed data shows that History students searched the e-resources maximum during the year 2017 while Political science students searched maximum during the year 2018. The data analysis shows that searching of e-resources among the students of English department increased in the year 2016 and 2017 than in the year 2018. Hindi students started searching the e-resources in the initial years but with the passing years their usage decreased. On the other hand, Philosophy, Bengali and Sociology student's usage of e-resources increased slowly but steadily along with the passing years. (Fig. 5, Table VI)

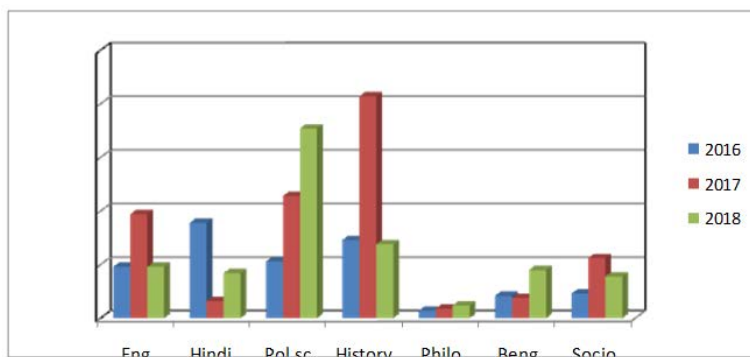


Fig. 5 Arts Stream Subject wise usage

TABLE VI ARTS STREAM SUBJECT WISE USAGE

Year	Eng	Hindi	Pol.sc	History	Philo	Beng	Socio
2016	48	89	53	73	7	21	23
2017	97	16	114	207	9	19	56
2018	48	42	177	69	12	45	39

Conclusion

After analyzing all the data, it is found that there is an overall increase in practice of accessing e-resources among the student's community increased significantly every year. UG students are using e-resources more frequently for their purpose than PG students. The study also finds out that the students of Science subjects access E-resources more often than the Arts subject's students. This trend reflects that may be science subject's e-resource collection is richer than the Arts and humanity stream. Among the science stream subjects a few departments students spend much time for accessing e-resources then few other subjects.

For example, Biology, Economics Mathematics and physics subject's students' access e-resources most frequently. The reason behind this may be that the collection of e-resources in these subject fields is better than other subjects of science stream. The same picture is can be seen in the Arts stream also. History, Political Science students used e resources more frequently than other Arts subject's students. The finally concludes that Presidency University e-resource collection related to Arts and Humanities must be improved to ensure Arts stream students requirements.

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Assessment on Use of Library Information Sources and Services among the Users of Public Libraries in Thiruvallur District, Tamil Nadu: A Study

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Abstract - *Tamil Nadu is the first state to enact the public libraries act in 1948 in India. Under the provision of this act, the public libraries were opened. Now more than 4500 public libraries are functioned in Tamilnadu. This article highlighted on users of public libraries in Tiruvallur district and its source and services. Tamilnadu public libraries act 1948 the first of its kind in India*

Keywords: *UNESCO, Public library services and sources, UNESCO Public Library Manifesto.*

Introduction

A public library is one that serves the entire population of community. Everyone in the community, regardless of nationality, race, color, language, creed, age, gender, status, educational attainments or any such considerations has a claim to its services as a matter of right. It is generally established and maintained out of public funds under the mandate of legislation. In a public library, librarian should manage several of users, like students, professional; researcher's etc. librarian helps people in finding information and using it effectively for personal and professional purposes. Librarian must have knowledge of wide variety of information sources. Librarian also compile list of books, periodicals, articles and audio visuals materials on particular subjects, analyze collections and recommended materials.

UNESCO Public Library manifesto

The UNESCO considered public library service so important that it brought out a public library manifesto in 1949. This was revised in 1972 which was observed as the international book year. The manifesto is concise and yet comprehensive statement of the modern concept, objectives and functions of the public library and of the general principles governing its service.

Major function for the public library system

1. Promoting education
2. Fostering culture
3. Dissemination information
4. Providing recreation

Resources and Services

The public library must offer to adults and children the opportunity to keep in touch with their times to educate themselves continuously and keep abreast of progress in the science and arts. Its contents should be a living demonstration of the evolution of knowledge and culture, constantly reviewed, kept up-to-date and attractively presented. In this way it will help people from their own opinions and develop their creative and critical capacities and powers of appreciation. The public library is concerned with communication of information and ideas, whatever the form in which these may be expressed. The public library used by children and students and adults. There is an increasing concern with the welfare of the elderly and all handicapped people.

Profile of Tiruvallur District

Tiruvallur district, a newly formed district bifurcated from the erstwhile Chengalpattu district (on 1st January 1997) is located in the North East Part of Tamilnadu. North Latitude between 12°15' and 13°15' East Longitude between 79°15' and 80°20'. The district is bounded by Kancheepuram district in the south, Vellore district in the West Bay Of Bengal in the east and Andhra Pradesh State in the North. The district spreads over an area of about 3422 sq.kms. An insight into the early history of this region shows the region was ruled by kingdoms such as the pallavas, the Golkondas, the Mughals, the French the Dutch and also the British. The district has been divided into three revenue divisions viz, Tiruvallur, Tiruttani, and Ponneri. There are three taluks under Tiruvallur division, two taluks under Tiruttani and three taluks under Ponneri division. There are 46 firkas and 820 revenue villages. Likewise, there are 14 blocks, 6 municipalities and 19 town panchayats which implement rural development activities.

Review of related literature

Richardson (1987) surveyed children's services of public libraries in Illinois in 1977 and 1987 and found that 1) The children's room is open on an average of 41 hours per week, 2) expenditure for children books and magazines represents an average of 28% of the total expenditure for books and magazines of the libraries. The study indicated the ranges in the extent and quality of public library services in U.S.

Saiful Islam (1990) has carried out a research on the current status and structure of public library systems and services in Great Britain and Bangladesh. It evaluates the British public library systems, passage of various acts, various library authorities, total number of public libraries, constituent libraries, computerized acquisition, cataloguing, classification, literature search and library finance, Major differences in library service between the two countries were brought out and recommendations for developing in effective public library service in Bangladesh.

Aslam (1998) stated that the importance of rural libraries to be reshaped as community information centre. A retrospect of rural libraries in India is traced back from 1910 when free public libraries were established in Baroda, discusses the present scenario in selected states such as Karnataka and Kerala: emphasizes the need for strengthening the rural libraries to shoulder new responsibilities for the socio economic developments. It identifies the following main objectives for community information centre. 1) provide easy access to necessary information to enable rural people to effectively participate in the process of development, 2) serve as centre for educational and cultural activities, 3) provide access to non-print media such as radio, TV, audio video tapes particularly for those who lack study skill and 4) develop the effective communication strategy with appropriate media mix such as print material, charts and graphics, posters, non-print media to educate the rural populations.

Padmamma *et al.*, (2001) have conducted a study of the public library services for women in the chickmangalore city central library, Karnataka, The necessary data for this study were collected through interviews of and questionnaires to the women users of chickmangalore city central library. The results of the study pointed out that 1) almost all respondents were satisfied with collection of books, magazines and newspapers and 58.33% were satisfied with borrowing facility 2) the library did not provide the users services such as new arrivals display, inter library loan, paper clipping service, reference service, overnight issue and books exhibition.

Objectives of the Study

1. To find out the frequency of visit.
2. To find out the time spent in the library.

3. To study the purpose of visit.
4. To find out the usage of library resources.
5. To find out the purpose of using the internet.

Research methodology

The present study is used questionnaire methods. Questionnaire is used to collect the primary data. The questionnaire was distributed to 110 users in Tiruvallur district. 103 filled questionnaires were received back by the researcher. Hence 103 questionnaires are used for data analysis and interpretation.

Data Analysis and Interpretation

TABLE I STATUS OF RESPONDENTS

Sl. No.	Status	Respondents	Percentage
1	Rural	44	43%
2	Urban	59	57%
	Total	103	100%

Source: Primary Data

The above table deals with out of the 103 respondents 57% (59) of the respondents are coming from urban area and the remaining 43% (44) are coming from rural areas.

TABLE II DISTRIBUTION OF RESPONDENTS - GENDER WISE

Sl. No.	Status	Respondents	Percentage
1	Male	23	22%
2	Female	80	78%
	Total	103	100%

Source: Primary Data

The Table II reveals that out of the 103 respondents 78% (80) of the respondents are female and the remaining 22% (23) are male respondents

TABLE III FREQUENCY OF LIBRARY VISIT BY THE RESPONDENTS

Sl. No.	Frequency	Respondents	Percentage
1	Daily	54	52%
2	Weekly	34	33%
3	Twice in monthly	10	10%
4	Occasionally	05	05%
	Total	103	100%

Source: Primary Data

The above table represented that only 52% (54) of the respondents are using library on a daily basis.

The below table shows that majority of the respondents 52% (54) spend 30 minutes during visit to the library, 33% (34) of the respondents using the library 1 hour respectively.

TABLE IV TIME SPENT IN THE LIBRARY BY THE RESPONDENTS

Sl. No.	Time	Respondents	Percentage
1	30 Minutes	54	52%
2	1-Hour	34	33%
3	1-2 Hour	10	10%
4	Above 2 hours	05	05%
	Total	103	100%

Source: Primary Data

TABLE V PURPOSE OF VISIT TO THE LIBRARY

Sl. No.	Purpose	Respondents	Percentage
1	Borrow Books	38	37%
2	Read Stories/ General Books	04	04%
3	Read Magazine/Newspaper	21	20%
4	Project work	40	39%
	Total	103	100%

Source: Primary Data

The above table deals with majority of the respondents 39% (40) of the users using the library for project work followed by 37% (38) to borrow books, 20% (21) to read magazine and news paper and 4% (04) for reading stories and General books.

TABLE VI USAGE REFERENCE SOURCES BY THE RESPONDENTS

Sl. No.	Methods	Respondents	Percentage
1	Dictionaries	31	30%
2	Encyclopedias	17	16%
3	Reference Books	40	39%
4	General Knowledge	15	15%
	Total	103	100%

Source: Primary Data

The Table VI shows that majority 39% (40) of users are using reference books followed by 30% (31) dictionaries, 16% (17) encyclopedias and 15%(15) General knowledge.

TABLE VII PURPOSE OF USING THE INTERNET BY THE RESPONDENTS

Sl. No.	Methods	Respondents	Percentage
1	Subject Search	74	72%
2	E-Mail	09	09%
3	Job search	14	14%
4	On line	06	05%
	Total	103	100%

Source: Primary Data

The Table VII indicate that majority 72%(74) are using internet for subject search, followed by 14%(14) for job search, 9%(9) for e-mail and 5%(6) for online goods.

Findings of the study

1. 57% of the users are coming urban area.
2. 78% of the users are female.
3. 52% of the users are using library daily.
4. 39% of the users using the library for project.
5. 39% of the users are using reference books in the library.
6. 72% of the users are using the internet for subject search.

Conclusion

The public library is a product of modern democracy. Democracy needs for its sustenance and survival an enlightened, knowledgeable and responsible citizenry. There are no institutions founded by the society which are more effective in the molding of such a citizenry than the public library. A public library the role it can play in the enhancement of the quality of life of the people cannot be over emphasized. There should be all out efforts to develop a public library system that will prove equal to this task.

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Use of E-Resources by the Engineering College Library Users in West Bengal

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Abstract - This particular research is going to evaluate the rate of using E-resources among library users of the engineering college in west Bengal. The salient objective of the study was to identify the frequent use of E-resources in the contemporary times. Finding of the research has revealed that all of the students are found to be interested in using E-resources and also are satisfied by using such E-resources in the contemporary times. This research has revealed that students are interested in using such a particular mode of information because it can be easier for them to stay connected with the basic daily information. Some of the students have decreased motivation by using E-resources due to the lack of accurate network connection, failure of power, improper maintenance of the system and issues related to subscription.

Keywords: E-Resources, Engineering College, Library Users.

Introduction

E-resources have become a silent backbone in the context of education that provides an easier mode of gaining knowledge for students. The E-Resources are dynamic as they are continuously and regularly updated so they are becoming one of the most indispensable sources of information for any organization and particularly to Libraries.

Variety of E-Resources

Formal Sources: E-Journals, E-Books, Digital Archives, Conferences, Statistical Sources, Reference Sources, Electronic Thesis and Dissertations, Standards, Patents, Reports, Newspaper.

Informal Resources: Electronic and Discussion Group, Databases, Bulletin Boards, Web Exhibitions, Virtual Help Desks, Sound Records, IRs, Subject Gateways, Institutional and People Sources.

Internet/ Web Resources: Internet and Web. Resources. Web Blogs, Library Websites, Web-OPAC, Digital/ Virtual Library, Wikis.

Literature

The reviews are secret into three categories namely

1. Use of online mode of resources.
2. Use of online library.
3. Accurate identification of online resource.

Use of E-Resources

As per the research of Bidyut Bijpal it can be found out that all of the faculty members are found to be satisfied over using such online mode of information in order to stay updated in the contemporary times. This study has been conducted in order to evaluate the implication of using this kind of resources by the teachers and professors of a particular college namely, VBS Purvanchal college. The salient purpose of the research was to know about the review about using the internet mode of learning in the particular context. By evaluating the result, it can be revealed that all of the faculty members are found to be dissatisfied regarding the slow connection of the network, issues related to speed and other issues that can be considered majorly as the connection issue.

Another research by Gunasekaran, Balasubramani and Sivaraj has revealed that people who are involved with the computer science and electronic department use more E-resources than others.

Electronic Library Use

Appleton has taken a case study in which three educational colleges have been used in order to conduct the entire research. This research has aimed to reveal the experience of these students in the context of using online mode of resources in their education. Along with that it can also be stated that this particular system of learning is found to be effective for developing autonomous as well as independent learning for students. This online mode of resources is also found to be effective in order to inform teachers as well as students about the collaboration in the education system. All of the staff members need to collaborate in order to make the entire process successful.

Selection of Electronic Resources

Miller (2000) has conducted a study in order to develop a clear knowledge about the process of collection for educational purposes. It can also be found out that a dramatic change in the context of purchasing power. From the research it has been found out that the increased importance of the present context. Another research of Davis (2001) has revealed that an in-depth application of selection activities is found to be effective in the context of increasing criteria among the education system. Technological context needs to be required before understanding the process of using online resources.

There are two levels of criteria that are used for selecting the formats that are solely related to non-book structure. These two levels are content, presentation and format that are found to be required in order to select such resources. In the context of selection of the mode of resources are mostly dependent on the advanced infrastructure. Authors, Publishers, producers and other persons need to be considered in order to determine the structure of the services.

Objectives of the Study

1. To Study the E-Resources available in the Engineering College in West Bengal.
2. To Study the Present Situation and identify the problems on E-Resources in Engineering College.
3. To Study the knowledge of Library Professionals on various aspects of E-Resources.

Delimitation of ythe Study (Scope)

This study has aimed to identify the importance and flexibility of the online resources considering the overall development of the particular mode of resources. Such a study helps to understand the use of these resources in engineering colleges of West Bengal. Availability has to be exploited optimally by the libraries for the benefit of the users. The study needs to be made to assess the provisions made by these colleges to provide access to these e-resources. It is also essential to study their impact on information service to the users to fulfill their needs. While studying the use it is also essential to understand and make plans for optimum use of these resources.

The salient topic lies in the concept of the usage of online resources by engineering college students in West Bengal. This study aims to reveal the information seeking behavior as well. The area of the study focused on approximately One Hundred Twenty Engineering Colleges of West Bengal. The geographical area of this study is confined only to West Bengal Engineering colleges. This study is related to the Information-seeking behaviour in Electronic Environment available information centers such as the Engineering College of West Bengal.

Methodology

Qualitative analysis has been done in order to complete this particular research. Data has been collected from the students who are involved with the engineering college. Questionnaires have been made in order to collect data in the present research. Target population has been chosen by including several faculty members, students and research scholars in order to know their experience about the entire topic. Participants were allowed to send their responses via online services. 66 engineering colleges have been included in the present context. The data were taken by using questionnaire format among the college students. Finally, 3468 participants have agreed to give data by involving with the particular research. Along with that it can be said that engineering colleges have been included for collecting data. The data were scrutinized and re-analyzed by using necessary tabulation and the process of manipulation. Necessary analysis has been done in order to maintain the accurate rule of the study.

General Information

TABLE NO I SEX- WISE DISTRIBUTION OF THE ASSENTERS (ANALYSIS OF THE STATICS)

Sl.No.	Sex	Library Assenters	Per-cent
1	Male	2148	32.54 %
2	Female	1320	20 %
	Total	3468	52.54 %

Table I contains the sex-wise distribution of the students, it shows that out of the 66 Engineering College Libraries assenters 2148 are Male that adds up to (32.54%) and 1320 are female assenters that add up to (20%) of the student count.

E-Resources Use in the Engineering College Library

TABLE II FREQUENCY OF VISITS TO THE LIBRARY TO ACCESS ELECTRONIC RESOURCES

Sl. No.	Frequency	No. of Users	Per-cent
1	Daily	2226	64.18 %
2	Twice a week	330	9.51 %
3	Weekly	448	12.92%
4	Fortnightly	168	4.84%
5	Monthly	196	5.65 %
6	Occasionally	100	2.90 %
	Total	3468	100

Table II is that clear 2426 (64.18%) out of 3468 respondents visit their college library daily to access E-Resources, 330 (9.51%) visit their library Twice a week, 448 (12.92%) visit their library weekly, 168 (4.84%) visit their library fortnightly, 196 (5.65%) visit their library monthly and 100 (2.90%) visit their library occasionally when the need arises to access E-Resources from the Library.

Average Time Spent in Library

Different users use different ways to access the information's that are published on electronic media. These may be by browsing and scanning through random web-pages or by searching for valid and specific information from the internet.

TABLE III THE AVERAGE PERIOD OF TIME SPENT IN THE LIBRARY TO ACCESS THESE RESOURCES

Sl. No.	The time period spent in the library	Number of Assenters	Per-cent
1	One Hour	1725	49.74 %
2	Two Hour	1328	38.29 %
3	More than Two Hours	415	11.96%
	Total	3468	100

It is clear from Table III that 1725 (49.74 %) out of 3468 respondents spent only one hour in their library to use resources and it might be presumed to browse and scan the reading materials only. It is found that 1328(38.29%) and 415 (11.96 %) spent Two hours and more than Two Hours using E-Resources in their college Library.

TABLE IV AWARENESS LEVEL TOWARDS ELECTRONIC RESOURCES

Sl. No.	Level of Awareness	Number of Assenters	Per-cent
1	Excellent	1459	42.07 %
2	Good	1195	34.45 %
3	Fair	473	13.63%
4	Poor	194	5.60%
5	Very Poor	147	4.25 %
	Total	3468	100

Table IV indicates the level of awareness of using E-Resources towards Library Users among the 1459 (42.07%) Respondents Level of Awareness is Excellent, 1195 (34.45%) Respondents Level of Awareness is Good, 473 (13.63 %) Respondents Level of Awareness is Fair, 194 (5.60 %) Respondents Level of Awareness is Poor and 147 (4.25 %) Respondents Level of Awareness is very poor related to using E-Resources from Engineering College Library in West Bengal.

TABLE NO V AWARENESS TOWARDS THE ELECTRONIC RESOURCES

Sl. No.	Option	No. of Assenters	Per-cent
1	Yes	2961	85.38%
2	No	507	14.61%
	Total	3468	100

Table V indicates the awareness about E-Resources towards Library Users among the 2961 (85.38%) Respondents Aware about E-Resources from Engineering College Library in West Bengal and 507 (14.61%) Respondents are not aware of E-Resources.

Search Interfaces Used

The various students use various interfaces in their daily methods of accessing the electronic resources of data. It can be seen from the Table VI that 119 (3.44%) respondents working and study in engineering college under the study area use search engines to locate E-Resources, while 2725 (78.57%) use library websites and 624 (17.99%) Respondents use other useful sites to locate E-Resources. The respondents are either not familiar with search formulations or other alternative search methods.

TABLE NO VI THE INTERFACE OF SEARCHING USED BY THE ASSENTERS TO LOCATE THE RESOURCES ON THE ELECTRONIC MEDIA

Sl. No.	Search interface used	Number of assenters	Per-cent
1	Search Engines	119	3.44%
2	Library Website	2725	78.57 %
3	Have information on all useful sites	624	17.99%
	Total	3468	100

Implementational Places of Electronic Resources

The general accessing places are the Departments, library, Home, or Cyber Centres.

TABLE VII IMPLEMENTATIONAL PLACES OF ELECTRONIC RESOURCES

Sl. No.	Option	No. of users	Per-cent
1	Department	188	5.42 %
2	Library	530	15.28 %
3	Home	1250	36.04 %
4	Hostel	1130	32.58 %
5	R&D Centre	200	5.76 %
6	Browsing Centre	150	4.32%
7	Any Other	20	0.57 %
	Total	3468	100%

Table VII reveals that about 188 (5.42%) respondents using Search E-Resource in Department, 530(15.28%) respondents using Search E-Resource in Library, 1250 (36.04%) respondents using Search E-Resource in Home, 1130 (32.58%) respondents using Search E-Resource in Hostel, 200 (5.76%) respondents using Search E-Resource in R&D Centre, 150 (4.32%) respondents using Search E-Resources in Browsing Centre and 20 (0.57%) respondents using Search E-Resource any other.

TABLE VIII LEVEL OF SATISFACTION WITH THE E-RESOURCES /DATABASE/CONSORTIUM

Sl. No.	Option	No. of users	Per-cent
1	Excellent	1350	38.92 %
2	Good	1062	30.62 %
3	Fair	566	16.32%
4	Poor	295	8.50%
5	Very Poor	195	5.64 %
	Total	3468	100

Table VIII indicates the Level of Satisfaction with the E-Resources/ Database/ Consortium of using Consortia towards Library Users among the 1350 (38.92%) Respondents Level of Satisfaction is Excellent, 1062 (30.62%) Respondents Level of Satisfaction is Good, 566 (16.32 %) Respondents Level of Satisfaction is Fair, 295 (8.50%) Respondents Level of Satisfaction is Poor and 195 (5.64 %) Respondents Level of Satisfaction is very poor related to using Consortia from Engineering College Library in West Bengal.

Awareness on Availability of Electronic Resources

The availability of the e-Resources is also affected by the awareness of the users and the ways that they can be accessed.

TABLE IX AWARENESS ABOUT THEIR LIBRARY SUBSCRIBING FOR ELECTRONIC RESOURCES PORTAL

Sl. No.	Option	No. of users	Per-cent
1	Yes	2760	79.58 %
2	No	708	20.42 %
	Total	3468	100

It is found that 2760(79.58%) out of 3468 respondents are aware that their college library subscribes to the E-Resources portal while 708 (20.42%) Respondents are not aware that their college library is subscribing to the E-Resources portal. It is quite encouraging and satisfactory.

TABLE X ENGINEERING DATABASE USING

Sl.No.	Option	No. Of Users	Percentage
1	Yes	2534	73.06%
2	No	934	26.94%
	Total	3468	100 %

It is found that 2534(73.06%) out of 3468 respondents are aware that their college library uses Engineering Database while 934(26.94%) respondents are not aware that their college library uses Engineering Database. It is quite encouraging and satisfactory. The not aware category might be from fresher's who have entered the job recently such possibilities can be explored and also in this context orientation program on library resources is required the library services.

Purpose of Use Electronic Resources

They were asked about their subscribed electric resources and the data of their responses is in the table below

TABLE XI PURPOSE USE E-RESOURCES IN ENGINEERING LIBRARY

Sl. No.	Option	No. of Users	Per-Cent
1	Studying	1441	41.55 %
2	Publishing Research Article	560	16.15 %
3	Research/Project	652	18.80 %
4	Exchange of Idea	225	6.50 %
5	Teaching/Guide	269	7.75 %
6	Other	321	9.25 %
	Total	3468	100 %

Each individual has a different purpose in using electronic resources, Table no. XI sheds light on the most popular purpose of the students to use these type of resources. The assenters stated that about 1441 (41.55%) of the students use them on a daily frequency for daily information purposes. About 560 (16.15%) use them for academic purposes and study.

About 652 (18.80%) use the e-Resources for publishing their own research articles. 225 (6.50%) respondents use e-Resources for an exchange of thoughts and ideas. 269 (7.75%) users refer to these resources as teaching guides and 321 (9.25%) use them for various other purposes.

The Institution Repositories Consulted

The query was sought for what content that is E-Resources the Teachers and Users use and the results are presented in Table

TABLE XII TYPES OF E-RESOURCES USE IN ENGINEERING LIBRARY

Sl.No.	Option	No. Of Users	Percentage
1	Website	679	19.57 %
2	E-Journal	551	15.88 %
3	E-Books	726	20.93%
4	Online database	1125	32.43%
5	CD-ROM Database	143	4.13%
6	OPAC	94	2.71 %
7	Other	150	4.35 %
	Total	3468	100

ERs are available in various forms to the students to satisfy the needs and requirements of the readers and the amount of information that is presented in the resource. From evaluation Table 12 states that a huge ratio of the assenters 1125 (32.43%) use online databases. 679 (19.57%) respondents use Website, 551 (15.88%) respondents use E-Journal, 726(20.93%) respondents use E-Books, 143 (4.13%) respondents use CD-ROM Database. However, 94(2.71%) respondents use OPAC and 150 (4.35 %) respondents use other types of ER.

Different Methods Used to Access Electronic Resources

The opinions of the assenters were obtained through the survey and it was found that there are different methods of accessing an electronic resource, and ways to identify the exact resources that would be relatable and applicable in the reason behind the quest for the resource.

TABLE XIII METHOD ACCESS THE E-RESOURCES

Sl. No.	Option	No. of users	Percentage
1	Trial and error method	472	13.62 %
2	Suggestions from friend and colleagues	1370	39.50 %
3	Guidance from the Library Staff	467	13.46 %
4	Self instructions	389	11.22 %
5	Attending Workshop, Training Programs	470	13.55 %
6	Other	300	8.65%
	Total	3468	100

It can be seen from the above Table XIII that 472(13.62%) out of 3468 respondents access E-Resources by Trial and error method, 1370 (39.50%) respondents take suggestions from friends and colleagues to access E-Resources, 467(13.46%) respondents take the help and guidance from

the Library staff to access E-Resources, 389(11.22%) respondents self instructions to access E-Resources, 470(13.55%) respondents have learned from training programs and workshops, while 300(8.65%) respondents use other methods to access E-Resources.

Advantages of E-Resources

The respondents were asked to answer to a checklist of advantages such as saving space, high storage, easy to handle, searchability, universal access, cost of searching, visibility and multimedia advantages of the content, and so on. The extent the use of E-Resources has various effective advantages with the results generated from this survey and the same are presented under Table XIV. The advantages are also rated with different scales as; 1,2,3,4 and 5 representing.

1. Strongly Agree
2. Agree
3. Uncertain
4. Disagree
5. Strongly Disagree

Share Experiences in Various Advantages of Electronic Information Resources

1. Strongly Agree
2. Agree
3. Uncertain
4. Disagree
5. Strongly Disagree

TABLE XIV SHARE EXPERIENCES IN VARIOUS ADVANTAGES OF ELECTRONIC INFORMATION RESOURCES

Sl.No.	Advantage of E-Resources	1	2	3	4	5	Users
1	High storage requirement	454	317	37	23	09	840
2	Data reliability and Security	205	131	10	4	3	353
3	Save space and time	135	79	19	19	24	276
4	Easy to handle	122	66	13	14	20	235
5	common access	175	77	19	11	8	290
6	Reduced costs	113	53	6	6	13	189
7	many access and many access	60	45	7	5	6	123
8	Consortia approach	145	51	9	3	4	212
9	Multimedia effect	78	23	6	8	7	122
10	Search ability	134	33	3	7	3	180
11	Hyperlinks	71	43	2	3	1	120
12	Speed Communication	246	66	15	10	5	342
11	Anytime, anywhere access	67	34	7	7	4	119
14	Others	34	20	10	2	1	67

It can be seen from the above Table XIV that 454 respondents out of 3468 respondents who are Users in Engineering Colleges understudy region strongly agree that High Storage requirement is most advantages of the E-Resources. It is also advantageous as it Data reliability and Security which is strongly agreed and agreed by 205 respondents. The responses for strongly agree and

agree are taken together here as they are near common characteristics. E-Resources have an advantage due to their Save space and time, Easy to handle which is agreed by 135 respondents and 122 respondents. 175 respondents agree that E-Resources are Common access, 113 respondents agree that information is available at Reduced costs through E-Resources, 60 respondents agree that they can be accessed by multiple users at any point of time, 145 respondents agree that the advantage in Consortia approach, 78 respondents agree that E-Resources provide Multimedia effect, 134 respondents agree that they are easily searching able, 71 respondents agree that the advantage in E-Resources are the hyperlinks they provide, 246 respondents agree that the advantage in Speed communication, 67 respondents agree that the advantage in E-Resources is the Anytime, anywhere access.

Preference To Read The Retrieved Information

The respondents were asked that are their preferences to read print or electronic version of the retrieved documents. The data is presented under Table XV.

TABLE XV PREFERENCES TO READ THE RETRIEVED INFORMATION (EX. JOURNAL/ARTICLE)

Sl. No.	Option	No. of user	Percentage
1	Print (Hard Copy) only	1150	33.16 %
2	Electronic (Computer) only	1045	30.14 %
3	Both	1273	36.70 %
	Total	3468	100

It has been observed from Table XV that 1150 (33.16%) out of the 3468 assenters have a keen preference towards printed resources and reading materials. 1045 (30.14%) have a preference for reading electronic resources only and 1273 (36.70%) assenters do not have any specific preference over both and are keen to read both electronic as well as printed data.

Disadvantages Of E-Resources

The E-resources have some advantages; there are also few disadvantages of them which are identified from the responses received from the respondents under the survey. The disadvantage seems to be technical and operational. Table XVI has listed them and their responses.

It is found that technological changes, updating of software tools, like operating systems and word processors, have led to a situation where users have to encounter some unaware of the trend. So all these demerits of E-Resources are examined here and user responses are sought. The data are presented here.

1. Strongly Agree
2. Agree
3. Uncertain
4. Disagree
5. Strongly

It can be seen from the above Table XVI that 345 (out of 3468 respondents agree that face difficulty due to incompatibility between formats while in case of using diverse data formats, 126 respondents agree that they face problems, while 30 strongly agree that they face problems in copyrights issues while accessing E-Resources, 121 respondents strongly agree that they are uncomfortable while reading e-copy, 211 respondents strongly agree that readability of e-copies is the disadvantages while accessing E-Resources.

TABLE XVI SHARE EXPERIENCES ON DISADVANTAGES OF ELECTRONIC INFORMATION RESOURCES

Sl.No.	Disadvantage of E-Resources	1	2	3	4	5	Users
1	Incompatibility between formats	345	123	66	20	13	567
2	Use diverse data formats	126	56	12	20	16	228
3	Copyright issues	30	23	22	46	33	154
4	Uncomfortable in reading e-copy	121	61	32	13	13	240
5	Readability (Slower than paper)	211	98	45	7	5	366
6	Credibility	125	60	40	13	7	245
7	Acceptability	260	132	33	22	7	454
8	Performance	204	80	40	20	10	354
9	Slow download	60	40	70	60	27	257
10	Technology change	99	31	10	3	2	145
11	Health issue	133	41	26	18	6	224
12	Others	164	50	10	7	3	234

125 respondents strongly agree that they face the problem about the credibility of information available through E-Resources, 260 respondents strongly agree that acceptability of the information available while going through E-Resources. 204 respondents strongly agree that they face problems in the performance of information collected from E-Resources.

60 respondents strongly agree that they face the problem of slow download while accessing information through E-Resources. 99 respondents strongly agree that they find it difficult to access E-Resources due to continuous technological changes that take place. 133 respondents strongly agree that they face health issues while accessing E-Resources.

Problems in Accessing E-Resources

The survey also made on the problems faced by the respondents on accessing E-Resources. The data are presented under Table XVII.

TABLE XVII PROBLEMS FACED WHILE ACCESSING THE E-RESOURCES

Sl.No.	Option	No. of users	Percentage
1	Lack of availability of computer terminals	292	8.41%
2	Lack of information about how to use E-Resources	1799	51.88%
3	Lack of self-helping guides	677	19.54 %
4	Lack of support from the Library Staff	455	13.11%
5	Others	245	7.06%
	Total	3468	100

It can be seen from Table XVII that 292 (8.41%) out of 3468 respondents in engineering colleges face the problem of lack of availability of computer terminals in their library when they want to access E-Resources, 1799 (51.88%) respondents feel that there is no information on the use of E-Resources in their library, 677 (19.54%) respondents feel that there are no self-helping guides in

their library to access E-Resources, 455 (13.11%) respondents felt that enough supports are not coming from the library staffs of their colleges in accessing E-Resources.

Orientation Programmes

To promote and facilitate the use of the library and its resources, in print and E-Resources libraries are conducting Orientation programs to the users. A question was put to find how many college libraries are conducting such programs. The Data are presented under Table XVIII.

TABLE XVIII ORIENTATION/ TRAINING PROGRAMMES TO USERS OF E- RESOURCES

Sl.No.	Option	No. of users	Percentage
1	Yes	569	16.40 %
2	No	2899	83.60 %
	Total	3468	100

It can be seen from the above Table XVIII that 569 (16.40%) out of 3468 respondents have been given orientation/ Training programs to use E-Resources by their library and 2899 (83.60 %) have not been given orientation/ training programs to use E-Resources by their library.

Suggestion

1. The Librarian and the Users as well are comfortable with the Technological advancements converted to the advantage of their collection of information sources and services.
2. All Engineering College of West Bengal College should have their portals instead of forming part of the College's main Web page. The College Web page may find a place in the College main Web page and hyperlink.
3. Awareness and Training Programmes should be conducted for all Users (Library Users)
4. More number of Terminals have to be added in the Digital/ Infonet Division of the Library with Internet Connectivity.
5. Engineering Students should be provided more Training for the use of E-Resources and Internet Effectively.

Conclusion

The current generation is heavily dependent on Information technology and the Internet of thinks for education and various other purposes. Most of the respondents' have experienced that there must be User-Oriented awareness programs that would incorporate the access and availability of the electronic resources of data. The library profession plays a very important role in the handling of information along with retrieval and repacking them into resources. Information is one of the main resources of education and knowledge in the current society for various reasons. The growth of the ER is important for the development of the students who access them and use them. Information is accessible in different formats and forms and most of them are accessed in e-formats. The growth of these resources will be seen when the sources are developed and made advanced and better accessible for the students and the teachers to access. In the context of the Indian students AICTE, National level for Engineering and Technical education are guidelines for the subscription of E-Resources subsequently state the various method that could be used to upload and update these e-resources. The Engineering Libraries are subscribing a variety of E-Resources to meet the information demands of users in Engineering College. Maximum Engineering College is following management aspects to maintain E-Resources in Libraries. Professionals need to attend information literacy programs in the areas of E-Resources.

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User Perceptions on Extension Services and Library Usage in Public Libraries: A Case Study on Ernakulam Public Library

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Abstract - *The libraries nourish and flourish with the increase in the number of users and resource usage. Information needs have a profound change in the current educational scenario owing to digital evolution. The regular library activities should be reformed to link the transformational needs of the present users. The study is focused on the marketing strategies practised to publicise Ernakulam public library, particularly extension programmes of the library to attract and motivate users to visit the library and explore its resources.*

Keywords: *User needs, Extension Services, Public libraries, Ernakulam Public Library, User satisfaction, Marketing Strategies.*

Introduction

The library is a treasury of knowledge, and the librarians are considered the stewards to maintain and manage the treasure in it. So, the knowledge has to be disseminated and shared among people to explore its value. The libraries should reach out to the users to promote and market their resources and services; it is the library professionals' fundamental responsibility. The way users approach information has changed entirely; the library system should also be restructured to accommodate the users' changing needs. They should bring the users' resources, and extension activities are crucial components to achieve such goals. ALA Glossary of Library and Information Science 1983 defines library extension services as "the provision by a library of materials and services (including advisory services) to individuals and organisations outside its regular service area, especially to an area in which library service is not otherwise available".

Digitalisation is also a trend adapted in knowledge; information centres have also become a part of it by converting their resources and services into digital formats. The change created a significant impact on the user's access to information, and it will continue. As part of the regular library routine reconstruction, Digi-mode information access should bond up with the implementation of extension activities in libraries. The study's fundamental concepts are the user perceptions on extension services and their relation with library usage in Ernakulam public library and the need for such activities, and the role of digitalisation in implementing the programmes.

Literature Review

Hadiza Umar (2020) endeavoured to ascertain the role of extension services to develop influential information societies in Nigeria. The study further describes the concept of Information Societies, Strategies for Library extension services as affecting the development of information and the challenges associated with library extension services.

Mamta Kumari and Sukhpreet Singh (2017) connect extension services with the public's social relationships through their paper "Extension services in public library" It explains that the activities can help broaden the circle of the user community.

Zahra Tabatabaei Shahrabad (2016) examined the young adults' perceptions and usage of public library services in Iran. He found out that the necessity of the public library is more than the moderate extent, and loan services, reference service, and information services were used more

than the expected level. Extension services were used less due to the lack of time and a tremendous amount of homework. Rasmussen (2015), in his paper "Every Reader His Book-Every Book, its Reader? Notion on readers Advisory and Audience Development in Danish Public Libraries", aims to enhance an understanding of activities situated in the period between readers' advisory and audience development. It was achieved by analysing opinions and reflections expressed by 13 managers and librarians in all six county libraries in Denmark.

Owoeye and Rita (2012), in the article "Strategies for Development of Public Libraries: A Survey of Selected Public Libraries in Lagos State, Nigeria", investigates strategies for the development of public libraries in Lagos State, Nigeria. The study population consists of librarians and users of public libraries in Lagos State, and eleven public libraries and twenty local government libraries in the state were surveyed. The significant findings were that public libraries in Lagos State were not sufficiently financed. The parent body has yet to meet the International Federation of Library Associations (IFLA) standard of public library establishment. The study highlighted the challenges faced by public libraries in Lagos and offered some remedies.

Objectives of the Study

1. To revise various extension activities of Ernakulam public library to enrich the quality of the services.
2. To highlight the inevitability of such activities in public libraries to promote the public's resources and services.
3. To analyse the user satisfaction in various activities of the library.
4. To find out the library usage association with extension services.
5. To explore the role of digitalisation in the marketing strategies of the library for publicising the resources.

Scope and limitations of the study

Extension service is the library's effort to increase users' number and enhance the maximum use of its resources and services (Savitha, 2017). Regular promotion of library activities may create a significant impact on library usage. The intent was to analyse the perspectives of Ernakulam public library users about the extension services to discover the essential way to foster the resources and services.

The Ernakulam public library, which was founded in 1870, is Kerala's oldest and largest library. With over 150,000 books in various Indian languages, the library has over 10,000 members and can accommodate another 10,000. There are 47248 English books, 30665 Malayalam books, 4777 Hindi books, 2891 Tamil books, 200 Sanskrit books, and 127 French books in the library's collection. The library follows the open access system, permitting an individual to decide on any book that he/she desires by walking around the shelves. The library and reading room works even days a week except on notified holidays from 10.00 am to 7.00 pm and 8.00 am to 8.00 pm. The extension services offered by Ernakulam public library are a) Mobile library, b) Reading to the illiterate, c) Reading circles for children, d) Reading circles for adults, e) Exhibitions, f) Cultural programmes, g) Talks on current topics, h) Seminars, i) Mini library system, j) Audio-visual media, k) Memorisation speech, l) Quiz programmes, m) Celebration of book week, n) Book reviews, o) Film shows.

The library users were the participants of the study. The study centred solely on the users of the public library in Ernakulam district. So, the outcomes of the study are only applicable to Ernakulam public library users. The result of the work may be inaccurate due to the lack of cooperation of the participants.

Methodology

The case study method was adopted to analyse the work. The questionnaire was the tool used to collect the required data. A structured questionnaire was designed and delivered randomly to hundred users of the library on five different days. Ninety-eight individuals responded to the questionnaire.

Analysis

The data analysed and processed using the feedback received from the questionnaires given to the public library users. The private data of the respondents have not been revealed in the analysis. The research information collected using the survey is conferred within the sorts of tables.

Opinion about the extension activities of the library

The users' opinions about the extension services were analysed to know the views and responses. Users were given the provision to express their opinion in five different options, which are a) excellent, b) good, c) satisfactory, d) poor, e) no comments. More than 50% of users had an excellent opinion about all the library's extension services.

TABLE I OPINION ABOUT THE EXTENSION ACTIVITIES OF THE LIBRARY

Services	Excellent		Good		Satisfactory		Poor		No comments	
	Number of users	Percentage (%)	Number of users	Percentage (%)	Number of users	Percentage (%)	Number of users	Percentage (%)	Number of users	Percentage (%)
Mobile library	55	56.12	24	24.48	6	6.12	11	11.22	2	2.04
Reading to the illiterate	50	51.02	17	17.34	20	20.40	7	7.14	4	4.08
Reading circles for children	52	53.06	24	24.48	12	12.24	8	8.16	2	2.04
Reading circles for adults	50	51.02	18	18.36	18	18.36	10	10.20	2	2.04
Exhibitions	56	57.14	20	20.40	17	17.34	4	4.08	1	1.02
Cultural programmes	51	52.04	18	18.36	20	20.40	7	7.14	2	2.04
Talks on current topics	55	56.12	21	21.42	9	9.18	10	10.20	3	3.06
Seminars	51	52.04	25	25.51	14	14.28	6	6.12	2	2.04
Mini library system	58	59.18	30	30.61	6	6.12	3	3.06	1	1.02
Audio-visual media	57	58.16	22	22.44	12	12.24	6	6.12	1	1.02
Memorization speech	52	53.06	23	23.46	16	16.32	5	5.10	2	2.04
Quiz programmes	54	55.10	21	21.42	12	12.24	8	8.16	3	3.06
Reading week celebration	50	51.02	21	21.42	16	16.32	9	9.18	2	2.04
Book review	58	59.18	26	26.53	10	10.20	2	2.04	2	2.04
Film shows	59	53.06	29	29.59	8	8.16	2	2.04	0	0.0

Satisfaction in conducting library extension services

Satisfaction level in organising extension services was inquired to find out whether it meets with user requirements. 77.5% of users were satisfied with the frequency of conducting the activities.

TABLE II SATISFACTION IN CONDUCTING LIBRARY EXTENSION SERVICES

Satisfaction in conducting library extension services	Number of respondents	Percentage
Yes	76	77.5%
No	22	22.44%

Most preferred extension services

Film shows are the most preferred extension activity from the user's perspective. They are also more attracted to exhibitions, memorisation speech, book reviews and cultural programmes.

TABLE III MOST PREFERRED EXTENSION SERVICES

Most useful extension services	Number of respondents	Percentage
Book review	14	14.28%
Film shows	31	31.62%
Memorization speech	17	17.34%
Exhibitions	19	19.38%
Cultural programmes	14	14.28%
others	3	3.06%

Progress in library usage through extension activities

Users (More than 75%) express that the different activities of libraries encourage them to visit the library and use the resources available in the library.

TABLE IV OPINION ABOUT THE PROGRESS IN LIBRARY USAGE THROUGH EXTENSION SERVICES

Opinion about the progress in library usage through extension services	Number of respondents	Percentage
Strongly agree	45	45.91%
Agree	31	31.63%
Strongly disagree	10	10.20%
Disagree	8	8.16%
No comments	4	4.08%

Causes of dissatisfaction in the extension services of the library

The investigation regarding the causes of the dismay in the extension services queried shows that the dissatisfaction caused mainly was due to the lack of time and interest.

TABLE V CAUSES OF DISSATISFACTION IN THE EXTENSION SERVICES OF THE LIBRARY

Causes of dissatisfaction in the extension services of the library	Number of Respondents	Percentage
Lack of time	13	59.09%
Lack of encouragement from the staffs	1	4.5%
Lack of training	1	4.5%
Lack of interest	4	18.18%
Unawareness about the extension services	2	9.09%
Others	1	4.5%

Findings and Suggestions

Film shows and Exhibitions are the most preferred activities among the other programmes. The users are highly satisfied with the events and sessions. Opinions of users about library usage progress through the conduct displays the perfect association of extension services with library usage. Digitised programmes are less (film shows and audio-visual media). It has to be upgraded; social media platforms like Facebook, Instagram, etc., can be used to promote library activities. More digitalised programmes have to be added with the current ones to motivate the public to grow a scholarly society.

Conclusion

Users are the customers of libraries; satisfaction of the customers should be the priority for an organisation. The products also have to be boosted through campaigns, discussions, workshops etc. Extension services are one of the best marketing strategies used for advertising libraries and their treasures.

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Difficulties to Access Information Sources and Services in Mango Cultivation of Malda District in West Bengal

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Abstract - It is too important to get necessary information in time from the reliable information sources. The study deals with multi facets of difficulties that are being faced by the mango cultivators to get accurate information from the various information sources due to proper knowledge and guidance. The study reveals that the horticulture and allied information extension centres are responsible to fulfill the mango cultivators' information need and also provides proper guidance to take care of their mango orchard. Basically, mango cultivators are depending on verbal or oral information sources whenever they are fall in difficulties whereas they are not much eager to access documentary information sources. In the study it has been focused on unwillingness of mango cultivators to visit different information centres, difficulties to access information from various information sources and also evaluate the allied statements with the mango cultivation.

Keywords: Information Sources, Information Centers, Difficulties to Access Information, West Bengal.

Introduction

The study deals with viewpoint of the mango cultivators against the various difficulties to access information from the different sources. Due to proper knowledge to access information and guidance in time, mango growers are suffering lots of complexities in their mango farming. Farmers are unable to access current research outcome from the different research institutions and allied subject matter of mango cultivation. Basically rural mango growers are depending on verbal or oral information sources in their residing whenever fall in troubles whereas they are totally not trying to access information of documentary resources from the reliable sources. It has been focused on unwillingness of mango cultivators to visit different information centres, difficulties to access information from various information sources and also evaluate the allied statements.

Objectives of the Study

The objectives are as follows.

1. To assess difficulties of the mango cultivators to access information sources.
2. To evaluated allied statements by the mango cultivators.

Scope and coverage

The Malda district has been selected purposively because it possesses a maximum in an area of 30482 hectares under mango cultivation during 2016 with a 2,70,000 metric ton among all other West Bengal districts. The survey had been conducted during the year 2017-2019 and 400 mango cultivators had been considered for collection of data from four blocks and 100 from each block of Malda district, namely English Bazar, Manikchack, Rotua-II, and Rotua-I, because of highest production stated by R. Chakraborty, Assistant director of horticulture office, Malda (Personal communication, December 20, 2017).

Research methodology

It has been intended to adopt the survey method of research and a structured interview schedule has been prepared. Snowball sampling technique has been followed to select the appropriate sample size. Apart from that, relevant data have been collected from various documents, personal and institutional sources. The collected data have been classified, tabulated, analyzed, compared and interpreted duly keeping in view the investigation's objectives. The citations format in text and bibliographical references for print and non-print materials are strictly followed the guidelines forwarded by the 6th edition of American Psychological Association (2010).

Findings

Data interpreted and analysed based on responses received from the mango cultivators, and the below findings have been furnished.

Forms of information sources

Information is being published in a several format and it is important to select suitable format which is most convenient to the information seekers of their information need. It has been made an attempt to find out several forms of information resources as printed, non-printed and oral or verbal which were preferred to access by the respondents. In this regard 1 to 3 ranks scale were taken to represent the data of the mango cultivators in the below table.

TABLE I FORMS OF INFORMATION SOURCES

Forms of information sources	Rank					
	1		2		3	
	R	%	R	%	R	%
Printed	50	12.5	87	21.75	263	65.75
Non-printed/ Electronic (Web/Internet, TV, CD, DVD, Audio Tape etc.)	25	6.25	278	69.5	97	24.25
Oral/Verbal	325	81.25	35	8.75	40	10
Total	400	100	400	100	400	100

Table I highlights that highest (81.25%) number of respondent followed by oral or verbal sources of information, second highest (12.50%) number of respondent followed by printed sources of information and lowest (6.25 %) number of respondent followed by non-printed form of sources who was assigned 1st rank. Highest (69.5%) number of respondent followed by non-printed form of documents, second highest (21.75%) number of respondent followed by printed sources of information and lowest (8.75%) number of respondent followed by oral or verbal sources of information who was assigned 2nd rank. Highest (65.75%) number of respondent followed by printed form of sources, second highest (24.25%) number of respondent followed by non-printed sources of information and lowest (10%) number of respondent followed by oral or verbal sources of information who was assigned 3rd rank.

Information centers

There are several information centres available to fulfill the needs of information seekers. In the study has only considered the below tabulated information centres. Table II indicates that several information centres were visited by the mango cultivators to fulfill their information needs. All the 100% respondent not interested to visit library to fulfil their demand. Maximum (93.75%) number of respondent not interested and only 6.25% respondent interested to visit Block Development Office (BDO). Highest (90.75%) number of respondent not interested and only 9.25% respondent interested to visit horticulture office whereas maximum (95.75%) number of respondent not interested and only 4.25% respondent interested to visit mango merchant office.

TABLE II VISITS OF INFORMATION CENTRES

Name of center	Yes		No	
	R	%	R	%
Library	Nil	Nil	400	100
Block Development Office	25	6.25	375	93.75
Horticulture office	37	9.25	363	90.75
Mango merchant office	17	4.25	383	95.75

Reasons of unwillingness to visiting information sectors

In the study it has been endeavored to identify the reasons of hesitancy to access information through the different information centres such as Library, Block Development Office (B.D.O), Horticulture office and Mango merchant office of Malda district. The mango growers have accumulated their necessary information for mango cultivation from different corners of the information sources. Moulasab in his study 'A study on knowledge and adoption of improved cultivation practices by mango growers of north Karnataka' (2004) have cited, large majority of mango cultivars have used exhibitions, mass media, and literatures. Mango orchards are grown and established from generation to generation. This must helped the growers to know the basic practices of mango cultivation. The details of unwillingness of mango cultivators to visit various information centres have been discussed in the below table.

TABLE III REASONS OF UNWILLINGNESS TO VISITING INFORMATION SECTORS

Different sectors	No idea whether sectors can fulfill mango farming information needs		No idea about the sectors		Others	
	R	%	R	%	R	%
Library	264	66	63	15.75	73	18.25
Block Development Office	161	42.93	Nil	Nil	214	57.07
Horticulture office	Nil	Nil	229	63.09	134	36.91
Mango merchant office	Nil	Nil	207	54.05	176	45.95

R= Respondents

Total population of not visited stated information centres

Library: 400 respondents, Block Development Office: 375 respondents, Horticulture office: 363 respondents and Mango merchant office: 383 respondents.

Table III identifies that reasons of hesitancy to access information from the different information sectors. Maximum (66%) numbers of respondents confined that there was no idea whether the library could fulfill the information need of mango farmers whereas lowest 15.75% of the respondents confined that there was no idea about the library and 18.25% of the respondents not confined the specified reasons. There, in Block Development Office, highest (57.07%) numbers of respondents were not confined the specified reasons on the table whereas no respondent found of there was no idea about the Block Development Office (B.D.O) and 42.93% of the respondents confined that there was no idea whether the library could fulfill the information need of mango farmers. There found a maximum (63.09%) numbers of respondents who had no idea of the horticulture office, no respondent found whether the horticulture office could fulfill the mango farming information needs and 36.91% of the respondents not confined the specified reasons. There was also the highest (54.05%) numbers of respondents found who had no idea of mango merchant office and 45.95 % of the respondents not confined the specified reasons. No respondent found whether the mango merchant office could fulfill the mango farming information needs.

Difficulties to access information from information resources

It has been made an attempt to identify adversities of accessing information from the different information sources. The adversity circumstances generated from the various sources of information i.e. Books, Journal and Magazines, Newspapers, Oral or Verbal, TV and Web with associated measures have been taken into account. The difficulties of accessing information from the various sources are shown in the following table.

TABLE IV DIFFICULTIES TO ACCESS INFORMATION FROM INFORMATION RESOURCES

Information sources	No timely information		Inadequate information		No sufficient time to use		Others	
	R	%	R	%	R	%	R	%
Book	Nil	Nil	Nil	Nil	82	20.50	318	79.50
Journal/ magazine	Nil	Nil	Nil	Nil	17	4.25	383	95.75
Newspaper	28	7	22	5.50	87	21.75	263	65.75
Oral/ verbal	Nil	Nil	75	18.75	Nil	Nil	325	81.25
TV	24	6	19	4.75	117	29.25	240	60
Web	Nil	Nil	Nil	Nil	77	19.25	323	80.75

Table IV reflects that adversity circumstances generated from the various sources of information. Maximum (79.50%) numbers of respondents not confined the specified difficulties on the table against accessing information through book whereas 20.50% of the respondents had not found the sufficient time to read the books and no respondent found against it was provided inadequate and not in time information by book. Maximum (95.75%) numbers of respondents not confined the specified difficulties against accessing information through journal and magazine, 4.25% of the respondents had not found the enough time to the journals and magazines and no respondent found against it was provided inadequate and not in time information by journal and magazine. Maximum (65.75%) numbers of respondents not confined the specified difficulties against accessing information through newspaper, 21.75% of the respondents had not found the sufficient time to read the newspapers, 7% of the respondents confined that it was not provided information in time whereas lowest 5.50% of the respondents confined that it was provided inadequate information by newspaper. Maximum (81.25%) numbers of respondents not confined the specified difficulties against accessing information through oral or verbal whereas 18.75% of the respondents confined that it was not provided adequate information and no respondent found against there was provided not in time information and also no sufficient time to access information through oral or verbal. Maximum (60%) numbers of respondents not confined the specified difficulties against accessing information through television, 29.25% of the respondents had not found the sufficient time to access information by watching television, 6% of the respondents confined that it was not provided information in time whereas lowest 4.75% of the respondents confined that it was provided inadequate information by television. Maximum (80.75%) numbers of the respondents not confined the specified difficulties against accessing information through web, 19.25% of the respondents had not found the sufficient time to surfing the web and no respondent found against it was provided inadequate and not in time information by web.

Evaluation of complications encounter with mango cultivator

An evaluation has been made to grasp the complications encounter with mango cultivation by the recommendations received against allied statements from the respondents. For the purpose of evaluation, the three scales have been considered i.e. A-Agree, DA-Disagree and N-Neutral. In the below table it has been highlighted.

TABLE V EVALUATION OF COMPLICATIONS ENCOUNTER WITH MANGO CULTIVATOR

Statement	A		DA		N	
	R	%	R	%	R	%
Unconsciousness of the horticulture office	183	45.75	37	9.25	180	45
Cultivators are not aware about the globalized information sources	84	21	Nil	Nil	316	79
Lack of knowledge about the use of ICT	195	48.75	33	8.25	172	43
Unconsciousness of the public library	95	23.75	Nil	Nil	305	76.75
Lack of knowledge about marketing and exporting	330	82.50	17	4.25	53	13.25

Agree, DA- Disagree, N- Neutral

Table V reflects that highest (45.75%) numbers of respondents found at agreed position whereas lowest (9.25%) numbers of respondents found at disagreed position and 45% of the respondents found at neutral position against the statement of unconsciousness of the horticulture office. Highest (79%) numbers of respondents found at neutral position, 21% of the respondents found at agreed position and no respondent found at disagreed position against the statement of cultivators were not aware about the globalized information sources. Highest (48.75%) numbers of respondents found at agreed position, 43% of the respondents found at neutral position and only 8.25% respondents found at disagreed position against the statement of lack of knowledge about the use of ICT. The highest (76.75%) numbers of respondents were found at a neutral position, 23.75% of the respondents found at agreed position and no respondent found at disagreed position against the statement of the public library's unconsciousness. Highest (82.50%) numbers of respondents found at agreed position, 13.25% of the respondents found at neutral position and lowest (4.25%) numbers of respondents found at disagreed position against the statement of lack of knowledge about marketing and exporting.

Conclusion

The study has conveyed sets of problems faced multi facets to identify sources of information in accordance with their complications. Different levels of mango cultivator groups are framed to get fruitful result of the research study. Cultivators are unable to access different kinds of information sources due to information divide. It has been observed that respondents are not aware of different information centres that may serve them necessary information in their mango cultivation due to lack of knowledge. Only a few respondents have visited Block Development Office, horticulture office and mango merchant office and basically oral or verbal information have provided to them. The study reveals that the horticultural and different allied information extension sectors are responsible to transfer mango farming information and technology to the mango cultivators and provides them proper guidance to take care of mango orchard and also improve horticultural practices to increase horticultural productivity.

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Awareness and Utilization of Information Resources and Services among Library Users of JCBM College Sringeri, Karnataka

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Abstract - *The College library plays a major role in the curriculum and personal development of a college student. College library supports teaching, learning and research activities of a college. This study was conducted at Sri JCBM College Sringeri to assess user's awareness and satisfaction with library resources and services. The data is collected by providing structured questionnaire and personal visit to college library. Convenience sampling technique is used to collect the data. 70 structured questionnaires were distributed and 52 duly filled questionnaires were returned back, the response rate is 74.29%. The study reveals that the users are using library daily and most preference they gave to newspapers reading. The users were satisfied with various resources and services. Some of suggestions include providing Wi-Fi facility, need of more reference books and photocopying service.*

Keywords: *Library Resources, Library Services, JCBM College Sringeri, Library Users.*

Introduction

The College Library is a part and parcel of a college set up. It exists to serve the objectives of its parent organization. A College library can play a very important role in helping the education system to achieve its goals. The performance of students can be improved considerably if they use the library regularly. College Librarians have an important role to play in the college education systems. College Library resources mainly include print and Electronic resources.

Objectives of the study

1. To know about the frequency of users visit to the library.
2. To know the type of resources used for access the information.
3. To assess the user satisfaction with library resources and services.
4. To know the problems being faced in using the library.

Review of literature

A search strategy was developed and run in Scopus, web of Science, Library Science journals, search engines like Google Scholar and open access resources. The literature review included published research studies, results of the studies were summarized.

Awotona Samuel Olukayode and Ipadeola Oluwaseun Lekan (2019) the study revealed that textbook, reference sources, back volumes of journals and Newspaper and Magazines are most used resources in the library. The study unveiled the users are satisfied with circulation service, orientation programmes to fresher's, CAS, new arrival records, reference or information service, etc., The users staff co-operation, library fines, relevancy of information resources. Zakaria Abukari (2019) result of study showed that the library is majorly used and contains sufficient number of reading materials.

The students are satisfied with textbooks, print journals, reference materials, etc., but most of users are not satisfied with latest editions of textbooks which are not acquired in time, e-books, proper supply of newspapers. The users are satisfied with staff knowledge about library resources, physical facilities. Viji P. and Dr. P. Balasubramanian (2019) the survey revealed most of

respondents believed and using the 'Internet' as the source for accessing information. Second preference, the respondents gave 'library' as a source for accessing information. Hira Kalita and Sanjay Kumar Singh (2020) the study revealed that the students are using the library for accessing e-resources and preparing for examination.

The users are took advantage from various services offered by the library like E-PAC, e-resource accessibility, lending service, printing service and information alert service. The users are pleasure with internet facility, infrastructure, library staff co- operation, strong strength Wi-Fi facility. The study also explored that PG students are more concerned with e-resources than print resources.

Analysis of data

The questionnaires were distributed to the users of college library like final year undergraduate students and faculties who visited the library using convenience sampling method. A total of 70 questionnaires were self-administered to the participants. The percentage of response was (74.29%).

TABLE I SURVEY POPULATION

No. of questionnaire Distributed	No. of duly filled questionnaire returned	Percentage of sample size
70	52	74.29%

Gender wise distribution of college library users

The below Table II demonstrates that there are 44.23% male users, against 55.77% female users. Thus it is observed that female users are more than male users.

TABLE II GENDER WISE DISTRIBUTION OF COLLEGE LIBRARY USERS

Gender	Total No. Respondents	Percentage
Male	23	44.23%
Female	29	55.77%
Total	52	100

Position wise distribution of users of college library

The breakup of position wise distribution of the college library users is shown in Table III. It may be observed from the table that 63.46% of the users are mainly Students. Remaining 36.54% are faculty members.

TABLE III POSITION WISE DISTRIBUTION OF USERS OF COLLEGE LIBRARY

Position	Total No. of respondents	Percentage
Faculty	19	36.54%
Students	33	63.46%

Frequency of library visit by users

From the Table IV it is seen that the majority number of respondents (86.54%) visit the library daily, followed by 9.62% users who visit weekly. Other 3% of made their visit 2- 3 times a week.

TABLE IV FREQUENCY OF LIBRARY VISIT BY USERS

Frequency of library visit	Total no of respondents	Percentage
Daily	45	86.54%
Once in a week	5	9.62%
2-3 times a week	2	3.84%
Monthly	0	0
Rarely	0	0
Never	0	0

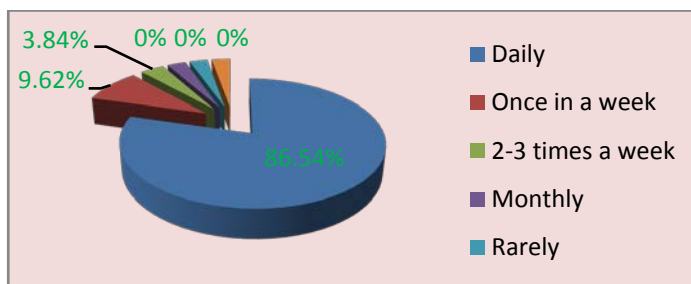


Fig. 1 Frequency of library visit by users

Reason for visiting the library

The following Table .V shows 63.46% of users using library to reading newspapers, 55% are for updating their knowledge, 42% users using library for study, 26% of users using for exam preparation and another 26% for reading general Books, 26.92% of users using library for preparing exams, 23.08% users using to issue and return the books, 21% of users prefers to read general magazines and another 21% using for internet browsing, 17% users referring journals, 7% users use for other purpose, 1% users using for preparing slides.

TABLE V REASON FOR VISITING THE LIBRARY

Reason	Total No. of respondents	Percentage
For preparing exam	14	26.92%
For issue and return the book	12	23.08%
For updating the knowledge	29	55.77%
To refer journals	9	17.31%
To read general magazines	11	21.15%
To read newspapers	33	63.46%
For browsing internet	11	21.15%
To read general books	14	26.92%
To prepare slides	1	1.92%
For study	22	42.31%
Others	4	7.69%

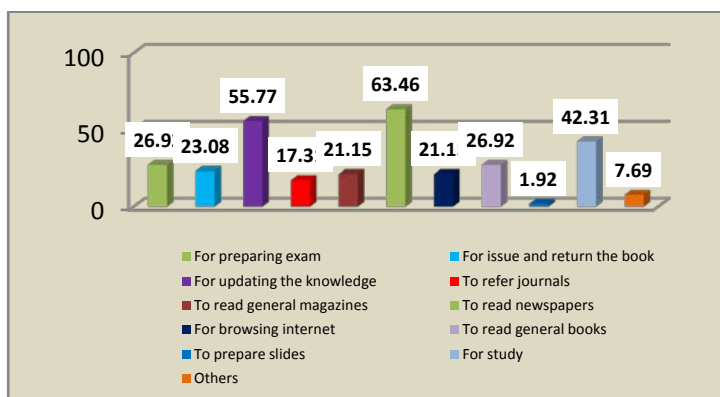


Fig. 2 Reason for visiting the library

Visiting the college library by users

The Table VI and fig. 3 shows when the users visit the library. There are 86% of users visiting library during free hours, 23% before class hours, 15% after the class hours and 5% users visit library during exam holidays.

TABLE VI VISITING THE COLLEGE LIBRARY BY USERS

Time of visit to library	Total respondents	Percentage (%)
Before class hours	12	23.08
During free hours	45	86.54
After the class hours	8	15.38
During exam holidays	3	5.77

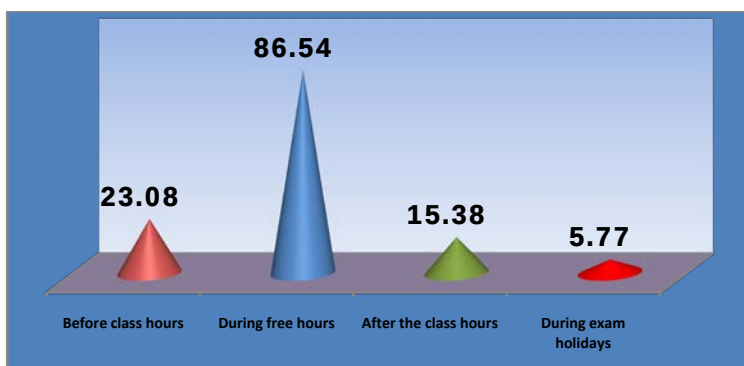


Fig. 3 Visiting the college library by users

The Table VII Shows when the users visit the library. There are 86% of users visiting library during free hours, 23% before class hours, 15% after the class hours and 5% users visit library during exam holidays.

Users satisfaction with library hours

The following table VII and figure 4 shows user's satisfaction with library hours. 67% users are satisfied with library hours, 25% users highly satisfied with working hours, 5% user's opinion is neutral, 1% users are dissatisfied with working hours or library.

TABLE VII USERS SATISFACTION WITH LIBRARY HOURS

Satisfaction with library hours	Total respondents	Percentage (%)
Highly satisfied	13	25
Satisfied	35	67.31
Neutral	3	5.77
Dissatisfied	1	1.92
Highly dissatisfied	0	0

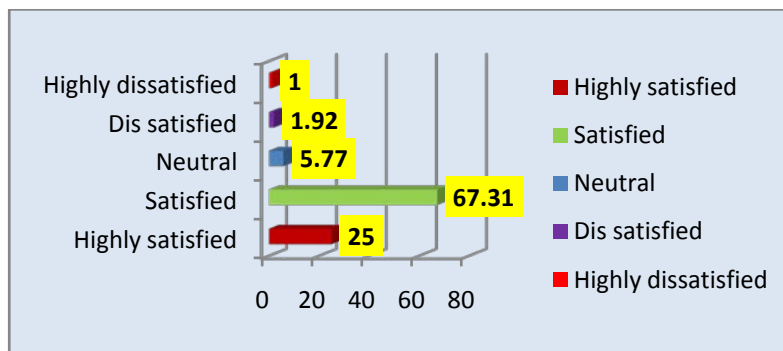


Fig. 4 User satisfaction with library hours

Awareness about new arrivals of the library

The following Table VIII and figure 5 shows how the users are aware about new arrivals. 40% users aware about new arrivals by teachers, 17% by display of new jackets, 34% by classmates, 28% by list of new arrivals, 23% by colleagues.

TABLE VIII AWARENESS ABOUT NEW ARRIVALS OF THE LIBRARY

Sources	Total No. of respondents	Percentage
By teachers	21	40.38
From display of book jackets	9	17.31
By classmates	18	34.62
List of new arrivals	15	28.85
By colleagues	12	23.08

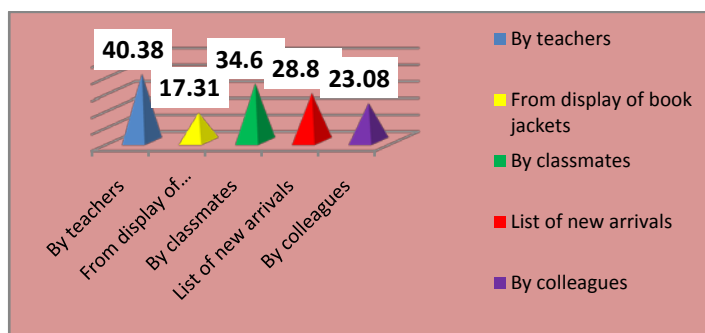


Fig. 5 Awareness about the new arrivals of the library

E-Resources access by users

The Table IX and figure 6 shows users awareness about e-resources. There are 84% of users aware about e-question papers, 80% users about e-Books, 76% users aware about e-newspapers.

TABLE IX E-RESOURCE ACCESS BY USERS

Sl. No.	E-resources	Total no. of respondents	Percentage
1	e-books	42	80.77
2	e -question paper	44	84.61
3	e-journals	30	57.69
4	full text databases	16	30.77
5	e-news paper	40	76.92

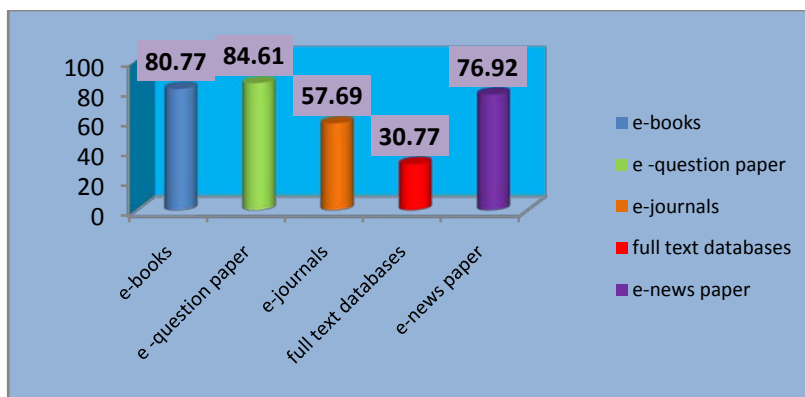


Fig. 6 E-resources access by users

Awareness about library services

The following Table X shows awareness about the library resources to users.

TABLE X AWARENESS ABOUT LIBRARY SERVICES

Sl. No.	Services	Yes	No	Total
1	Circulation Service	41	11	52
2	Reference Service	43	9	52
3	CAS/SDI	32	20	52
4	Interlibrary Loan	14	38	52
5	Reprographic Service	23	29	52
6	Newspaper Clipping	42	10	52
7	Book Bank Facility	46	6	52
8	Internet Browsing	50	2	52

Satisfaction with library services

The following Table XI and figure 7 shows the satisfaction of users with library services.

TABLE XI SATISFACTION WITH LIBRARY SERVICES

Sl. No.	Library Services	Satisfaction Level				
		Highly Satisfied	Satisfied	Uncertain	Dissatisfied	Highly Dissatisfied
1	Circulation Service	14	29	6	2	1
2	Reference Service	15	35	2	0	0
3	CAS/SDI	10	31	7	3	1
4	Interlibrary Loan	3	33	9	3	4
5	Photocopying Service	10	30	9	0	3
6	Newspaper Clipping	24	25	1	0	2
7	Book Bank Facility	24	26	2	0	0
8	Internet Browsing	24	27	1	0	0

TABLE XII PROBLEMS IN FINDING THE INFORMATION

Sl. No.	Problems	Total No. of respondents	Percentage (%)
1	Lack of Access to all Information	6	11.54
2	Lack of Resources	11	21.15
3	Lack of Familiarity	5	9.62
4	Lack of Time	17	32.69
5	Lack of Training	19	36.54
6	Low Internet Speed	22	42.31
7	Lack of Assistance by Staff	7	13.46
8	Lack of Computer Facility	20	38.46

Problems in finding the information

The Table XII and figure 7 shows the problem faced by users while searching for required information. 42% of respondents feel internet speed is low, 36% of users feel training is needed to search the documents from library. 38% of respondents feel lack of computer facility, 32% respondents have time issues with library.

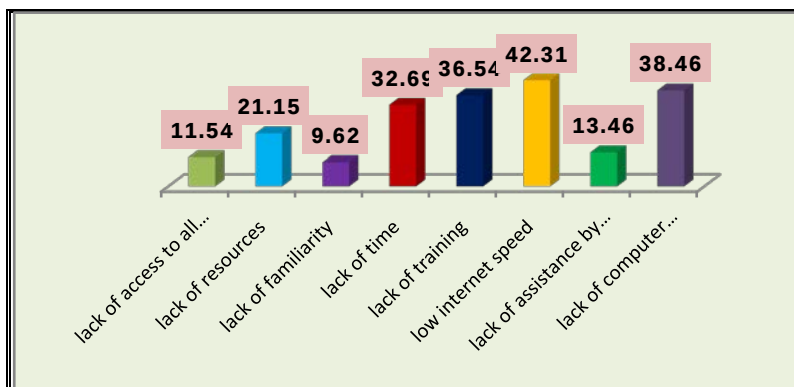


Fig. 7 Problems in finding information

Findings of the Study

1. From the study it is observed that female users (55%) who are visiting the library is more than male users (44%). The study notices that female users using library in higher extent.
2. Category represents the type of users i.e., faculty and students. The study noticed that the students are using library much (63%).
3. The outcome of study shows more (75%) users choose to read newspapers followed by 73% of users using library for textbooks.
4. The study shows there are more number of (86%) users using library daily.
5. There are number of (63%) users visiting library to read newspapers, 42% of users consider library as a place for study.
6. The study reveals more number (86%) of users visiting library during free hours.
7. The study shows 67% of users are satisfied with library hours.
8. The study reveals textbooks, general books, magazines, dictionaries & encyclopedias, old question papers, newspaper are adequate but CD/DVD and library not having adequate collection of back volumes.
9. The study shows users are satisfied with magazines, textbooks, general books and highly satisfied with newspapers and students has dissatisfied with CD/DVDs.
10. More number of users especially students know about new arrivals by their teachers (40%), and classmates (34%).
11. Users find problem with internet speed, less number of computers.
12. Users are aware about circulation Service, reference Service, current awareness Service, book Bank facility but they are not aware about inter library loan service and photocopying Service.
13. The study reveals most of the times users using library for circulation of books, interaction with library staff, to get notified about the news paper clippings.
14. Users are satisfied with circulation Service, reference Service, reference Service, newspaper clipping Service, book Bank facility.

Suggestions

1. It is suggested that although the internet facility is provided but it is slow. So internet speed required be increased.
2. The users are suggested that the library required having more computers.
3. The users suggested that library require more number of e-resources like e-journals
4. It is suggested to provide Wi-Fi facility.
5. The study reveals that users suggest that there is a need for separate computer section.
6. It is suggested that there is separate reading area for students and teachers.
7. The users suggested that there is a need of information about all reference Books related to all subjects.
8. It is suggested that photocopying Service is to be provide.
9. The users suggested adding new books which are expensive to buy.

Conclusion

JCBM College is one of the very good institutions affiliated to Kuvempu University, Karnataka. It provides qualitative education to the students. The College has provide a well-established library contains most of the resources according to the need of the users. The activities are automated. The library provided with good reading environment to its users. The libraries have computers and internet facility and manuscripts. As the study suggested there requires more computers, high speed internet, photocopying facility. The study showed that the users are well satisfied with library hours, resources, library staff support, services and library infrastructure.

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Internet Use Pattern of the Students of University of Lucknow: A Study

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Abstract - *The present study attempts to find out the Internet usage pattern of the students of the University of Lucknow, Lucknow. It also examines the Internet services provided by the university library. The main objectives were to find out the frequency and purpose of using the internet, and the knowledge of the internet possessed by the students. To fulfil these objectives, a survey method was adopted and a structured questionnaire was used to collect data. A sample of 100 students was collected comprising 50 males and 50 females. The findings revealed that student's primary purpose of using the internet was for academic reasons, followed by their information need. Further, the internet services provided by the library were found satisfactory. The problem of connectivity and speed of the internet provided was identified. This study also makes some suggestions to improve the library services based on the findings.*

Keywords: *Internet, Internet Usage, Academic Library, Lucknow University Library.*

Introduction

The present era we live in can also be called the digital era where information and technology play a constantly expanding role in all aspects of our being. Information and knowledge are regarded as the new 'factor of production', playing as critical a role in human development as the traditional factors of production – land, labour, and capital (World Bank, 1998/99 as cited in Mchombu, 2003). We often find ourselves searching, gathering, organizing, evaluating or using information. It can be rightly said that information has now become the most basic of all human needs. As a part of the search for the satisfaction of information needs, an individual may engage in info-seeking behaviour. (Omiunu, 2014) Depending upon the nature of the need for the information, the individual may seek information from formal sources or systems that are customarily defined as information systems (such as libraries, on-line services, or information centres). Alternatively, the user may seek information from other people or sources, rather than from systems. One of these informal sources of information is the Internet and very quickly it is increasingly becoming the most popular one.

In the words of Leiner (2009), the Internet is at once a world-wide broadcasting capability, a mechanism for information dissemination, and a medium for collaboration and interaction between individuals and their computers without regard for geographic location. The Internet represents one of the most successful examples of the benefits of sustained investment and commitment to research and development of information infrastructure. The origin of the Internet can be dated back to the 1960s when ARPANET was created as a result of the Cold War between the USA and the Soviet. It was devised for telecommunication and research and was implemented in various universities, research units and companies. The internet went commercial (1984-89) with the growth in international networks and the emergence of various software programs. The 1990s saw a massive boom in terms of Internet users. With the advent of personal computers, several software companies such as America Online (AOL), Microsoft, Sun Microsystems, Yahoo! and Cisco came into being and prospered. Presently, social networking has revolutionized the Internet; people can easily share, socialize, and exchange information and ideas of their personal as well as commercial interest. Internet since its inception has grown extensively in its availability, connectivity and geographic distribution and has become a part of daily life.

Correspondingly, the amount of internet users has risen alarmingly and it continues to rise. According to www.internetworldstats.com, Internet users around the world exceeded 4.9 billion in December 2020. This number roughly represents 63% of the total world population.

As the number of internet user's increases, their profiles differentiate and resemble the characteristics of the general population. While very few users benefited from the internet in its early phase, it is ranked among mass forms of communication nowadays (Cahoon, 1998, p. 5 as cited in Boz and Aksoy, 2011). At present, the Internet has become a crucial tool used by students for education. It facilitates research, teaching and communication. A lot of students, researchers as well as teachers use the Internet to enrich their academic work. Nowadays, most academic and research institutions provide access to internet service. Further, the internet also enhances the skills and capabilities of the students that can facilitate their studies and professional life. Therefore, we need to acquire much information about internet usage among students.

Review of Literature

In India, Devi and Roy (2012) Biradar, Rajashekar and Sampath (2006) Renuka and Gurunathan (2017) Balasubramanian (2013) Naik (2011) Ratna (2019) studied the Internet usage pattern of university students; Devi and Singh (2009) Mulimani and Gudimani (2008) Sinha (2011) studied the Internet usage of the university library. On the International front, Hossain and Rahman (2017) Almarabeh, Majdalawi and Mohammad (2016) Biloš and Galić (2016) Apuke and Iyendo (2018) Bolu-Steve, Oyeyemi, and Amali (2015) Sultana and Imtiaz (2018) are some of the authors who studied that Internet usage of university students in various parts of the world.

Objectives of the Study

The specific objectives of the study concerning Internet Usage are

1. To trace the frequency of usage of the internet.
2. To find out the purpose(s) for using the internet among students.
3. To examine the knowledge/skills of using the internet among the students.

The specific objectives of the study concerning Internet Usage in the University Library are

1. To find out the frequency of internet usage in the university library.
2. To know the satisfaction level of the students in terms of internet facilities.
3. To find out the problems faced by the students in using the internet.

There are various factors that can influence the internet usage pattern such as residential background, age, gender, education levels, income and more. The present study aims to find out if there exists a gender-based difference in the Internet usage pattern of the students. The above objectives are analyzed using Gender as a variable to fulfil that.

Method of Study

The present research adopts the survey method. A well-structured questionnaire has been used for data collection for this study. The sample of the present study is drawn from Undergraduate and Postgraduate students and Ph.D. scholars from different disciplines at the University of Lucknow, Lucknow. The sample consisted of 100 students, comprising 50 males and 50 females. For the selection of sample purposive sampling technique has been adopted.

Data Analysis and Interpretation

The data collected from the questionnaires were analysed and interpreted using Microsoft Excel and is represented through tables and graphs.

Frequency of Internet usage by the Students

TABLE I FREQUENCY OF INTERNET USAGE

Frequency of usage	Male		Female		Grand Total
	Frequency	Percent	Frequency	Percent	
Less than 1 hour	1	2%	0	0%	1
1-3 hours	18	36%	20	40%	38
3-6 hours	16	32%	15	30%	31
More than 6 hours	15	30%	15	30%	30
Total	50	100%	50	100%	100

The students were asked about the amount of time they spend using the Internet in a day. It is assumed that all the participants use the internet. As per Table 1, out of 100 respondents, 38 students (38%) spend 1-3 hours on the Internet, followed by 31 students spending 3-6 hours on the Internet, followed by 30 students (30%) spending More than 6 hours on the Internet. Only 1 student (1%) spent less than 1 hour on the internet. As per Table I, among 50 male students, 18 (36%) use the Internet for 1-3 hours, 16 (32%) use the Internet for 3-6 hours, 15 (30%) use the Internet for more than 6 hours, while only 1 uses the Internet for less than 1 hour. Among 50 female students, 20 (40%) use the Internet for 1-3 hours, 15 (30%) use the Internet for 3-6 hours, 15 (30%) use the Internet for more than 6 hours.

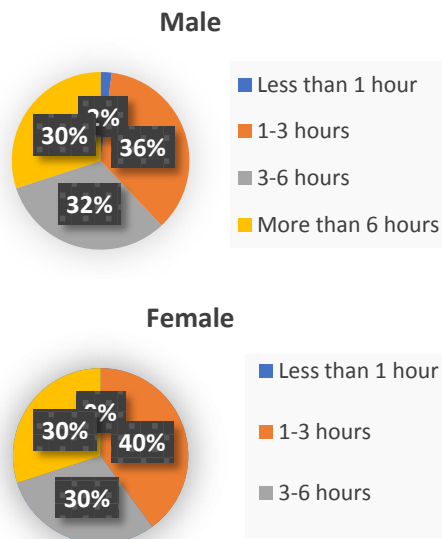


Fig.1 Frequency of Internet usage by Males and Females

The primary purpose of using the Internet

Internet can be used for various reasons and purposes but it's essential to find out the primary purpose of internet usage to know the importance of the internet in a student's life. Table 2 shows that out of 100, 58 students use the Internet for Academic purpose, followed by 42 students using it for their information need, 18 students use it for entertainment, 17 students use it for communication, and 12 students use it for socializing. According to Table 2, among 50 males, 33 respondents use the Internet for Academic purpose, followed by 24 students using it for their

information need, 13 students use it for entertainment, 11 students use it for communication, and the remaining 7 students use it for socializing.

TABLE II PRIMARY PURPOSE OF USING INTERNET

Primary Purpose	Male	Female	Total
Communication	11	6	17
Socializing	7	5	12
Entertainment	13	5	18
Information Need	24	18	42
Academics	33	25	58

Among 50 females, 25 students use the Internet for Academic purpose, followed by 18 students using it for their information need, 6 students use it for communication, 5 students use it for entertainment and for socializing each. Thus, it can be seen that even though there are more males using the Internet for Academic reasons as compared to females, the main reason for both male and female students is the same which is for Academic reasons.

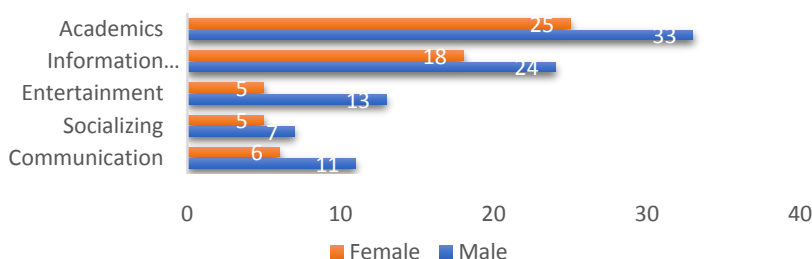


Fig.2 Primary Purpose of using the Internet among Males and Females

Source of Knowledge and Training of Internet

The students were asked if they received any formal training of knowledge of the internet or not. Out of 100 respondents, 56 students (56%) checked the source of training they received. The remaining 44 students (44%) did not respond, it is assumed that they did not receive and formal knowledge and were self-taught or learned from friends and family. From Table IV, it is evident 20 students (20%) received training from College/University, followed by 18 students (18%) who received it from High School, 11 students (11%) from Primary School and the remaining 7 (7%) from Private institutions.

TABLE III SOURCE OF KNOWLEDGE AND TRAINING OF INTERNET

Source of Knowledge	Male		Female		Grand Total
	Frequency	Per cent	Frequency	Per cent	
Primary School	8	16%	3	6%	11
High School	10	20%	8	16%	18
College/University	7	14%	13	26%	20
Private Institute	4	8%	3	6%	7
No response	21	42%	23	46%	44
Total	50	100%	50	100%	100

Among males, 21 students (42%) did not respond, 10 students (20%) received training from High School, followed by 8 (16%) from Primary school, 7 (14%) from College/University and the remaining 4 (8%) from Private institutions. Among females, 23 students (46%) did not respond, 13 students (26%) received training from College/University, followed by 8 (16%) from High school, 3 (6%) from Primary School and the remaining 3 (6%) from Private institutions. Thus, it is evident that the primary source of knowledge and training between males and females differ.

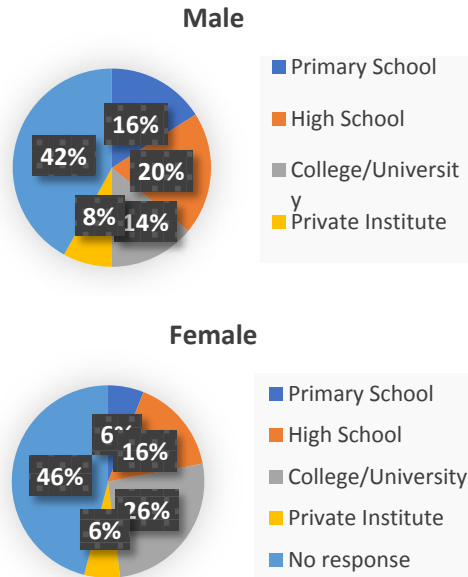


Fig. 3 Source of Knowledge and Training of Internet among Males and Females

Knowledge of Internet

TABLE IV KNOWLEDGE OF INTERNET POSSESSED BY THE STUDENTS

Knowledge of Using Internet	Male	Female	Total
Using e-mail.	37	42	79
Uploading/ downloading from cloud storage	29	34	63
Downloading music/videos	28	36	64
Searching information database	36	30	66
Creating a blog	14	8	22
Coding using languages such as HTML	11	10	21
None of these	0	3	3

To know the awareness level of the internet, students were asked which areas and services of the internet they were familiar with. As shown in Table IV, out of 100, 79 students know how to use e-mail, 66 students can search information database, 64 students can download music/videos, 63 students can upload/download from cloud storage, 22 students can create a blog, and 21 students know coding using programming languages. 3 students weren't aware of either of these

services/areas of the internet. Table IV indicates, among 50 males, 37 students know how to use e-mail, 36 students can search information database, 29 students can upload/download from cloud storage, 28 students can download music/videos, 14 students can create a blog, and 11 students know coding using programming languages.

Among 50 females, 42 students know how to use e-mail, 36 students can download music/videos, 34 students can upload/download from cloud storage, 30 students can search information database, 10 students know coding using programming languages and 8 students can create a blog. There were 3 females who were not aware of either of the areas/services mentioned. Thus, we find that more females use email, cloud storage and can download music/videos as compared to males. While more males know how to search information database, create a blog and use programming languages, as compared to females.

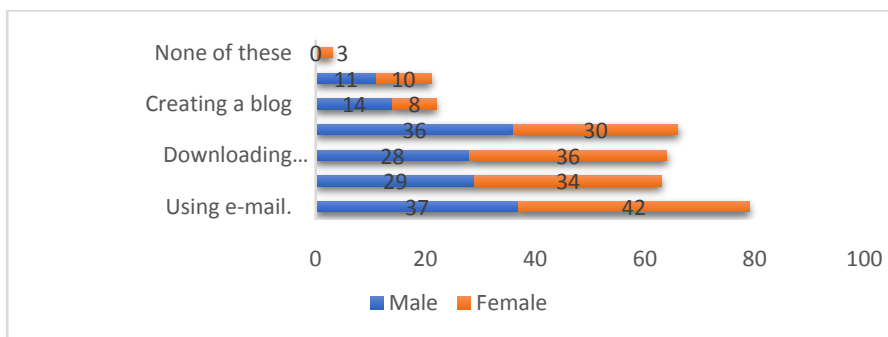


Fig. 4 Knowledge of Internet possessed by Males and Females

Frequency of Internet usage in the university library

TABLE V FREQUENCY OF INTERNET USAGE IN THE UNIVERSITY LIBRARY

Frequency of usage	Male		Female		Grand Total
	Frequency	Percent	Frequency	Percent	
Daily	26	52%	10	20%	36
Monthly	3	6%	14	28%	17
Weekly	9	18%	11	22%	20
Other (Once in a while)	0	0%	3	6%	3
No response	12	24%	12	24%	24
Total	50	100%	50	100%	100

The university students were asked if they were aware of the Internet services provided by the library or not. Out of 100 respondents, 85 students (85%) responded yes while only 15 students (15%) said they weren't aware of it. As per Table 5, 36 students (36%) use the Library Internet facility daily, 20 students (20%) use it weekly, and 17 students (17%) use it monthly. 3 students (3%) chose other frequency consisting of once in a while, rarely and when needed. 24 students did not respond, it is assumed that they do not use the Library Internet facility.

Table V indicates that among 50 males, 26 males (52%) use the Library Internet facility daily, 9 (18%) use it weekly and 3 (6%) use it monthly. There was no response from 12 males. Among 50 females, 14 females (28%) use the Library Internet facility monthly, 11 (22%) use it weekly and

10 (20%) use it monthly. There was no response from 12 females. Thus, it can be seen from Figure 5 that there is a significant difference between the frequency of library internet usage between male and female students.

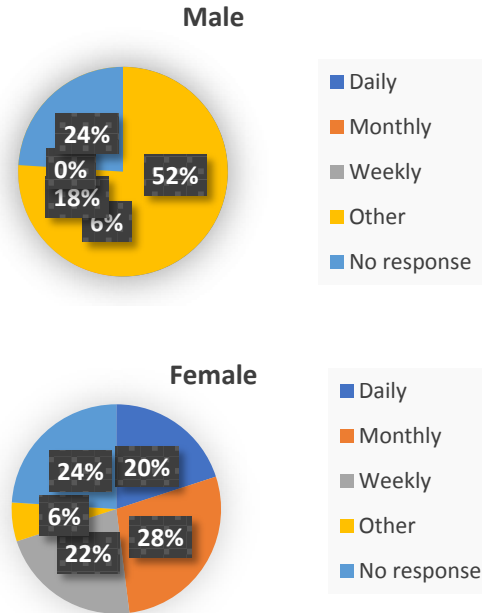


Fig. V Frequency of Internet usage in the university library among Males and Females

Satisfaction level of the students in terms of internet facilities

TABLE VI SATISFACTION LEVEL OF THE STUDENTS OF LIBRARY INTERNET FACILITIES

Level of Satisfaction	Frequency	Percent
Dissatisfied	4	5%
Somewhat Dissatisfied	6	7%
Neither Dissatisfied nor Satisfied	17	20%
Somewhat Satisfied	20	24%
Satisfied	37	44%
No Response	16	
Total	100	100%

The respondents were asked to rate their level of satisfaction gained from the usage of the internet facility at the university library. As per Table 6, out of the 84 responses received, 37 students (44%) were satisfied with the service provided, 20 students (24%) were somewhat satisfied, 17 students (20%) were neither dissatisfied nor satisfied, 6 students (7%) were somewhat dissatisfied and 4 students (5%) were dissatisfied. Thus, we can say that the overall satisfaction level of the students from the Library Internet service was found satisfactory.



Fig.6 Level of Satisfaction from Internet services of the University Library

Problems faced by the students in using the internet

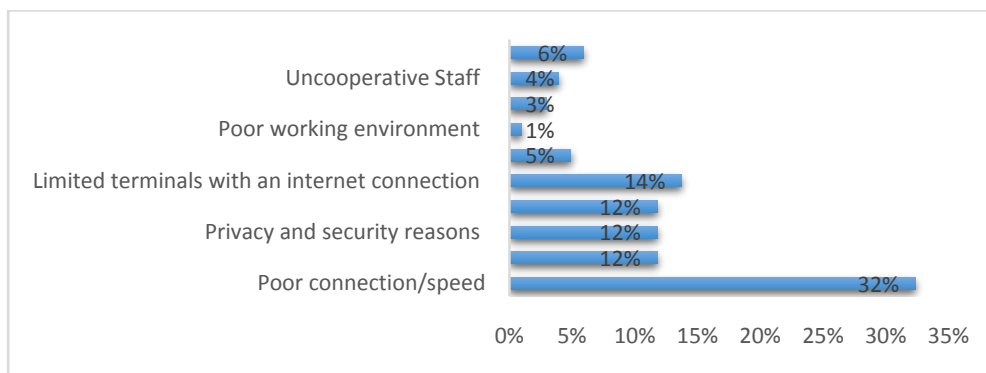


Fig. 7 Problems faced using Library Internet Services

The respondents were asked in the questionnaire about the kinds of problems they face while using the internet services of the university library. Out of the 76 students who use library internet facilities, 67 of them (88%) faced some kind of problem. Figure 7 shows that the most prominent problem identified by the respondents was Poor connection/speed (32%), followed by Limited terminals with an internet connection (14%); Software related problems, Hardware related problems and Privacy and security reasons were next at par (12%). Poor working environment (1%) was the least reported problem. Other problems mentioned by the respondents were Crowded space, Disconnection of Internet services for a long time, Terminals not working properly.

All these issues faced by the respondents results in wastage of time of the students and hampers their flow of work. Connectivity and speed problem is a major concern for many university libraries in India.

Key Findings

1. Most of the students (38, 38%) spend 1-3 hours on the Internet.
2. The primary purpose of using the internet by the students was for academic reasons regardless of gender.
3. Google was found as the most popular search engine as a cent per cent of students used it, followed by Yahoo (15%) and Microsoft Bing (11%).
4. The most popular web browser among students was Google Chrome (98%), followed by Mozilla Firefox (18%), Internet Explorer (14%) and Microsoft Edge (12%).
5. 56% of the students have received some sort of formal training of the internet.
6. There are 36% of the students who use the Library Internet facility, use it daily.

7. Among 50 males, 26 males (52%) use the Library Internet facility daily, while among 50 females, 14 females (28%) use the Library Internet facility monthly.
8. The overall level of satisfaction of the students from the Library Internet services was found satisfactory.
9. The most common problem found by the students was connectivity/speed issues (32%), followed by Limited terminals with an internet connection (14%).

Suggestions and Conclusion

The Internet has become the best source of information we have in this age. Originally developed for research and communication, now it's being used for fulfilling our information needs. As per this study, it is evident that most students primary purpose of internet usage is for academic reasons. Thus, to achieve academic growth and development, it has become imperative that students are provided with a proper internet facility at the university. This can be done in the following ways:

1. Proper connectivity to the internet should be ensured at all working hours.
2. Internet bandwidth should be increased to provide faster access.
3. All the terminals present should have internet connectivity.
4. Faulty terminals should be removed or repaired at once.
5. Access to the internet library services should be available 24/7 so that students can visit the library after university hours.
6. Wi-Fi services should be provided throughout the Library.
7. A printing service should also be provided along with the internet facility at nominal rates so that students can print out notes and other study material.
8. To create more awareness about e-resources and other academic benefits, digital literacy programmes or events should be held occasionally.

The Internet has revolutionized modern society in terms of information dissemination. Its global presence has brought a sea change in the advancement of information technology. Whatever the future may look like, technology is going to play a major role in shaping it. This present study confirms the importance of the internet in our present lives.

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A Scientometric Analysis of UGC Approved Physical Education Journals

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Abstract - *The University Grants Commission – Consortium for Academic and Research Ethics has promoted quality research, academic integrity and publication ethics in Indian universities and provide high quality publications that would help in achieving higher global ranks. The data were taken from UGC Approved Journal List (<https://ugccare.unipune.ac.in/Apps1/Home/Index>). This study aimed to find out the physical education journals indexed by different databases to identify the quality of Physical Education journals by impact factor, cite core, journal current index. It is found that the ‘Scopus and WoS’ Databases have indexed highest number of 61 (49.59%) Physical Education journals and further it is found that Sports Health’ has highest (2.38) cite score in Scopus. It is further found that ‘Proceedings of the Institution of Mechanical Engineers Part P-Journal of Sports Engineering and Technology’ has highest (1.070) impact factor.*

Keywords: *UGC Approved Journals, Physical Education Journals, Scopus, Web of Science, Metrics.*

Introduction

Today, India manages one of the largest higher education systems in the world. In 1925 was established the Inter-University Board (later known as the Association of Indian Universities) to promote university activities, by sharing information and cooperation in the field of education, culture, sports and allied areas. The UGC was formally established only in November 1956 as a statutory body of the Government of India. The UGC List of Journals is a dynamic list which is revised periodically The UGC-approved List of Journals consists of 1. Journals Indexed in WoS (Science Citation Index, Social Science Citation Index and Arts and Humanities Citation Index) 2. Journals Indexed in Scopus 3. Journals Indexed in Indian Citation Index 4. Journals Recommended by the Members of UGC Standing Committee and Language Committee (s) and 5.

Journals Recommended by the Universities. In order to achieve the same also to improve the quality of publications by faculty members and researchers UGC has approved 32,659 journals in all disciplines. 4,305 journals were removed from the current UGC-Approved List of Journals on 2nd May, 2018 because of poor quality/incorrect or insufficient information/false claims. Besides, 13,130 journals are ceased publications that are stored separately. However, in the UGC website there are 4 major categories (Science, Social Science, Arts and Humanities and Multidisciplinary) 341 contents in to these calculated the journals counts are 50369 in all disciplines as on 10th July 2018. The UGC has prepared the Approved List of Journals that would be considered for the purpose of Career Advancement Scheme (CAS) and Direct Recruitment of Teachers and other academic staff as required under the UGC (Minimum Qualifications for Appointment of Teachers and other Academic Staff in Universities and Colleges). This study aimed to find out the physical education journals indexed by different databases to identify the quality of Physical Education journals by impact factor, cite core, journal current index.

Review of Literature

Eugene (2006) mentioned the idea of an impact factor in Science with support from the National Institutes of Health, the experimental Genetics Citation, publication of the Science Citation Index

and journal impact factor developments and its use to help select additional source journals. To do this researcher simply re-sorted the author citation index into the journal citation index. From this simple exercise, researcher learned that initially a core group of large and highly cited journals needed to be covered in the new Science Citation Index (SCI). It also addressed the development of SCI and Impact Factor. Tibor, Wolfgang and Andras (2006) suggested that a h-type index – equal to h if you have published h papers, each of which has at least h citations – would be a useful supplement to journal impact factors. Recently, Hirsch² proposed what he called the “h-index” (a scientist has index h if h of his/her N papers have at least h citations each, and the other (N–h) papers have fewer than h citations each) to quantify an individual’s scientific output. Colledge, et al (2010) introduced two journal metrics recently endorsed by Elsevier’s Scopus: SCImago Journal Rank (SJR) and Source Normalized Impact per Paper (SNIP). SJR weights citations according to the status of the citing journal and aims to measure journal prestige rather than popularity.

Researcher also underlined important points to keep in mind when using journal metrics and discussed the potentialities about specific interests of a user and theoretical beliefs about the nature of the concept of journal performance. Jamali, Salehi-Marzijarani, & Ayatollahi (2014) introduced top journals of obstetrics and gynecology field based on their Impact Factor (IF), Eigenfactor Score (ES) and SCImago Journal Rank (SJR) indicator indexed in Scopus databases and then the scientometric features of longitudinal changes of SJR in this field were presented. Time, Index in Pubmed, H_index, Citable per Document, cites per Document, and IF affected changes of SJR in the period of study. study showed a significant association between SJR and scientometric features in obstetrics and gynecology journals and found SJR may be an appropriate index for assessing journal quality.

Research Methodology

The data pertaining to journals were extracted from the UGC website (<https://www.ugc.ac.in/journallist/>). The word “Physical Education and Sport” has been employed to retrieve the data during July 2020. Totally, 123 journals on Physical Education and Sport have been approved by the UGC. The journals which are indexed in various databases were grouped such as Web of Science, Scopus, Indian Citation Index, Journals recommended by UGC, Journal recommended by Universities. The impact factor, Cite Score and Journal Current Index was calculated based on the JCR List 2017(https://www.researchgate.net/publication/342534785_Web_of_Science_Journal_Citation_Reports_Impact_Factor_2019) and Scopus Journal Metrics (<https://www.scimagojr.com/journalrank.php>).

Objectives of the Study

1. To analyze the UGC approved Journals on Physical Education that are indexed in various online databases.
2. To find out the impact factor of the Physical Education journals.
3. To investigate the Research Impact Indicator (RII) of the Physical Education journals.

Data Analysis and Interpretation

Source wise Physical Education Journals

Table I shows that list of Physical Education journals approved by UGC and indexed in various sources such as Scopus, Web of Science, Journals recommended by UGC and Universities.

TABLE I SOURCE WISE PHYSICAL EDUCATION JOURNALS

Sl. No.	Name of the Source	No. of Journals	Percentage (%)	Rank
1	Scopus	43	34.95	2
2	Web of Science	1	0.81	5
3	Scopus & Web of Science (mixed)	61	49.59	1
4	Journals recommended by UGC	04	3.25	4
5	Journal recommended by Universities	14	11.38	3
Total		123	100	5

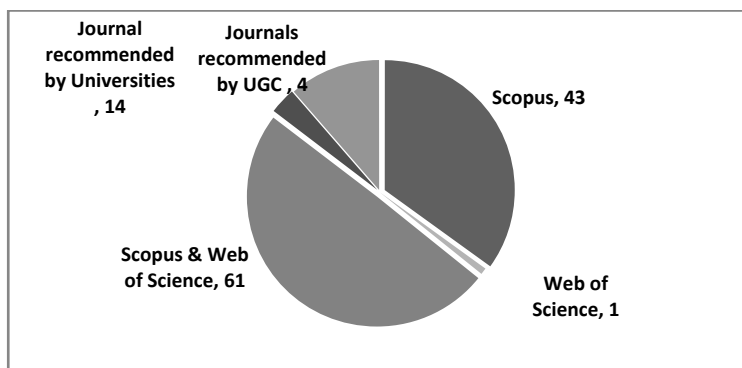


Fig. 1 Source wise Physical Education Journals

Table I and Figure 1 indicate that the source wise Physical Education journals. It is found that the 'Scopus and WoS' Databases have indexed highest number of 61 (49.59%) Physical Education journals which is approved by UGC and placed in first position and it is followed by 'Scopus' has 43(34.95%) journals and placed in second position. 'Journals Recommended by UNI' has 14 (11.38%) journals and placed in third position. 'Journals Recommended by UGC' has 04 (3.25%) journals and placed in fourth position. It is further found that the 'Web of Science' has 1 (0.81%) Physical Education journals and placed in fifth position.

Physical Education Journals indexed in Scopus with Cite Score:

Table II indicates the Physical Education journals indexed in Scopus with Cite Score, SCImago Journal Rank (SJR) and Source Normalized Impact per Paper (SNIP) and journals ranked based on Cite Score.

TABLE II PHYSICAL EDUCATION JOURNALS INDEXED IN SCOPUS WITH CITE SCORE

Sl. No.	Journal No.	Journal Name	Publishing Country	Cite Score	SJR	SNIP	Rank
1	8104	ApuntsMedicina de l'Esport	Spain	0.42	0.181	0.339	25
2	12959	Deutsche ZeitschriftfürSportmedizin	Germany	0.21	0.134	0.199	33
3	19197	Journal of Physical Education and Sport	Romania	1.33	0.284	1.012	9
4	1268	Asian Journal of Sports Medicine	Iran, Islamic Republic Of	1.32	0.506	0.653	10

5	2777	International Journal of Computer Science in Sport	Austria	0.53	0.261	0.565	20
6	19458	Journal of Quantitative Analysis in Sports	Germany	0.67	0.290	0.853	18
7	23992	SchweizerischeZeitschriftfürSportmedizin und Sporttraumatologie	Switzerland	0.03	0.103	0.035	37
8	5877	Medicine and Sport Science	Switzerland	1.83	0.621	0.606	3
9	25886	Japanese Journal of Physical Fitness and Sports Medicine	Japan	0.11	0.121	0.157	35
10	26147	Journal de Traumatologie du Sport	France	0.15	0.152	0.215	34
11	28532	Journal of Human Sport and Exercise	Spain	0.39	0.163	0.232	26
12	28568	Journal of Imagery Research in Sport and Physical Activity	Germany	0.38	0.144	0.320	27
13	28956	European Studies in Sports History	France	0.05	0.101	0.000	36
14	31704	Movement and Sports Sciences - Science et Motricite	France	0.31	0.169	0.263	30
15	33605	Sport enGeneeskunde	Netherlands	0.00	0.102	0.000	40
16	33611	Sport OrthopadieTraumatologie	Netherlands	0.00	0.00	0.00	-
17	33614	Sport Science	Bosnia and Herzegovina	0.44	0.201	0.244	25
18	33615	Sport Sciences for Health	Germany	0.77	0.311	0.411	17
19	33634	Sportwissenschaft	Germany	0.00	0.00	0.00	-
20	34146	RevistaBrasileira de Ciencias do Esporte	Brazil	0.23	0.183	0.494	32
21	36436	Open Sports Sciences Journal	Netherlands	0.52	0.137	0.484	21
22	23548	International Journal of Sport Policy	UK	1.67	0.708	0.992	4
23	23550	International Journal of Sport Management and Marketing	UK	0.92	0.377	0.265	14
24	32402	Qualitative Research in Sport, Exercise and Health	UK	1.66	0.792	1.136	5
25	33607	Sport History Review	UK	0.00	0.101	0.000	41
26	20563	Journal of Sport and Tourism	UK	1.16	0.357	0.557	12
27	15050	BMC Sports Science, Medicine and Rehabilitation	UK	2.33	0.926	1.088	2
28	10433	Research in the Sociology of Sport	UK	0.32	0.297	0.568	29
29	33608	Sport in History	UK	0.57	0.601	1.283	19
30	33609	Sport in Society	UK	0.77	0.427	0.719	16
31	33617	Sport, Ethics and Philosophy	UK	0.51	0.299	0.590	22
32	33620	Sports Engineering	UK	1.21	0.493	1.172	11
33	33628	Sports Technology	UK	0.00	0.261	0.742	38
34	33630	Sports, Business and Management	UK	0.44	0.233	0.238	24
35	7924	International SportMed Journal	US	0.00	0.194	0.154	39

36	7925	International Sports Law Journal	US	0.27	0.136	0.359	31
37	4123	Measurement in Physical Education and Exercise Science	US	1.49	0.615	0.870	6
38	20564	Journal of sport history	US	0.35	0.391	0.695	28
39	20566	Journal of Sport Psychology in Action	US	0.87	0.306	0.341	15
40	22004	Journal of Clinical Sport Psychology	US	1.36	0.563	0.764	8
41	23545	International Journal of Sport and Exercise Psychology	US	1.40	0.527	0.809	7
42	33622	Sports Health	US	2.38	1.107	1.150	1
43	36664	Orthopaedic Journal of Sports Medicine	US	1.15	0.935	1.177	13

Table II shows that 'Sports Health' has highest (2.38) citescore and placed first rank and it is followed by 'BMC Sports Science, Medicine and Rehabilitation' journal with 2.33 citescore and placed second rank. The 'Medicine and Sport Science' journal with 1.83 citescore and placed third rank. It is further found that 'Sport en Geneeskunde', 'Sport History Review' have citescore also the 'Sport Orthopadie Traumatologie' and 'Sportwissenschaft' have no any score in the above table of Physical Education Journals indexed in Scopus.

Physical Education journals indexed in Web of Science with Impact Factor

Table III shows that Physical Education journals indexed in Web of Science with impact factor and journals ranked based on Impact Factor.

TABLE III PHYSICAL EDUCATION JOURNALS INDEXED IN WEB OF SCIENCE WITH IMPACT FACTOR

Sl. No.	Journal No.	Journal Name	Publishing Country	Total Cites	Impact Factor	Rank
1	38580	Proceedings of the Institution of Mechanical Engineers Part P-Journal of Sports Engineering and Technology	England	203	1.070	1

Table III shows that 'Proceedings of the Institution of Mechanical Engineers Part P-Journal of Sports Engineering and Technology' has highest (1.070) impact factor and placed first rank of Physical Education journals indexed in Web of Science.

Physical Education journals indexed in Scopus and Web of Science with Impact Factor:

Table IV shows that Physical Education journals indexed in Scopus and Web of Science with impact factor. Table IV shows that 'Sports Medicine' has highest 6.92cite score and placed first rank and it is followed by 'American Journal of Sports Medicine' journal with 5.99 cite score and placed second rank. The 'British Journal of Sports Medicine' journal with 4.84cite score factor and placed third rank. It is further found that 'Medicinadello Sport', 'Sportverletzung Sportschaden' have less cite score.

TABLE IV PHYSICAL EDUCATION JOURNALS INDEXED IN SCOPUS AND WEB OF SCIENCE
WITH CITE SCORE

Sl.No.	Journal No	Journal Name	Publishing Country	Cite Score	SJR	SNIP	Rank
1	10771	Journal of Teaching in Physical Education	US	1.63	0.757	1.206	42
2	33612	Sport Psychologist	US	1.79	0.753	0.956	35
3	3616	American Journal of Sports Medicine	US	5.99	3.949	2.821	2
4	5876	Medicine and Science in Sports and Exercise	US	4.09	2.073	1.68	4
5	7865	International Review for the Sociology of Sport	US	1.68	0.632	0.835	39
6	10495	Research Quarterly for Exercise and Sport	US	1.68	0.77	0.964	38
7	11138	Journal of the International Society of Sports Nutrition	US	2.08	0.775	1.092	28
8	11257	Journal of the Philosophy of Sport	US	0.78	0.31	1.54	53
9	14409	Current Sports Medicine Reports	US	1.01	0.448	0.685	49
10	16003	Clinics in Sports Medicine	US	1.64	0.838	1.015	41
11	18869	Clinical Journal of Sport Medicine	US	1.98	0.999	1.03	30
12	20560	Journal of Sport and Exercise Psychology	US	2.54	1.117	1.173	16
13	20562	Journal of Sport and Social Issues	US	1.76	0.791	1.298	36
14	20565	Journal of Sport Management	US	2.12	0.943	1.168	25
15	20567	Journal of Sport Rehabilitation	US	1.49	0.769	0.738	43
16	20569	Journal of Sports Economics	US	0.83	0.608	1.585	50
17	23546	International Journal of Sport Finance	US	0.95	0.574	0.81	49
18	23547	International Journal of Sport Nutrition and Exercise Metabolism	US	2.26	0.963	0.938	22
19	23557	International Journal of Sports Physiology and Performance	US	2.97	1.749	1.295	12
20	25044	Journal of Orthopaedic and Sports Physical Therapy	US	2.25	1.357	1.344	23
21	29058	Exercise and Sport Sciences Reviews	US	3.87	1.943	1.951	5
22	30812	Physician and Sportsmedicine	US	1.56	0.613	0.667	42
23	33610	Sport Management Review	US	3.28	1.159	1.694	10

24	33618	Sport, Exercise, and Performance Psychology	US	2.03	0.95	1.109	28
25	33624	Sports Medicine and Arthroscopy Review	US	1.47	0.824	0.713	44
26	36316	Sociology of Sport Journal	US	1.65	0.832	0.936	39
27	36474	Operative Techniques in Sports Medicine	US	0.36	0.215	0.325	57
28	30782	Physical Education and Sport Pedagogy	England	2.5	1.209	1.609	17
29	28953	European Sport Management Quarterly	England	2.25	0.797	1.114	24
30	28853	European Journal of Sport Science	England	2.58	1.122	1.297	14
31	20572	Journal of Sports Sciences	England	2.54	1.127	1.345	15
32	10426	Research in Sports Medicine	England	1.91	0.839	0.884	31
33	9361	British Journal of Sports Medicine	England	4.84	3.232	2.637	3
34	7903	International Review of Sport and Exercise Psychology	England	3.53	0.93	2.036	7
35	28900	European Physical Education Review	England	1.85	0.754	0.983	33
36	30811	Physical Therapy in Sport	England	1.96	0.888	1.173	30
37	33619	Sports Biomechanics	England	1.44	0.696	1.013	45
38	21450	Journal of Applied Sport Psychology	England	2.09	0.89	1.102	26
39	833	The International journal of the history of sport	UK	0.39	0.275	0.488	56
40	23559	International Journal of Sports Science and Coaching	UK	0.78	0.435	0.646	54
41	23894	Scandinavian Journal of Medicine and Science in Sports	UK	3.41	1.541	1.601	8
42	33616	Sport, Education and Society	UK	2.38	1.128	1.463	19
43	34995	Transportation Research Part F: Traffic Psychology and Behaviour	UK	2.72	1.462	1.707	13
44	34180	Revista Brasileira de Medicina do Esporte	Brazil	0.34	0.185	0.293	59
45	33339	South African Journal for Research in Sport, Physical Education and Recreation	South Africa	0.34	0.164	0.299	58
46	5844	Medicinadello Sport	Italy	0.28	0.153	0.202	60
47	6112	Journal of Transport and Health	Netherlands	2.44	0.918	1.127	18

48	32190	Psychology of Sport and Exercise	Netherlands	3.31	1.282	1.804	9
49	6583	Knee Surgery, Sports Traumatology, Arthroscopy	Germany	3.02	1.845	1.466	11
50	23555	International Journal of Sports Medicine	Germany	2.28	1.217	1.092	14
51	25455	Zeitschrift fur Sportpsychologie	Germany	0.54	0.413	0.574	55
52	33632	SportverletzungSportschaden	Germany	0.24	0.203	0.278	61
53	14741	Biology of Sport	Poland	1.78	0.641	0.929	35
54	20385	Journal of Science and Medicine in Sport	Australia	3.64	1.714	1.709	6
55	20561	Journal of Sport and Health Science	Peoples R China	1.86	0.722	1.186	32
56	20570	Journal of Sports Medicine and Physical Fitness	Italy	1.06	0.477	0.552	47
57	23549	International Journal of Sport Psychology	Italy	0.81	0.362	0.351	51
58	20571	Journal of Sports Science and Medicine	Turkey	2.34	1.091	1.296	20
59	23309	International Journal of Performance Analysis in Sport	Wales	1.43	0.556	0.959	46
60	24013	Science and Sports	France	0.59	0.274	0.452	54
61	33623	Sports Medicine	New Zealand	6.92	3.367	3.248	1

UGC Recommended Physical Education Journals List

Table V indicates the University Grants Commission (UGC) of Standing Committee and Language Committee (s) Recommended Physical Education Journals List.

TABLE V UNIVERSITY GRANTS COMMISSION (UGC) RECOMMENDED JOURNALS LIST

Sl. No.	Journal No.	Journal Name	Publishing Country
1	41693	International Journal of Physical Education	India
2	41699	International Journal of Physical Education	Germany
3	41691	Canadian Journal of History of Sport and Phy. Edn.	Canada
4	62384	Sport and Exercise Psychology Review	United Kingdom

Table V shows that the UGC recommended journal's list. In this list, the 'International Journal of Physical Education' Journal is publishing in India that journal number is 41693 in the UGC website.

Universities (UNI) Recommended Physical Education Journals List

Table VI indicates that the Universities Recommended Physical Education Journals List.

TABLE VI UNIVERSITIES (UNI) RECOMMENDED JOURNALS LIST

Sl. No.	Journal No.	Journal Name	Publishing Country
1	43689	Series Physical Education and Sport/Science, movement and health	Romania
2	64534	European Journal of Physical Education and Sports Science	Romania
3	44404	International Journal of Physiology, Nutrition and Physical Education	India
4	47474	International Journal of Adapted Physical Education & Yoga	India
5	49073	International Journal of Physical Education & Sports Sciences	India
6	63896	International Journal of Fitness, Health, Physical Education and Iron Games	India
7	49165	International Journal of Yogic, Human Movement and Sports Sciences	India
8	47624	European Journal of Physical Education	US
9	48424	Journal of Physical Education, Recreation and Dance	US
10	48493	European Journal of Physical Education and Sport	Russia
11	43813	Sport, Business and Management: An International Journal	UK
12	44503	Annals of Applied Sport Science	Iran
13	48176	Serbian Journal of Sports Sciences	Serbia
14	48207	Women in Sport And Physical Activity	Australia

Table VI shows that the UNI recommended by the journal's list. In this list, there are 5 journals publishing in India also the 4 are approved by the UGC.

Conclusion

In this study conclusion, is impact factor give databases are Scopus and web of science regarding in this study. So based on the databases there was no anyone journals in this databases from publishing the Physical Education journals in India. University Grants Commission (UGC) has wanted improves the quality of journals with publications to dye up with whose give impact factor databases as international standard. In turn this will help to get more academic scores Academic Performance Indicator (API) for their publications and for the visibility in international level also (API) Scores for recruitment of faculty members by direct and promotion under CAS in universities and colleges.

Recommendations

1. In the study recommend that more number of Physical Education journals to be included in Indian Citation Index (ICI), Web of Science and Scopus for the overall improvement of Physical Education contributions.
2. In UGC Website, there are four major categories with 341 contents but no Physical Education content in any part of UGC journal list. Hence must add special content for Physical Education journals.
3. Through the study, Governments want give important to the Physical Education with their research works to publish the international level standard with high impact factor journals for (prevent it before comes) health in India.

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Webometric Study of Non Agricultural University Websites of Maharashtra State

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Abstract - *The article examines the websites of Non- Agriculture University of Maharashtra State. The study is to do the webometric analysis of Non-Agriculture university of Maharashtra state. This study was conducted based on the data collected during December 2020 to February 2021. It was found that all University in Maharashtra has their update websites. The data were analyzed to find out to evaluate the efficiency of this university website in terms of Global Rank, website audience, and Marketing Channels. The study is done based on the parameters determined by similar web.*

Keywords: *Webometric, Website audience, Global Rank, Channels overview, Search Traffic.*

Introduction

The World Wide Web (WWW) allows computer users to position and view multimedia-based documents (i.e., documents with text, graphics, animations, audios and/or videos) on almost any subject. Even though the Internet was developed more than three decades ago, the introduction of the WWW was a relatively recent event. In 1989, Tim Berners-Lee of CERN (the European Laboratory for Particle Physics) developed the World Wide Web and several communication protocols that form the backbone of the WWW. The Internet and the World Wide Web will surely be listed among the most significant and profound creations of humankind. In the past, most computer applications ran on standalone computers. (i.e., computers that were not connected to one another) Today's applications can be written to communicate among the world's hundreds of millions of computers. The Internet makes our work easier by mixing computing and communications technologies. It makes information immediately and conveniently accessible worldwide. It makes it possible for individuals and small businesses to get worldwide contact.

Non-Agriculture Universities are considered holy institutions where education is imparted among the masses. Therefore, anything affiliated or developed by Non-Agriculture University should have a positive impact. This is the era of information & technology; people tend to access the information online rather than visiting the place physically. Much of the information about universities is placed on their websites, and these websites are visited by the students, scholars, and researchers etc to gather the information. How effective a website is and how efficiently it is catering the needs of users is indicated by certain parameters like how frequently a website is visited, how much time is spent on it by a user, how much content is downloaded from it etc. Evaluating a website against such parameters is termed as webometric analysis.

Conceptual Analysis

Webometrics

In the area of Bibliometric the volume of webometrics is greatly increased. The technique of studying the relationship between different sites is adopted in Bibliometric which is called scientific Mapping in Bibliometric research. The science of webometrics (also cyber metrics) tries to measure the World Wide Web to get knowledge about the number and types of hyperlinks, structure of the World Wide Web and usage patterns. The definition of webometrics is "the study of the quantitative aspects of the construction and use of information resources, structures and

technologies on the Web drawing on bibliometric and informatics approaches (Wikipedia, 2021)."

The term webometrics has been defined as "the study of web-based content with primarily quantitative methods for social science research goals using techniques that are not specific to one field of study", which emphasizes the development of applied methods for use in the wider social sciences. The definition focused on webometric as a tool to help publicize appropriate methods pushing the borders of possibilities of webometric studies in social sciences. Even the term webometrics was coined by Tomas Almind and Peter Ingwersen in 1997 and defined as "The study of web-based content with primarily quantitative methods for social science research goals, using techniques that are not specific to one field of the study" (Ingwersen, 1997). Hence webometric is the study tool in this online environment to evaluate the efficiency and efficacy of website in projecting and impacting its respective audiences.

Objectives of Study

The following are the major objectives of this study.

1. To Measure the Global and Indian Rank of Non-Agriculture University websites.
2. To calculate total visits and traffic share by monthly visits, avg. visit duration, daily Page per view & Bounce rate onsite.
3. To calculate the total sites linking in and search engine visits.

Scope & Limitation of Study

The current web metric study is confined to the Non-Agriculture University of Maharashtra State. There are a total number of 13 (10 Non-Agriculture University +1 Open University +01 special Sanskrit university+ 1 special woman's University) Non-Agriculture University in Maharashtra. The data collected is confined during December 2020 to February 2021.

Methodology

The data were extracted from 13 (10 Non-Agriculture University +1 Open University +01 special Sanskrit university+ 1 special Woman University) Non-Agriculture University in Maharashtra. Website during December 2020 to February 2021. All the websites are evaluated based on the parameters determined by similar web website.

Review of Related Literature

Zahidwani & UbaidUllahshas (2019) in conference paper webometric analysis of university websites of Jammu & Kashmir, India. The study aims to evaluate the efficiency of these websites in satisfying the needs of its different users like students, researchers, professors etc. (Ullahshas, 2019)

Ali Mardani-Nejad, FarshidDanesh, Hossein Saadat, Seyyed Mohammad Reza Darbani (2009) websites content quality of Iranian university of technology a webometrics study in this study is to analyse websites content quality in Iranian University to technology. (Ali Mardani-Nejad, 2009) Meisam Dastani, Somayeh Panahi & Masoumeh Sattari (2019), in their study analyzed the websites ranks on Iranian medical sciences universities in the period of 11 September 2016 to March 2017. It was performed on webometrics method which contains 41 websites of Iranian medical sciences universities. (Dastani, 2019)

Deshmukh R.K., (2019), Webometric Analysis Agriculture University Websites for Maharashtra State analysed the websites of Agriculture Universities of Maharashtra. (Deshmukh R.K. Vol 6 (10), 2019)

Data Analysis**Maharashtra Non- Agriculture University**

The information on all functions and activities of the all Non-Agriculture University's is provided through the following channels and websites. The analysis of the website has also been included.

TABLE I UNIVERSITY AND WEBSITE NAME

Sl. No.	Name of University	University web site	Sector
01	Swami RamanandTeerth Marathwada University, Nanded	www.srtmun.ac.in	Non-Agriculture University
02	Dr. Babasaheb Ambedkar Marathwada University, Aurangabad	www.bamu.ac.in	Non-Agriculture University
03	Mumbai University, Mumbai	http://mu.ac.in/	Non-Agriculture University
04	RashtrasantTukadojiMaharaj Nagpur University, Nagpur	https://www.nagpuruniversity.ac.in	Non-Agriculture University
05	KavayitriBahinabaiChaudhari North Maharashtra University, Jalgaon	http://www.nmu.ac.in/	Non-Agriculture University
06	SavitribaiPhule Pune University	http://www.unipune.ac.in/	Non-Agriculture University
07	SantGadge Baba Amravati University, Amravati	https://www.sgbau.ac.in/	Non-Agriculture University
08	Shivaji University, Kolhapur	http://www.unishivaji.ac.in/	Non-Agriculture University
09	Smt. NathibaiDamodarThackersey Women's University, Mumbai	https://sndt.ac.in/	Women's University
10	PunyasholkAhilyadeviHolkar, Solapur University, Solapur	http://www.sus.ac.in/	Non-Agriculture University
11	YashwantraoChavan Maharashtra Open University, Nashik	https://www.ymou.ac.in/	Open University
12	Gondwana University, Gadchiroli	https://unigug.ac.in/	Non-Agriculture University
13	KavikulaguruKalidas Sanskrit University, Ramtek, Nagpur	http://kksanskrituni.digitaluniversity.ac/	Sanskrit University

It was found that the State with the most Non-agricultural universities is Maharashtra with the total number of 13 (10 Non-Agriculture University +1 Open University +01 special Sanskrit university +1 special woman's University).

All Maharashtra Non-Agriculture University website is the official website of the respective Non-Agriculture University, Maharashtra State. The website content is available in English and Marathi.

Global Rank

On analyzing the data, it was found that Non- Agriculture University of Maharashtra is ahead of all other universities in terms of both Global Rank. The Website Global ranking analysis found that Savitribai Phule Pune University website was Highest Searchable website. Savitribai Phule Pune University Global Rank 22322 and Indian rank 1211 and Educational category rank 12 in world ranking. Mumbai University, Mumbai is world rank 68993 and followed by Sant Gadge Baba Amravati University, Amravati, Educational Category Ranking was 162.

TABLE II GLOBAL & INDIAN RANK

Sl. No.	University web site	Global Rank	Country Rank (Indian)	Category Rank (Education)
1	www.srtmun.ac.in	325749	16775	363
2	www.bamu.ac.in	380091	20771	471
3	http://mu.ac.in/	68993	3659	48
4	https://www.nagpuruniversity.ac.in	420738	21659	1174
5	http://www.nmu.ac.in/	302351	15569	335
6	http://www.unipune.ac.in/	22322	1211	12
7	https://www.sgbau.ac.in/	173364	9161	162
8	http://www.unishivaji.ac.in/	210179	11155	222
9	https://sndt.ac.in/	821523	43329	2032
10	http://www.sus.ac.in/	929444	48936	1144
11	https://www.ycmou.ac.in/	498726	25465	583
12	https://unigug.ac.in/	1011283	52487	2366
13	http://kksanskrituni.digitaluniversity.ac/	No data available		

Total Visits – website audience (December 2020 to February 2021)

Visitor hits to the website is a very remarkable criterion in evaluating the popularity of the organization /institution itself reflected by way of the number of visitors. Sum of all visits for the selected period December 2020 to February 2021 is shown in the table no-3 showing the total visits website audience following chart

TABLE III WEBSITE AUDIENCE

Sl. No.	University web site	Total Visits	Monthly visits	Monthly unique visitors	Avg. Visits Duration	Pages visits	Bounce Rate %
1.	www.srtmun.ac.in	676934	225645	61451	00:04:43	4.27	34.82
2.	www.bamu.ac.in	250585	83528	40348	00:04:56	7.50	41.98
3.	http://mu.ac.in/	2.744M	914922	348007	00:04:46	3.62	44.86
4.	https://www.nagpuruniversity.ac.in	330459	110153	54921	00:04:48	2.98	61.72
5.	http://www.nmu.ac.in/	446038	148679	52008	00:04:54	3.94	44.95
6.	http://www.unipune.ac.in/	5.605M	1.868M	600352	00:06:48	6.88	32.36
7.	https://www.sgbau.ac.in/	767191	255730	60579	00:03:41	3.18	39.30
8.	http://www.unishivaji.ac.in/	629967	209989	70569	00:02:33	3.18	39.30
9.	https://sndt.ac.in/	115553	38518	23706	00:03:19	2.96	51.28
10.	http://www.sus.ac.in/	96254	32085	17876	00:02:48	4.30	47.36
11.	https://www.ycmou.ac.in/	218257	72752	44685	00:02:52	4.65	49.46
12.	https://unigug.ac.in/	78655	2618	11541	00:03:01	2.66	48.64
13.	http://kksanskrituni.digitaluniversity.ac/	19358	6453	<5000	00:11:02	7.31	22.50

On analyzing the data, it was found that the institutional website of Kavi kulaguru Kalidas Sanskrit University, Ramtek, Nagpur 19358 (22.50%) has got maximum visits to its website and average duration times per day was 11.02 mints. Users also stay on the website for longer duration, followed by Savitribai Phule Pune University 5.605M (32.36%) is viewed visits of website last three months and average duration times per day 06.48 mints. Even the User visit duration considerably showed the user inclination towards these universities in getting information from their websites.

Searching Platform

Percent of incoming traffic from desktop Vs. mobile web searching Platform following Chart

TABLE VI DESKTOP AND MOBILE SEARCH PLATFORM

Sl. No.	University web site	Desktop%	Mobile web%
1	www.srtmun.ac.in	12.53	87.47
2	www.bamu.ac.in	29.99	70.01
3	http://mu.ac.in/	27.22	72.78
4	https://www.nagpuruniversity.ac.in	19.29	80.71
5	http://www.nmu.ac.in/	28.06	71.94
6	http://www.unipune.ac.in/	34.38	65.62
7	https://www.sgbau.ac.in/	6.01	93.99
8	http://www.unishivaji.ac.in/	29.24	70.76
9	https://sndt.ac.in/	21.98	78.02
10	http://www.sus.ac.in/	22.55	77.45
11	https://www.ycmou.ac.in/	16.80	83.20
12	https://unigug.ac.in/	28.83	71.17
13	http://kksanskrituni.digitaluniversity.ac/	17.70	82.30

In the search form the user is searching for the website through the Desktop or Mobile. While checking the incoming traffic as evident from the table IV it was found that Mobile Searching was the most preferred means as compared to Desktop search. It was recorded highest 93.99% user who searched Amravati university website searched through the use of mobile web. On a comparative basis it was found that mobile web search out passed desktop search of the website in case of all universities. In case of Desktop search Savitribai Phule Pune University topped it with 34.38%.

Visitors over Time

Table V shows that during December 2020 to February 2021 website search volume by the trend of visits over the selected time period. Visitor time shows the search times of university websites from December 2020 to February 2021, in which users searched Non-agricultural universities during three months, the website of the university Pune recorded showed the largest volume of time devoted by the users.

Geographical Distribution

The data related to website visits has been analyses based on the countrywide search. The geographical distribution of search profile for the website is given in Table VI.

TABLE V VISITORS OVER TIME

Sl. No.	University web site	Visitors over Time		
		Dec-2020	Jan-2021	Feb-2021
1	www.srtmun.ac.in	416361	180770	97557
2	www.bamu.ac.in	69011	119498	62077
3	http://mu.ac.in/	992079	1.55M	696983
4	https://www.nagpuruniversity.ac.in	131717	118992	79750
5	http://www.nmu.ac.in/	171054	152201	122782
6	http://www.unipune.ac.in/	2.488M	1.478M	1.638M
7	https://www.sgbau.ac.in/	291519	202033	273639
8	http://www.unishivaji.ac.in/	244859	190026	195081
9	https://sndt.ac.in/	39401	43049	33103
10	http://www.sus.ac.in/	35838	37277	23139
11	https://www.ymou.ac.in/	119601	53770	44885
12	https://unigug.ac.in/	34068	15264	29323
13	http://kksanskrituni.digitaluniversity.ac/	8795	<5000	5610

TABLE VI GEOGRAPHICAL WISE ANALYSIS

Sl. No.	University web site	Countries				
		India	United States	China	Brazil	Pakistan
1	www.srtmun.ac.in	97.67%	21%	41%	38%	0
2	www.bamu.ac.in	97.34%	38%	0	0	22%
3	http://mu.ac.in/	93.28%	2%	0	0	29%
4	https://www.nagpuruniversity.ac.in	97.64%	39%	0	0	0
5	http://www.nmu.ac.in/	96.48%	1%	0	0	9%
6	http://www.unipune.ac.in/	96.06%	98%	36%	0	0
7	https://www.sgbau.ac.in/	98.80%	17%	0	0	0
8	http://www.unishivaji.ac.in/	96.70%	56%	0	20%	0
9	https://sndt.ac.in/	94.83%	2%	0	0	0
10	http://www.sus.ac.in/	96.11%	3%	0	0	0
11	https://www.ymou.ac.in/	98.18%	84%	0	0	0
12	https://unigug.ac.in/	99.16%	0	0	0	0
13	http://kksanskrituni.digitaluniversity.ac/	93.01%	7%	0	0	0

As evident from table VI as an obvious finding the country with highest search hits was India Table VI. It is important to note that about 12 out of the 13 universities of Maharashtra got search hits from USA. Even Savitribai Phule University and SRTM Nanded University got search hit from China. Even Brazil and Pakistan were also the countries which show search hits for few of universities amongst the total 13 Non-Agricultural Universities of Maharashtra.

Channels Overview (Marketing Channels)

Following Table VII is showing the different medium used in searching the respective websites of the studied 13 Non-Agricultural Universities of Maharashtra.

TABLE VII CHANNELS OVERVIEW

Sl. No.	University web site	Direct	Email	Referrals	Social	Organic Search	Paid Search	Display Ads
1	www.srtmun.ac.in	25.29	5.35	2.93	0.33	65.66	0	0.33
2	www.bamu.ac.in	35.4	1.01	0.99	0.05	62.18	0	0.37
3	http://mu.ac.in/	43.65	1.69	0.74	1.3	52.58	0	0.03
4	https://www.nagpuruniversity.ac.in	68.32	0	1.45	0	30.23	0	0
5	http://www.nmu.ac.in/	17.82	1.71	2.86	0.22	77.28	0	0
6	http://www.unipune.ac.in/	30.46	2.23	5.86	1.39	60.06	0	0
7	https://www.sgbau.ac.in/	28.78	1.38	0.97	0.16	70.18	0	0
8	http://www.unishivaji.ac.in/	27.32	1.38	0.97	0.16	70.03	0	0.15
9	https://sndt.ac.in/	25.21	0	4.48	0	70.31	0	0
10	http://www.sus.ac.in/	0	0	0	0	0	0	0
11	https://www.ycmou.ac.in/	11.25	0	4.73	2.06	91.96	0	0
12	https://unigug.ac.in/	41.42	24	7.18	0.04	50.91	0	0.21
13	http://kksanskrituni.digitaluniversity.ac/	37.14	0	19.88	0	42.97	0	0

It was found that direct visit and organic searches were the most preferred means of browsing through the University website. Various others mediums like Email, referrals, social media, etc. were also used though the frequency of its use was bare minimum.

Conclusion

Websites play an important role in determining the capacity of the organizations to meet the needs of the users and to understand their demands. The purpose of the present study is to evaluate the websites of Maharashtra state Non- agricultural university. From this study it was found that Savitribai Phule Pune University website is doing much better than other universities websites in terms of bounce rate. Overall there is a trending pattern to visit university websites for all the academic as well as administrative work as well as to get details about various processes and facilities. Savitribai Phule University holds the top position in terms most of the evaluative parameters of judging the efficiency and efficacy of a university website. This also reflects the popularity as well as growing importance of that particular university.

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A Scientrometric Analysis on Earth Science Research During 2011-2020

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Abstract - *This paper discusses about the importance of earth science research details from 2011 to 2020 by conducting scientometric analysis of data were downloaded from web of science database. The information used for this examination included numbers of paper, ranking of authors based on h-index, key word, country and institution. The information was coded and tabulates with the help of various scientometric techniques. The results showed that there was a significant growth in quantity of papers from 2010 to 2020.*

Keywords: *Earth Science, H-Index, Scientometrics, Web of Science.*

Introduction

Alan Pritchard defined bibliometric as “the application of mathematics and statistical methods to books and other media of communication”. All the studies concentrate towards the merits and demerits of the research publications which will be helpful for its further development. This paper studies the Scientometric analysis of the earth science from 2011 – 2020. Earth sciences, the fields of study concerned with the solid Earth, its waters, and the air that envelops it. Included are the geologic, hydrologic, and atmospheric sciences. The subject earth sciences the main focus of the study that includes research results also, moreover the focusing the related the subjects such as earth, science and data. This continues in serial publication under the title "earth science. In this regard, the present study entitled “Scientrometric analysis on earth science research output: a study on web of science”. The present study is an attempt to Scientometric measures of the published research output of earth science in terms of using various statistical tools, Scientometric techniques, and indicators.

Objectives of the study

The major objectives are frame with the select notion of the present study as mention below:

1. To find out year wise distribution
2. To identify ranking of authors based on h-index
3. To analyze the words wise distribution
4. To study the country wise distribution
5. To examine the institutions wise distribution

Methodology

They require data to be collected from web of science databases for a period of ten years from 2011 to 2020. It can be seen that almost 1035 records were collected from earth science research. A total of 1035 records have been found and same has been exported in the excel format, Bibexcel software and histcite software tools for further analysis.

Analysis and Results

Table I indicates that the year-wise output of earth science research publications; it is observed that the research output in this field step by step growing from 2011 to 2020. In the year 2011 earth science research output 80(7.73%) and it increase to 83 (8.02%) in the year of 2012. In the year 2014 research output is decreased slightly from 2015, 2016, 2017 and 2018 the highest

research output 146(14.11%) in the year 2019 onwards the input in research earth science improved identically.

TABLE I YEAR WISE OUTPUT OF EARTH SCIENCERESEARCH

Year	Records	%	TLCS	TGCS
2011	80	7.73	16	1831
2012	83	8.02	15	1819
2013	107	10.34	47	3233
2014	75	7.25	17	2388
2015	93	8.98	20	1781
2016	101	9.76	22	2450
2017	107	10.34	21	1770
2018	105	10.14	11	842
2019	138	13.33	7	730
2020	146	14.11	1	217
Total	1035	100	177	17061

TABLE II RANKING OF AUTHORS BASED ON H-INDEX

Rank	Authors Name	Records	H-Index	Citations	Citation sum with in h-core
1	Di LP	7	6	87	83
2	Baumann P	5	4	117	116
3	Chang CY	8	4	92	83
4	Hulley GC	4	4	236	236
5	Peral E	4	4	94	94
6	Zhang X	4	4	55	55
7	Hook SJ	4	4	394	394
8	Yue P	4	4	81	81
9	Hodges RE	3	3	61	61
10	Natraj V	3	3	104	104
11	Teng JW	3	3	21	21
12	Nativi S	3	3	123	123
13	Tarolli P	3	3	80	80
14	Gupta HV	3	3	61	61
15	Hall DK	3	3	55	55
16	Peters SE	3	3	69	69
17	Dong SW	3	3	73	73
18	Sofia G	3	3	80	80
19	Hirose K	3	3	188	188
20	Clark N	3	3	103	103

This table revealed that, top 20 authors and h-index of the authors in these to twenty authors, Di LP have 7 articles, citation 87 and h-index is 6, Baumann P have 5 publications, 119 citations and 4 h-index followed by, Chang CY have 8 publications, 83 citations and 4 h-index and followed authors were h-index has 4 and 3 but citation and Publications different values. Tables 2 have been detailed about author h-index and citations.

TABLE III TOP 20 INSTITUTION IN EARTH SCIENCE RESEARCH

Sl.No.	Institution	Records	TLCS	TGCS
1	NASA	68	18	1777
2	Chinese Academy Science	66	13	711
3	CALTECH	54	12	1391
4	University Maryland	26	7	889
5	china university of geosciences	24	4	627
6	University Chinese academy of sciences	24	3	127
7	Columbia University	18	5	315
8	University Colorado	18	3	477
9	University Calif Berkeley	17	3	392
10	US Geol Survey	17	1	178
11	University Tokyo	15	1	332
12	MIT	14	3	298
13	Natl Taiwan Normal University	14	2	151
14	Japan Agcy Marine Earth Sci & Technol JAMSTEC	13	0	225
15	University Alabama	13	3	195
16	University Arizona	13	2	690
17	University Texas Austin	13	2	328
18	Harvard University	12	1	381
19	Japan Agcy Marine Earth Sci & Technol	12	2	311
20	NOAA	12	3	280

This table shows that institution wise distributions, 1360 institutions contributed earth science research. In this research top 20 institutions shown in this table, NASA has the highest distribution 68 publications, 18 local citation scores and 1777 global citation scores. Chinese Academy Science 66 publications were second contribution in earth science research, 13 local citation scores and 711 global citation scores. CALTECH 54 publications were third contribution in this research, 12 local citation score and 1391 global citation scores.

The top 10 most collaborating countries with publication of earth science research during 2011–2020 are shown in Table IV. In collaborative research in earth, out of total 59 countries, the USA tops the first rank with a total of 105 (43.86%) publications, followed by Peoples R China with 164 (15.84%) publications respectively with the 2nd rank and India with 28 (2.70%) publication respectively with the 13th rank.

TABLE IV COUNTRY WISE DISTRIBUTION

Sl.No.	Country	Records	%	TLCS	TGCS
1	USA	454	43.86	105	9393
2	Peoples R China	164	15.84	30	2480
3	UK	126	12.17	18	2838
4	Germany	89	8.60	13	2486
5	Japan	79	7.63	5	1785
6	France	64	6.18	6	1764
7	Italy	63	6.08	12	1022
8	Australia	57	5.52	9	1528
9	Canada	50	4.43	7	832
10	Unknown	39	3.76	3	107
11	Switzerland	31	2.99	7	781
12	Spain	29	2.80	2	320
13	India	28	2.70	1	319
14	Netherlands	27	2.61	4	757
15	Taiwan	24	2.32	5	402
16	New Zealand	14	1.35	1	458
17	South Africa	14	1.35	3	53
18	Austria	13	1.25	3	508
19	Norway	12	1.16	1	473
20	Poland	12	1.16	1	344

TABLE V KEY WORDS WISE DISTRIBUTION

Sl. No	Key Words	Records	TLCS	TGCS
1	Earth	314	78	3011
2	Science	294	63	2318
3	Data	134	43	2119
4	Using	63	7	750
5	Based	60	6	1046
6	Analysis	58	5	461
7	New	52	4	850
8	System	47	9	603
9	High	41	9	1387
10	Learning	40	9	349
11	Climate	35	5	459
12	Development	35	10	324
13	Applications	33	7	1461
14	Case	31	6	245

15	Global	30	6	1087
16	Model	30	7	805
17	Change	28	7	466
18	Models	28	7	398
19	Surface	28	4	798
20	Application	27	2	126

This Table V shows the top 20 key words used in the earth science research output and based on the web of science database. The keyword Earth is maximum used in the research contributed 314 publications, followed by Science the second top most keyword with 294 and Data had taken the third place with 134.

Conclusion

The analysis activity of earth science research has been examined thoroughly based on the publication data of 1035 research articles in earth science research from 2011 to 2020. The modern trend towards research is one of the steps for the updated currency day by day. The highest paper of publication author is Di LP have 7 articles, citation 87 and 6 h-index. The keyword Earth is maximum used in the research contributed 314 publications. Earth science research has become the most indispensable one in the field of research activity which leads to the researcher to equip themselves and to bring new innovative ideas for the growth of Earth science.

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Assessment of Prize Impact on Publication Productivity, Citations and Collaboration of Nobel Laureates

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Abstract - Rewards, recognition and incentives are often linked with greater profits, better productivity and improved services. But, Nobel Prize (NP), considered as the epitome of recognition, is thought to have a disruptive impact on the future roles and later research works of Nobel Laureates (NLs), because of certain factors like increased social-status of the winners, diminished desire for recognition later, etc. Therefore, this study investigates the later i.e., post-prize reception, academic roles of NLs, in the field of chemistry, through evaluation and comparison of publication productivity, citation impact and collaboration of NLs, between pre-prize and post-prize periods. The data-sources used for the collection of data include- NP official web-site (<https://www.nobelprize.org/>) and the Web of Science database (<https://www.webofknowledge.com/>). The findings of the current study, as seen from annual distributions, demonstrate no significant change in publication productivity post-prize reception. Majority of the NLs show marginal variations for the cumulative publication counts too, for the two time-periods, with a deviation to slight rise post-prize, for a good number of NLs. Total citation counts and citation impact scores depict a decline post-prize, while 5-year citation scores (i.e., time-limited citations) do not show significant variations, thus, depicting that the dip in impact is not immediate after the prize-reception. The collaboration levels, too, show no conspicuous changes for the two periods.

Keywords: Recognition, Nobel-Prize, Nobel Laureates, Post-Prize Productivity, Publications, Citations.

Introduction

Scientific recognition and rewards are meant to identify and authenticate the achievements of scientists with a purpose to instil motivation and inspiration. The highest forms of recognition are the awards and prizes accorded to scientists (Zukerman, 1970). The recognition of scientific achievement through prizes dates back to the 18th century (Chan, Gleeson & Torgler, 2014). Since then, the scientific prizes have witnessed a huge proliferation. But, among all the prizes and awards, Nobel Prize (NP) is considered as the most prestigious one. It is regarded as the ultimate acknowledgement and honour for a scientist (Merton, 1968). Since 1901, the NP is being conferred to a scientist, writer or a peace promoter, annually, in the fields of physics, chemistry, medicine, literature and peace and can be shared by maximum of three persons in each category. More than the money that Nobel Laureates (NLs) receive, it is the reputation that provides them the edge. These incentives and honours inspire and motivate non-winners, too (Chan, Gleeson & Torgler, 2014).

Since, the main purpose of awards and prizes is to encourage scientists for their extended involvement in science, it, therefore, becomes pertinent to gauge the level of motivation of the winners of NP, to assess the effectiveness of this 'highest scientific accolade' in science. Accordingly, this study endeavours to unfold the motivational efficacy of the NP towards the academic research performance, irrespective of its social significance and status. Scientific publications are regarded as important out-put of research works, therefore, publication performance forms a relevant indicator for examination of researcher role and activity. The research performance as measured through research out-put i.e., publication productivity includes

publication count and citations, while considering citations as a proxy of quality (Sutter and Kocher, 2001) and determinants of scientific significance (Lindsey, 1980). Besides, examination of the collaboration in research works determines the team reliance and hence, the individual roles of the NLs. Thus, the current study evaluates the post-prize productivity and performance of NLs through publication counts, citation counts and citation impact (i.e., the average count of citations) and the collaborations, thereof.

Literature Review

Awards and prizes have grabbed the attention of researchers since long. Thus, adequate amount of literature, pertaining to various dimensions of awards and prizes, is available. The literature, specific to the current study, was surveyed to gain familiarity with the related works already undertaken. Zukerman (1967) interviewed 41 NLs and compared their research out-put with a matched sample of scientists drawn from the ‘American Men of Science’. The results reveal a dip in post-prize productivity and changed work-practices. The study also reports that collaborations started before the prize end soon post-prize reception. Inhaber and Przednowek (1976) studied the ‘differences in the perceived importance of the work’ of NLs for pre and post-prize periods. While comparing the citations of NLs with the control groups of scientists elected to the U.S. National Academy of Sciences and all the scientists cited in the Science Citation Index (SCI), the study traced the largest average change in citations after the prize receipt as compared to other two control groups. Mazlowmian, Eom, Helbing, Lozano and Fortunato (2011) assessed the publications of 124 Nobel laureates, for evaluation of citation data, for the time period 1990-2009. The study found prize-winning having a positive impact on the citation count of the laureate’s publications produced before winning the prize. Borjas and Doran (2013) compared the productivity of Fields Medallists with that of matched sample of non-winners and found similar publication productivity for both the groups till the award year with decline in productivity of winners after the prize reception.

Similarly, Chan *et al.*, (2013) have examined the impact of John Bates Clark Medal in economics, on the recipients’ research works and status, compared to a control group of non-winners. The study has found a positive impact of the medal on the recipient productivity and citations. Chan, Gleeson and Torgler (2014) have analysed the ‘Mathew Effect’ for NLs by exploring the award pattern of NLs before and after the prize reception. The data was collected on the number of awards won annually for 50 years before and after the prize. The results reveal an increasing rate of awards pre-prize reception, till the NP year followed by a sharp decline post-prize reception. In a yet another study, Chan, Onder and Torgler (2015) investigated publication records of 198 NLs to analyze the impact of prize on the co-authorship patterns. The findings signify less collaboration with new co-authors after the prize reception. The study revealed that NLs continue to work in the co-authorship works started before the prize reception.

Scope of the Study

Scientific productivity of Nobel Laureates, having received Nobel Prize (NP) from 2005 to 2008, in the field of Chemistry, has been examined. The data for the study, limited to article publications published 5-years pre-prize reception and 5-years post-prize reception for each laureate, have been harvested from the bibliographic database- Web of Science (WoS).

Objectives of the Study

The study aims to compare the changes in productivity, impact and co-authorship levels of NLs before and after receiving the NP, in order to assess the effect of recognition on the research output. Accordingly, the objectives framed are as

1. To examine the impact of NP on the publication productivity of NLs

2. To assess the impact of prize on the cumulative and time-limited citation counts and citation impact of NLs
3. Assessment of prize impact on the collaboration levels of NLs.

Methodology

The data for the study, which include names of Nobel Laureates and their publication details, were harvested from the Nobel Prize official web-site (<https://www.nobelprize.org/>) and citation database- Web of Science (<https://www.webofknowledge.com/>). The data retrieval involved following steps.

Phase 1

The official website of Nobel Prize- that gives free access to all the information pertaining to the Nobel Prize and NLs, was probed and the names of NLs, of time-period 2005-2008, in the field of Chemistry, were retrieved.

Phase 2

The retrieved names of the NLs were then individually run in the author search of the Web of Science database on 15-March-2021. The bibliographic details, displayed thereof, were then refined for 5-year period before the prize reception and common time-period after the prize reception, i.e., a total of 10 year publishing period, for each NL. Further, the publications were limited to article type only. The resultant datasets were harvested to the excel file using the export data option of the data-base.

Phase 3

The data in the excel file were sorted and compiled in two groups for pre-prize and post-prize periods and accordingly analysed to achieve the objectives of the study.

Results and Discussion

Publication Productivity of NLs - Pre and Post-Prize Period

The data shows the annual distribution and cumulative count of papers published by Nobel Laureates (NLs) five years before the Nobel Prize (NP) reception and five years after the Prize reception. As seen from the annual data, the NL Grubbs, a 2005 winner, has published 22 article publications in 2001 and 2002, each, 15 publications in 2003, 9 and 10 in 2004 and 2010, respectively, while the post-prize years of 2006, 2007, 2008, 2009 and 2010 have the respective publication productivities of 15, 17, 13, 17 and 18. Schrock RR, another 2005 winner, has pre-prize five year publication distribution of 17, 9, 11, 12 and 12 for respective years of 2001, 2002, 2003, 2004 and 2005, while the annual productivities post prize-reception i.e., from 2006-2010 are 23, 15, 16, 15 and 9. Similarly, all other NLs show, more or less, similar publication productivity patterns before and after the prize reception, except Ertl G, a 2007 winner – has published publication counts of 27, 7, 11, 6 and 3, annually, for pre-prize period from 2003 to 2006 while the post-prize period shows a record of only single publication for year 2010. Rest of the post-prize years show no publication records. Besides, except Ertl G, the data for all other NLs depict a similar irregular increase and decrease, in the annual productivities, during both the periods. Table I presents a lucid picture.

Thus, overall, the NP reception shows no conspicuous impact on the annual publication productivities of the NLs. They tend to maintain the pace of producing research out-put after the prize reception. This is in consonance with the finding of Li *et al.*, (2020) that NLs show no significant change in the average number of papers post-prize reception. For the cumulative publication productivities, the data depicts that most of the NLs (5 out of 8) have a slight increase in the total publication productivity post-prize reception as gauged from the 5-year time-periods, e.g., Grubbs has published 78 publications for 5-years pre-prize reception and 80 publications for

5-years post-prize reception, Schrock RR has 61 publications for 5-years pre-prize and 78 publications for post-prize period, Chauvin Y shows 5 publications before prize-reception period and 13 publications for after-prize period. Two NLs (Kornberg RD and Ertl G) depict a decline in post-prize productivity and one NL (Shimomura O) show equal number of publications for the two time-periods. Graph1 presents the data. Since NLs tend to have increased team-works post prize-reception (Li *et al.*, 2020), that may be the reason for their increased productivities. Overall, except Ertl G, the total productivities for all the NLs show marginal variations for the two periods.

TABLE I ANNUAL PUBLICATION PRODUCTIVITY OF NLS 5-YEARS PRE AND POST-PRIZE

NP Year	NL Name	Annual Publication Productivity												
		2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
2005	Grubbs	22	22	15	9	10	15	17	18	17	13			
2005	Schrock RR	17	9	11	12	12	23	15	16	15	9			
2005	Chauvin Y	0	0	1	1	3	1	1	2	3	6			
2006	Kornberg RD		5	6	5	5	5	2	3	3	4	6		
2007	Ertl G			27	7	11	6	3	0	0	1	0	0	
2008	Tsien M				9	5	8	6	5	7	7	5	7	8
2008	Shimomura O				1	2	2	1	3	1	2	2	1	3
2008	Chalfie M				3	1	2	2	0	2	2	4	1	2

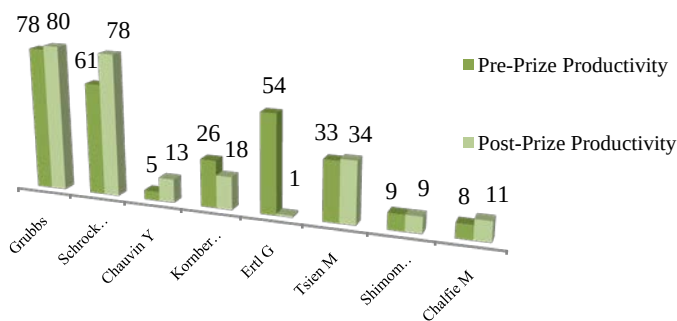


Fig. 1 Total Publication Productivity of NLS 5-years Pre and Post prize

Citation Count of NLS - Pre and Post-Prize Period

The data depicts the citation counts of NLs, received till 2018, for the annual as well as cumulative publication counts, produced 5-years pre-prize reception and 5-years post-prize reception.

Grubbs shows the total citation counts of 3576, 2409, 2931, 1080 and 1078 for the publications produced annually 5-years before prize-reception i.e., from 2001 to 2005, while the post-prize citation counts include- 1464, 1469, 1171, 1402 and 581 for the annual productivities published from 2006 to 2010, respectively. Kornberg RD, a 2006 winner, has the pre-prize total citation counts of 754, 718, 851, 355 and 762, while the post prize counts comprise- 1543, 316, 193, 314 and 366. Ertl G, a 2007 winner, has the pre-prize total citation distribution of 1065, 653, 501, 123 and 125. Since, post-prize 5-year period shows a record of single publication only published in 2010, has received 41 citations. Tsien M, a 2008 winner, has received the total citation counts of

5885, 1239, 1438, 642 and 1060 for pre-prize publication years from 2004 to 2008, while the post-prize counts include 1656, 1111, 654, 896 and 941, for annual productivities from 2009 to 2013, consecutively. Table II gives an overview of the data.

Thus, the data reveals that all the NLs have a peak citation year during the pre-prize period. Majority of the NLs show an increase in citation counts for the year following the prize-receipt year as compared to the prize-reception year and the one preceding that. Thereafter, counts follow an irregular rise or decline. Overall, majority of the NLs depict lower citation scores for the annual publications published 5-years post-prize reception. As for the total citation scores for the cumulative publication counts published 5-years before prize reception and 5-years after prize reception are concerned, Grubbs has received 11074 total citations for the pre-prize period and 6087 for the post-prize 5-year period. Schrock RR has 4149 and 3005 citation scores, respectively, for pre-prize and post-prize periods, Kornberg RD shows 3440 citation score for pre-prize period while 2732 score for post-prize period. Similarly, all other NLs, except Chauvin Y, have lower citation scores for the post-prize periods, as presented in graph 2.

TABLE II CITATION COUNT FOR ANNUAL PUBLICATIONS OF NLS 5-YEARS PRE AND POST-PRIZE

NP Year	NL Name	Citation Count													
		2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	
2005	Grubbs	3576	2409	2931	1080	1078	1464	1469	1171	1402	581				
2005	Schrock RR	1002	645	1194	594	714	834	534	462	893	282				
2005	Chauvin Y			99	20	106	6	98	48	174	209				
2006	Kornberg RD		754	718	851	355	762	1543	316	193	314	366			
2007	Ertl G			1065	653	501	123	125			41				
2008	Tsien M				5885	1239	1438	642	1060	1656	1111	654	896	941	
2008	Shimomura O				115	39	228	24	26	42	46	79	12	40	
2008	Chalfie M				252	311	234	158		71	202	150	99	49	

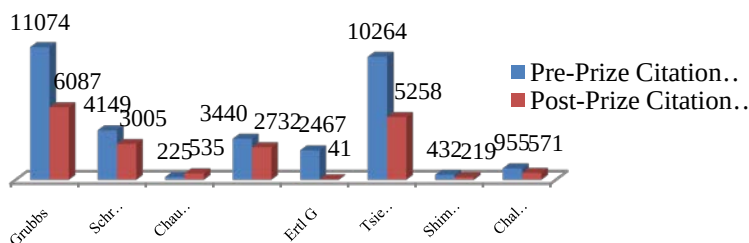


Fig. 2 Citation Count for cumulative Publications of NLs 5-years Pre-Prize and 5-years Post-Prize

Citation Impact for NLs - Pre and Post-Prize Period

Citation Impact is the average count of citations per publication calculated by dividing the total citations by total publications. Consistent with the earlier finding of lower citations post-prize reception, citation impact of the majority of the NLs, for the annual productivities, too, depicts a dip post-prize reception. E.g., Grubbs shows pre-prize citation impact distribution of 163, 110, 195, 120 and 108 for 2001, 2002, 2003, 2004 and 2005, respectively, while the post-prize citation

impact scores comprise- 98, 86, 65, 85 and 45 for the respective years of 2006, 2007, 2008, 2009 and 2010. Similarly, Schrock RR has the 5-year annual citation impact distribution of 59, 72, 109, 50 and 60 pre-prize reception i.e., 2001-2005, while 36, 36, 29, 60 and 31 for post-prize 5-years i.e., 2006-2010, consecutively, as given in table III. Consequent to the annual citation impact scores, all NLs, except Kornberg RD, have lower total citation impact scores for post-prize period as compared to the pre-prize period, e.g., Grubbs has total citation impact of 142 for 5-years pre-prize and 76 for 5-years post-prize, Schrock RR shows cumulative pre-prize citation impact of 68 while 39 for post-prize period. Graph 3 represents the comparative data.

TABLE III CITATION IMPACT FOR ANNUAL PRODUCTIVITIES OF NLS 5-YEARS PRE AND POST-PRIZE

NP Year	NL Name	Citation Impact												
		2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
2005	Grubbs	163	110	195	120	108	98	86	65	83	45			
2005	Schrock RR	59	72	109	50	60	36	36	29	60	31			
2005	Chauvin Y			99	20	35	6	98	24	58	35			
2006	Kornberg RD		151	120	170	71	152	772	105	64	79	61		
2007	Ertl G			39	93	46	21	42			41			
2008	Tsien M				654	248	180	107	212	237	159	131	128	118
2008	Shimomura O				115	20	114	24	9	42	23	40	12	13
2008	Chalfie M				84	311	117	79		36	101	38	99	25

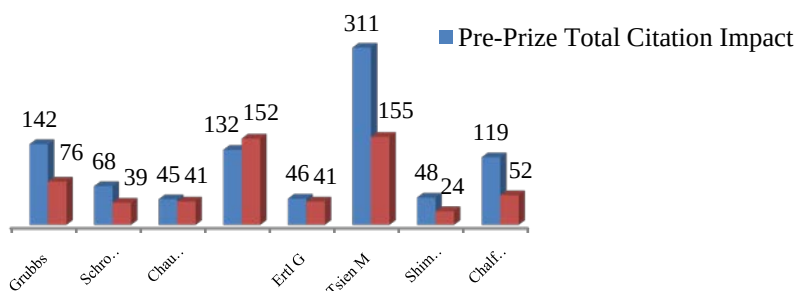


Fig. 3 Citation Impact for cumulative Productivities of NLs 5-years Pre and Post-Prize

Five-Year Citation Count and Citation Impact of NLs - 5-years Pre and Post-Prize

Since citation accumulation gets influence by time i.e., older publications accumulating more citations over time, therefore, to eliminate this limitation citation counts have been calculated for 5-years' time-span, only, for the publications published 5-years pre-prize and five-years post-prize. Pre-prize reception 5-year citation counts for the annual publications for Grubbs comprise- 1055, 654, 888, 411 and 374, while the post-prize counts include- 668, 694, 646, 696 and 337, for the publications published annually from 2006 to 2010. Kornberg RD has pre-prize citation counts of 258, 328, 425, 144 and 308, and the post-prize counts of 427, 163, 101, 193 and 127, consecutively, for the individual years from 2007 to 2011. Similarly, Tsien M has received 5-year citation counts of 366, 587, 1911, 504 and 290 for pre-prize years and 566, 743, 708, 237 and 856 for post-prize 5-year annual publications. The table 4(a) presents the data distribution in detail.

Thus, the data depict that, though, the 5-year citation counts do vary between the two periods but the variations are not so conspicuous. Since, the citations of limited time-span have been taken into consideration, it signifies that post-prize publications lay, more or less, a similar influence on the scientific community, during the early publication years as seen for the pre-prize publications. Beside, the data confirms the previous finding of citation rise, for majority of the NLs, for the year next to the prize reception year. The cumulative 5-year citation counts for Grubbs is 3382 for pre-prize 5-year productivity and 304 for post-prize 5-year productivity. Schrock RR has 5-year citation scores of 1685 and 1573 for pre and post-prize reception periods, respectively. Chauvin Y shows 82 count for pre-prize period and 301 for post-prize period. Similarly, Kornberg RD, Ertl G, Tsien M, Shimomura O and Chalfie M have 5-year total citation counts of 1463, 838, 3658, 148 and 307 for pre-prize periods, while, 1111, 21, 3110, 152 and 292 for post-prize periods, respectively. Graph 4(a) offers the presentation of the data. Thus, majority (i.e., 6 out of 8) of the NLs show lower 5-year citation counts for the publications produced after the prize-reception. Getting a more clear vision of impact of prize on immediate citation scores, the 5-year citation impact of annual publications, as seen from table 4(b), though are lower for most of the post-prize years, but, do not show much pronounced variations in the overall annual distributions.

Likewise, for cumulative 5-year citation impacts, Grubbs, Schrock RR, Tsien M and Chalfie M depict a decline for post-prize periods, e.g., Grubbs has total 5-year citation impact of 43 pre-prize and 38 post-prize, Schrock RR pre-prize score of 28 and post-prize 20. While Chauvin Y, Kornberg RD, Ertl G and Shimomura O have higher 5-year citation impact scores for post-prize 5-year productivities, e.g., Chauvin Y has 5-year citation impact score of 16 pre-prize and 23 post-prize, similarly, Kornberg RD has 56 pre-prize and 62 post-prize, as represented in graph 4(b). Thus, four NLs show post-prize decline for total 5-year citation impact and the other four depict a 5-year impact rise post-prize. These findings suggest that the decline in citations of NLs post-prize, mostly, is not immediate and initially tend to receive the citations at a good pace. The decline in citations may be experienced in their late careers.

TABLE IV(A) FIVE YEAR CITATION WINDOW FOR ANNUAL PRODUCTIVITIES OF NLS 5-YEARS PRE-PRIZE AND 5-YEARS POST-PRIZE

NP Year	NL Name	Five Year Citation Count												
		2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
2005	Grubbs	1055	654	888	411	374	668	694	646	696	337			
2005	Schrock RR	495	278	369	264	279	402	289	243	481	158			
2005	Chauvin Y			26	9	47	3	39	35	97	127			
2006	Kornberg RD		258	328	425	144	308	427	163	101	193	227		
2007	Ertl G			358	177	188	61	54			21			
2008	Tsien M				366	587	1911	504	290	566	743	708	237	856
2008	Shimomura O				33	15	74	13	13	27	37	54	10	24
2008	Chalfie M				94	90	85	38		29	86	87	59	31

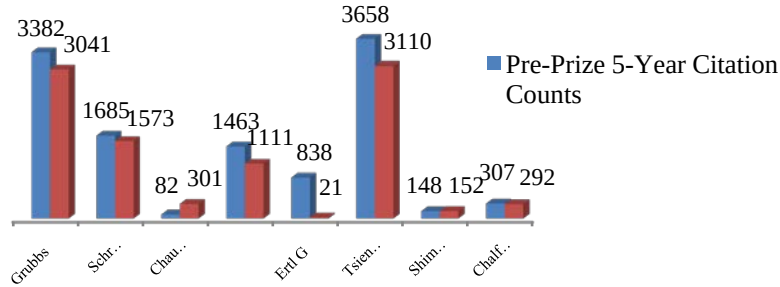


Fig. 4(a): 5-Year Citation Count for Cumulative Productivities of NLs for 5-years Pre-Prize and 5-years Post-Prize

TABLE IV(B): FIVE YEAR CITATION IMPACT FOR ANNUAL PRODUCTIVITIES OF NLS 5-YEARS PRE-PRIZE AND 5-YEARS POST-PRIZE

NP Year	NL Name	Five Year Citation Impact												
		2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
2005	Grubbs	48	30	59	46	37	45	41	36	41	26			
2005	Schrock RR	29	31	34	22	23	18	19	15	32	18			
2005	Chauvin Y			26	9	16	3	39	18	32	35			
2006	Kornberg RD		52	55	85	29	62	214	54	34	48	38		
2007	Ertl G			13	25	17	10	18			21			
2008	Tsien M				41	117	239	84	58	81	106	142	34	107
2008	Shimomura O				33	8	37	13	4	27	19	27	10	8
2008	Chalfie M				31	90	43	19		15	43	38	59	16

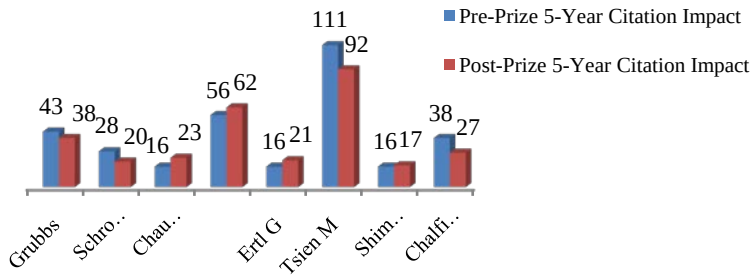


Fig. 4(b) 5-Year Citation Impact for cumulative publications of NLs published 5-years Pre-Prize and 5-years Post-Prize

Collaborative Index (CI) for Annual and Cumulative Publication Productivities

Collaborative Index (CI) means mean count of authors per joint paper. Therefore, the CI has been calculated for annual publication productivities as well as cumulative productivities 5-years pre-prize and 5-years post-prize. The annual pre-prize CI for Grubbs comprise- 4 for years 2001,2002 and 2005, each, and10 and 3 for 2003 and 2004, respectively, and post-prize scores include- 5 for 2006 and 2007, each, 4 for 2009 and 2010, each, and 3 for 2008. Kornberg RD has pre-prize annual CI of 4 for 2002, 2004, 2006, each, and 5 for 2003 and 2005, each, while post-prize shows CI of 5 for 2007, 2008 and 2010, each, and 6 for 2009 and 2011, each. Ertl G has 6, 5, 5, 4 and 5

CI scores pre-prize, and the only publication, recorded for post-prize period of 5-years, in 2010, has collaboration of 5 authors. Similarly, Tsien M shows the CI distribution of 8, 7, 6, 4 and 5 for pre-prize productivities, annually, while, post-prize scores comprise 7, 8, 9, 10 and 8 for the respective individual years from 2009 to 2013. Table V below presents a detailed overview of the data. As for the cumulative CI is concerned, four NLs depict a lower scores for post-prize 5-year periods, i.e., Grubbs has 5 CI as pre-prize score and 4 as post-prize, Schrock RR having CI of 7 pre-prize and 5 post-prize, Shimomura O and Chalfie M having 6 and 7 scores for pre-prize, while, 5 and 6 post-prize. Chauvin Y, Kornberg RD and Tsien M show higher post-prize collaborations i.e., 7, 5 and 8 CI scores post-prize while, 6, 4 and 6 for pre-prize periods respectively, as given in graph 5, below. Though, the annual distributions indicate slight decrease in CI for most of the post-prize years, but, overall, the data for the two periods do not vary significantly. Besides, cumulative scores depict almost equal chances of increase or decrease in collaborations. This is contrary to the increased collaborations post-prize claim made by Li *et al.*, 2020. Thus, it can be safely deduced that prize reception has no immediate impact on the collaboration levels and team-work of NLs.

TABLE V COLLABORATIVE INDEX FOR ANNUAL PUBLICATION PRODUCTIVITIES

NP Year	NL Name	Collaborative Index												
		2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
2005	Grubbs	4	4	10	3	4	5	5	3	4	4			
2005	Schrock RR	4	6	14	4	5	5	4	7	5	5			
2005	Chauvin Y			4	8	6	5	8	6	8	8			
2006	Kornberg RD		4	5	4	5	4	5	5	6	5	6		
2007	Ertl G			6	5	5	4	5			5			
2008	Tsien M				8	7	6	4	5	7	8	9	10	8
2008	Shimomura O				6	7	8	4	6	4	6	6	5	6
2008	Chalfie M				10	9	3	5		4	4	4	9	7

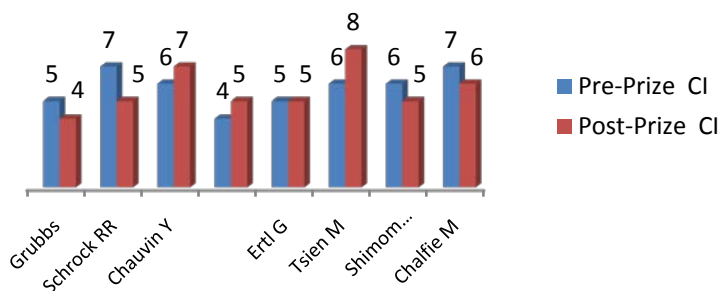


Fig. 5 CI for cumulative Publications 5-years Pre-Prize and 5-years Post-Prize

Conclusion

There is a general notion that recognition and rewards reignite the researcher or scientist enthusiasm. This implies that greater the recognition greater would be the motivation. Therefore, Nobel Prize, regarded as the epitome of recognition, deserves the prime attention in order to assess how far the prize meets its purpose. Accordingly, the current analysis reveals the Nobel Prize

impact on the scientist productivity. The post-prize out-put of the NLs, in terms of publishing papers, getting cited and making collaborations in research seems not substantial. Unexpectedly, the data reveals no boost in performance post-prize. The publication productivity and citation impact shows a slight rise initially, after the prize reception, while, collaborations depict a slight decline, which may be as a consequence of changed research topics post-prize as examined by Li *et al.*, 2020. The rise of citations seen immediately after the prize-reception may be due to the tendency of the scientific community to mention the works of elite scientists in their own works, irrespective of the quality of work- a phenomenon called ‘halo effect’ in science- when the works of eminent scientists are regarded as high quality due to the scientists earlier impression and reputation (Liao, 2021). But, overall, the findings reveal no significant a change or positive out-put post-prize reception. Thus, the study implies that the achievement of highest form of recognition by scientists does not necessarily mandate the greater productive roles later. Though, the study has examined the role of NP, future research needs to be conducted on lesser known recognitions or awards in science, which expectedly, would be having more encouraging impact on the scientists, probably with an aim of achieving higher recognitions.

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Use of Digital Library Resources by the Government Arts & Science College Students, Kangayam: A Survey

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Abstract - This survey examines the use of digital library resources in the Government Arts and Science College students' different disciplines. The sample consists of 350 students from Government Arts and Science College, Kangayam, Tirupur district of Tamil Nadu. Data were collected through questionnaire methods a digital library resources user survey. Responses were received from 330 (94%) students. Analysis revealed frequency use of digital library resources was low in B.com students compare with other branches. Information overload is the most common problem faced by students while searching the relevant information, lack of awareness to electronic resources provided by the library. The study recommended adequate Information and Communication Technologies training for different discipline students and provision of adequate computer terminals.

Keywords: Digital Resources, Arts and Science College, Information Communication Technology.

Introduction

Libraries prefer digital collections for many reasons, including, but not limited to, the following: digital resources can be linked from and to indexing and abstracting databases; access can be from the user's home, office or dormitory whether or not the physical library is open; the library can get usage statistics that are not available for print collections; and digital collections save space and are relatively easy to maintain. When total processing and space costs are taken into account, electronic collections may also result in some overall reductions in library costs. The advantages of electronic information can be accessed by any number of users at any time from any place irrespective of the distance. The digital information environment has drastically changed the way that students in accessing information. The present survey is focused on the use of the digital resources in Government Arts and Science College, Tirupur District of Tamil Nadu.

Objective of the Survey

The survey was under taken to analysis the usage of digital library resources provided in Government Arts and Science College, Kangayam different branch of students. The specific objectives of the proposed study were:

1. To measure the digital resources, use of Government Arts and Science College, Kangayam students in various branches.
2. To know how frequently the users are using digital resources provided by their library.
3. To know the method of learning skills.
4. To examine the respondents, purpose of gathering e- resources.
5. To study the respondent's satisfaction and problems in utilizing the e-resources.

Scope of the Survey

The scope of the present survey is limited to the students in Government Arts and Science College, Kangayam, are established 8 years ago in kangayam, Tirupur district of Tamil Nadu, Covering the degree level branches of BA Tamil, English, Economics B.sc Mathematics, Computer science, B.B.A, and B.com (Commerce). The survey is covered in Departments of all years.

Methodology

The survey is limited to Government Arts and Science College students of the Tirupur district of Tamil Nadu having a reasonable collection, staff, and separate digital section, as well as digital resources such as E- books, E- journals, Database, and CD Rom. 350 questionnaires were distributed for Government Arts and Science College Kangayam. The questionnaire was distributed to the users during their physical visits to the concerned library for BA Tamil, English, Economics, B.sc Mathematics, Computer science, B.B.A and B.com (Commerce) Departments of all year students, out of which 330 questionnaires were found utilizable.

Analysis

Experience of digital resource use

The results in Table I show that 41% of the Arts communities have 2 years of digital resource experience, followed by 26% with 2–3 years of experience in using the digital resources.

TABLE I EXPERIENCE OF DIGITAL RESOURCE USE

Experience	No of response	Percentage %
Less than 1 year	35	11%
1–2 years	138	41%
2–3 years	87	26%
More than 4 years	73	22%

Frequency of use digital resources

In order to assess the frequency of using digital resources, the respondents were asked to indicate any one out of four categories of time lag. 59% of the respondents used the digital resources daily, 20% used it 2 times a week and 13% once in a week. Only 8% used the digital resources once a month (Table II). B.com students are using digital resources 4% only.

TABLE II FREQUENCY OF USE DIGITAL RESOURCES

Frequency	BA. Tamil	BA. English	B.sc Maths	B.sc Comp.	BBA	BA Econo.	B.com	Total
Daily	18(9%)	25(13%)	32(16%)	38(20%)	52(27%)	22(11%)	8(4%)	195(59%)
2 Times in a week	16(24%)	12(18%)	8(12%)	8(12%)	9(14%)	7(11%)	6(9%)	66(20%)
Once in a week	11(25%)	8(19%)	7(16%)	4(9%)	5(12%)	6(14%)	2(5%)	43(13%)
2/3 times in a month	5(19%)	7(27%)	4(15%)	2(8%)	3(12%)	2(8%)	3(11%)	26(8%)

Digital resources learning method

Table III depicts that the most popular method of acquiring the necessary skills to use digital resource is via self instruction method 42% followed by guidance from teacher with 22% responses. 4% of the respondents learnt the digital resources through training/seminar/conference offered by the college.

TABLE III DIGITAL RESOURCES LEARNING METHOD

Method	No of response	Percentage
Trial and error method	58	18%
Guidance from friends	47	14%
Guidance from Teachers	72	22%
Self instruction	139	42%
Training/ Seminar /Conference	14	4%

Purpose of digital resources

Table IV reveals that a majority (57%) of respondents are using electronic resources for finding relevant information in their specialization and education purpose, followed by 24% of students are using for their research purpose. Whereas, 12% of students are using for communication purpose and less than 7% students are using entertainment

TABLE IV PURPOSE OF DIGITAL RESOURCES

Purpose	No of response	Percentage
Research	80	24%
Education	187	57%
Entertainment	23	7%
Communication	40	12%

Comparison of traditional documents and digital resources

Table V shows that 86.36% of the respondents believed that the digital resources saves time as compared with traditional documents. 84.54% of the respondents felt that the digital resource was easy to use. The majority of the respondents (i.e. 78.18%) felt that the digital resource was more informative than traditional documents. Respondents preferred the digital resource for being less expensive with 68.48% response. 66% of the respondents felt that digital resource was more preferred.

TABLE V COMPARISON OF TRADITIONAL DOCUMENTS AND DIGITAL RESOURCES

Digital Resources	No of response	Percentage
Time saving	285	86.36%
Easy to use	279	84.54%
More Information	258	78.18%
More useful	242	73.33%
Less expensive	226	68.48%
More preferred	218	66.06%

Problem facing using digital resources

Table VI Shows that, 137 (42%) of respondents have faced problem of limited access to computer terminals, followed by 74 (22%) of students indicating to much of information retrieval. 54 (16 %) and 36 (11%) of the students are troubled with time consuming and discomfort problems respectively. Lack of IT knowledge is 29(9%).

TABLE VI PROBLEM FACING USING DIGITAL RESOURCES

Problem	No. of response	Percentage
Too much information retrieval	74	22%
Limited access to computer terminal	137	42%
Lack of IT knowledge	29	9%
Discomfort	36	11%
Time Consuming	54	16%

Digital resources can replace library services

It can be inferred from Table VII that a majority of the respondents (i.e. 72%) felt that the digital resources could not replace library services but rather, acts as a supplement. Only 28% of the respondents felt that the digital resources could replace library services. So, it indicates that the digital resources could not replace library services but only supplements library services.

TABLE VII DIGITAL RESOURCES CAN REPLACE LIBRARY SERVICES

Digital Resources	No. of Response	Percentage
Yes	92	28%
No	238	72%

Findings of the Study

1. The analysis clearly indicates that on an average the majority of the respondents had more than 2 years of experience in using the digital resources (Table I).
2. More than 59% of the respondents used the digital resources daily (Table II).
3. The majority of the respondents (42%) learned by self instruction.
4. More than 57% of the respondents used the digital resource mainly for educational purposes, followed by research, with 24% response (Table IV).
5. Above 86% of the respondents felt that the digital resource was time saving, more informative, easy to use and less expensive than traditional print materials (Table V).
6. More than 42% of the respondents faced problems of limited access of computer terminal (Table VI).
7. A majority of the respondents (72%) feel that the digital resources cannot replace the physical resources (print resources) that it only supplements the print resources.

Suggestions to Improve Digital Resources

Based on the findings of the study, the following suggestions are put forward to improve the use of the digital resources the students in the Government Arts and Science College, Kangayam tirupur of Tamil Nadu states in India.

1. More computers with the latest specifications should be installed so that users can utilize digital resource effectively.
2. Printing facilities should be provided in the digital sections of the colleges so that users can print their study materials and other important documents at nominal rates.
3. Some orientation training programmes should be organized by the colleges at regular intervals so that more users can improve their proficiency in digital resource use for academic purposes.
4. Digital library resource facilities should be made familiar to all.

Conclusion

The technology helps the reader to get the information in various other formats than the traditional means. The e- journals as well as the e-books have made changes in the way the information is delivered to the readers. They help them to get up-to-date and latest information that is updated frequently. The hardware required for the use of e-books has to be considered before creation of the content. The digital resource provides a wealth of information on any subject field. Students are using the digital resource increasingly and it occupies an important place among various information sources. It is widely used by the academic community for their educational and research purposes and it plays an active role in the searching of information. The supplementation of library services with digital resource will benefit users in getting the right information at the right time.

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Scientometric Assessment of Chemistry Nobel Laureate Frances H. Arnold

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Abstract - A scientometric analysis was conducted to assess the publication productivity of Frances Arnold who had been conferred the Nobel Prize for Chemistry in 2018 for her works on the directed evolution of enzymes. Besides the coveted Nobel Prize, Frances Arnold also holds the distinction of receiving several other honors and accolades. Data for the study were collected were extracted using the Scopus software which is Elsevier's abstract and citation database launched in 2004. The data has been analyzed using R biblioshiny for bibliometrics. The findings of the study indicate that Arnold has produced 349 scholarly publications of which over three quarters (270; 77.4%) belong to the class of journal articles. The productive life of Arnold commenced in 1980 when she had attained the biological age of 24 years. The author has produced 8.725 publications every year on an average baring 1981 and 1983 with a maximum number of twenty publications in 2014. Arnold has collaborated with 467 different authors with a collaboration index of 1.43 and has 22 single-authored publications to her credit. The scientific articles of Frances Arnold have been published in 132 different journals thus fitting Bradford's law of scattering. Arnold's works have received 32933 citations in 19382 different documents. However, 16 scholarly works have not yet been cited. The mean cites per year and mean cites per paper of Arnold are 94.36 and 6.3 respectively. Frances Arnold has an h-index of 100, and the most frequently used word is 'article' which occurs 197 times.

Keywords: Frances Arnold, Scientometric Portrait, Collaboration, Authorship Status, Biobibliometrics, Individual Scientist.

Introduction

Scientometrics is an application that uses quantitative methods to the history of Science. It also collects works of eminent scientists and researchers and documents the same. Scientometric studies deal with the quantitative documentation of the communication of science by any scientist or researcher. Publications in the field of science provide the best available basis for measuring the outputs of individual scientists as there is a good correlation between the eminence of scientists and their sustained scholarly publications[1][2]. Scientometric studies are highly valued by administrators of scientific establishments, biographers of scientists, documentalists, educationalists, historians of science, science policymakers, R & D managers, students and researchers of scientometry, young scientists, information scientists, and science journalists[3].

Bio-bibliometrics is a biographical study concerning the individual careers of scientists and researchers and correlating the bibliographic analysis of their publications with their academic and scientific achievements. It is a fact that ideas emanate from individuals and form the basic foundations of any institution. The younger generation of researchers and scientists are bound to be stimulated by studying individuals who have reached the top positions in academic and research life and highlighting their works. S.K. Sen and S.K. Gan has been credited with both coining and using the term 'Bio-bibliometrics' to mean the quantitative and analytical method for discovering and establishing functional relationships between the various elements of biodata and bibliodata [4].

Though a large number of bio-bibliometric studies have been conducted to date, the term 'bibliometrics' has hardly been used in the titles of the papers except for S.K.Sen and S. K. Gan and W. Tiew [4][5]. One of the important ways that have been used in evaluating research productivity is scientometric analysis, which is a set of measures for studying the structure and process of scholarly communication [6]. The scientometric analysis deals with the growth, structure, inter-relationship, and productivity of scientific disciplines [1]. Scientometric analysis of individual scholars or scientometric portrait is a process that estimates the research productivity of any scholar over a given period and aids in understanding the caliber of any researcher. Scientometric studies deal with the biographical study of individual scholars and correlate this with the bibliographical analysis of their publications or academic and scientific achievements [7]. In short, scientometrics gives a non-reactive way of measuring research productivity.

The scientometric analysis involves certain indicators that include the number of publications, channels of communication, citation counts, partnership ability, and subject dispersion. However, in recent years Hirsch-index (h-index) is being used to further characterize the importance, significance, and impact of researchers' contributions. J.E. Hirsch had stated that a scientist will have an index of 'h' if 'h' papers have at least 'h' citations each and the other papers have citations less than 'h' [8]. Other variants of the h-index include the g-index which gives more weight to highly cited publications [9]. Three laws consider the dispersion of literature over journals, productivity of scientists, and the occurrence of words in publications. These laws include Lotka's Law which deals with the frequency of publications by authors in a given field and shows the inverse relationship between the number of publications and the number of authors producing these publications [10], Bradford's law which deals with the scattering of relevant literature on a subject over journals and points out that the major portion of literature of any discipline is concentrated in a small number of core journals [11], and Zipf's law which analyses the number of different words that appear in a body of text and then rank them by their number of occurrences [12].

The present study is attempted to draw the productivity, collaboration, and authorship status of Frances H. Arnold, who has been awarded the Nobel Prize in Chemistry in 2018 for her work on the directed evolution of enzymes.

Biographical Sketch

Frances Hamilton Arnold is the Linus Pauling Professor of Chemical Engineering, Bioengineering, and Biochemistry at the California Institute of Technology and has been awarded the Nobel Prize in 2018 at the age of 64 years for her pioneering work in the field of directed evolution to engineer enzymes. Frances Arnold was born on the 25th day of July 1956 at Edgewood, Pennsylvania. Arnold graduated from Princetown University in 1979 with a B.S. degree in mechanical and aerospace engineering with a focus on solar energy research [13]. In her Nobel Prize interview, Arnold stated the reason behind studying mechanical engineering. To quote her "[mechanical engineering] was the easiest option and the easiest way to get into Princeton University at the time and I never left" [14]. After graduating from Princeton, Arnold worked in South Korea, Brazil, and Colorado [15] where she designed solar energy plants for use in remote locations.

Frances Arnold earned her Ph.D. in chemical engineering from the University of California, Berkeley in 1985 [16] where her thesis investigated affinity chromatography techniques involving experiments conducted jointly with Harvey Warren Blanch. It was at Berkeley that Arnold became interested in biochemistry [17]. Frances Arnold completed her postdoctoral research in the field of

biophysical chemistry at the University of California, Berkeley in 1986 [18] whereafter she joined the California Institute of Technology as a visiting associate.

Her career progression involved being promoted to assistant professor in 1986, associate professor in 1992, and full-time professor in 1996. Arnold was named the Dick and Barbara Dickinson Professor of Chemical Engineering, Bioengineering and Biochemistry in 2000 and, the Linus Pauling Professor of Chemical Engineering, Bioengineering and Biochemistry in 2017 [19] a position she held when she won the Nobel Prize and still holds. In 2013, Frances Arnold was appointed director of Caltech's Donna and Benjamin M. Rosen Bioengineering Center [19].

Honors

Frances Arnold has been honored with several awards including the prestigious Nobel Prize in 2018. The honors received by Arnold are tabulated as under.

TABLE I AWARDS AND HONORS CONFERRED TO FRANCES ARNOLD

Year	Age(yrs)	Honor
2000	44	National Academy of Engineering
2001	45	Elected fellow of American Institute for Medical and Biological Engineering
2005	49	Francis P. Garvan–John M. Olin Medal, American Chemical Society
2007	51	FASEB Excellence in Science Award Enzyme Engineering Award from Engineering Conferences International and Genencor
2008	52	Elected to the National Academy of Sciences
2009	53	Elected fellow of the American Academy of Microbiology
2010	54	Elected fellow of the American Association for the Advancement of Science
2011	55	Charles Stark Draper Prize National Medal of Technology and Innovation American Academy of Arts and Sciences
2013	57	Emanuel Merck Lecture of the Technische Universität Darmstadt, Germany ENI Prize in Renewable and Nonconventional Energy Honorary Degree of Doctor of Science from the Stockholm University Honorary Degree of Doctor of Science from Stockholm University
2014	58	Inducted into the National Inventors Hall of Fame Golden Plate Award, American Academy of Achievement
2015	59	Honorary Degree of Doctor of Science from the ETH Zurich Elmer Gaden Award, Biotechnology, and Bioengineering
2016	60	Honorary Doctorate, University of Chicago Millennium Technology Prize
2017	61	Raymond and Beverly Sackler Prize in Convergence Research Spiegelman Lecture, University of Illinois Society of Women Engineers' 2017 Achievement Award Honorary Degree of Doctor of Science from Dartmouth College
2018	62	Nobel Prize in Chemistry Elected an International Fellow of the Royal Academy of Engineering
2019	63	Honorary Doctorate, Technical University of Denmark
2020	64	Foreign Member of the Royal Society

Methodology

A complete bibliography of Frances Arnold's research publications from 1980 - 2020 was retrieved and compiled from the web using the biblio-shiny software. Considering that citation counts accumulate over time, the information regarding Arnold's publications have been retrieved within a very short period.

The search strategy included all possible variants in Arnold's names as an author. The retrieved publications were carefully refined to ensure that only the works of Frances H. Arnold were captured and duplicates were removed. For this study, we have considered books, book chapters, book reviews, conference papers, and journal articles as scholarly publications.

A normal count procedure where, regardless of the position in the by-line, a full score is assigned for every occurrence of an author was employed to obtain the total number of publications. The curriculum vitae of the author was used to verify some of the retrieved data and obtain biographical information. The retrieved were compiled using Bibliometrix in R.

Results and Discussion

The publication activity of Frances Arnold began in 1980 and continues to date. The author was 24 years old when the first scholarly work was published. The data extracted from the web is indicative of the fact that the author has produced 349 documents which includes journals and books.

The types of scholarly documents have been tabulated in Table II. While the author is attributed with producing the highest number of articles (270), representing 77.4% of the total documents published, the number of books and letters is the lowest at 1 document each representing 0.3% of the total production.

TABLE II TYPES OF PUBLICATIONS BY FRANCES ARNOLD

Type of document	Number	% of the total
Article	270	77.4%
Book	1	0.3%
Book Chapter	7	2.0%
Conference Paper	15	4.3%
Editorial	4	1.1%
Erratum	6	1.7%
Letter	1	0.3%
Note	3	0.9%
Review	38	10.9%
Short Survey	4	1.1%
Total	349	100%

The scholarly contribution of Frances Arnold has been in the fields of Biochemistry, Bioengineering, Bioinformatics, Biomolecules, and Chemical Engineering. The numbers of publications in different fields vis-à-vis number of co-authors has been detailed in Table III.

TABLE III NUMBER OF SCHOLARLY PUBLICATIONS

Authors	Biochem.	Bioengg.	Bioinform.	Biomolec.	Chem. Engg.	Total
1	7	3		3	9	22 (6.3%)
2	26	21		10	15	72 (20.6%)
3	31	22		8	14	75 (21.5%)
4	22	7	1	9	15	54 (15.5%)
5	19	10		11	12	52 (14.9%)
6	7	12		6	11	36 (10.3%)
7	5	3		1	3	12 (3.4%)
8	2	3		2	2	9 (2.6%)
9	--	3		1	2	6 (1.7%)
10	2	1			2	5 (1.4%)
11	--	2			1	3 (0.9%)
12	1					1 (0.3%)
13	1					1 (0.3%)
17	--	1				1 (0.3%)
Total	88 (25.2%)	88 (25.2%)	1 (0.3%)	51 (14.6%)	86 (24.6%)	349 (100%)

TABLE IV TWENTY OF THE MOST PREFERRED CHANNELS OF COMMUNICATIONS

Channel of communication	Number
Proceedings of the national academy of sciences of the united states of america	23
Journal of the american chemical society	22
Nature biotechnology	18
Angewandtechemie - international edition	11
Biotechnology and bioengineering	11
Protein engineering design and selection	11
Current opinion in biotechnology	10
Journal of molecular biology	10
Applied and environmental microbiology	8
Current opinion in chemical biology	8
Journal of chromatography a	8
Nature	7
Science	7
Trends in biotechnology	6
Chembiochem	5
Chemistry and biology	5
Current opinion in structural biology	5
Journal of biomolecular screening	5
Methods in enzymology	5
Methods in molecular biology	5

As observed from Table III, Frances Arnold has published the maximum number of scholarly works in the field of Biochemistry, and Bioengineering, followed by Chemical Engineering. Other than 22 publications, all the other publications are multi-authored. 21.5% of her scholarly works are three authored, followed by 21.5% which are two authored. The scholarly works of Frances Arnold has been published in 132 different sources. The twenty sources where the maximum number of her works have been published is shown in table IV.

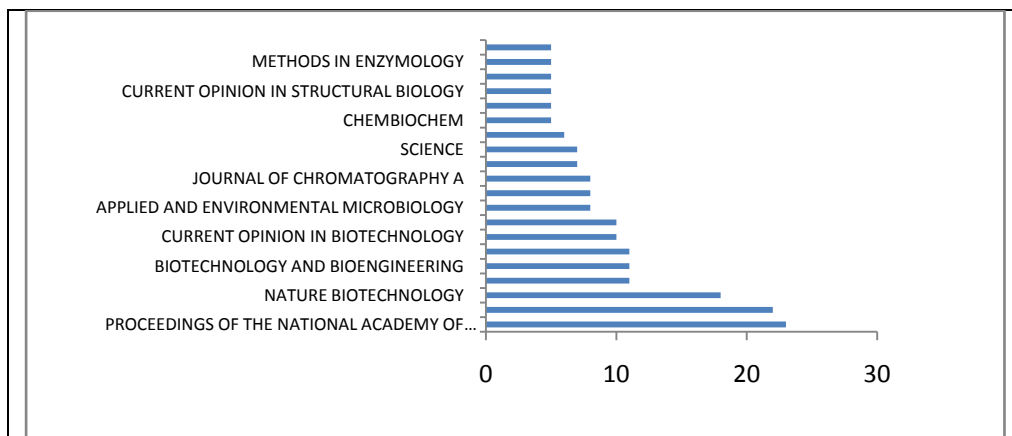


Fig. 1 Ten of the most preferred channels of communications

In the 40 years of her productive life, Frances Arnold has produced scholarly works in all years except 1981 and 1983. The maximum number of scholarly works (20 documents) have been published during 2014 (Fig 2). The most productive period of Frances Arnold has been after 19 years of her productive life (Fig 3).

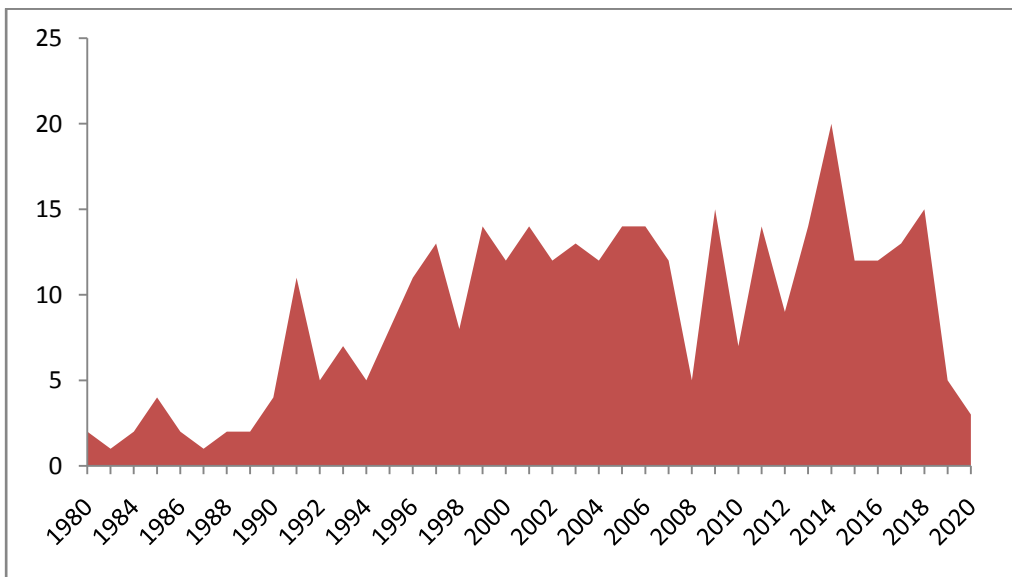


Fig. 2 Publications (year-wise) of Frances Arnold

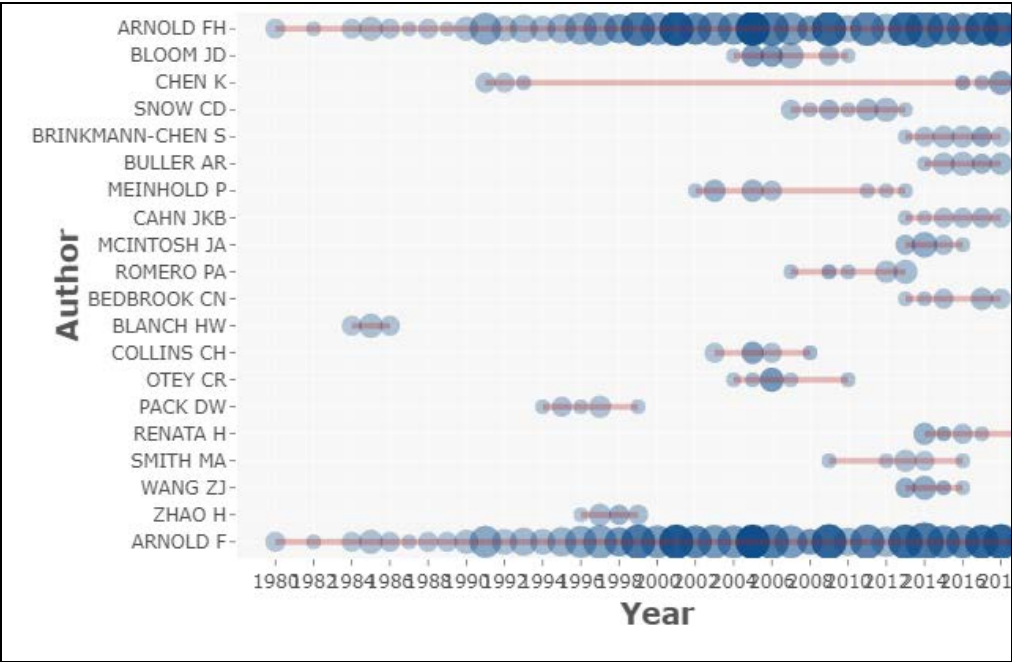


Fig. 3 Author's Productivity over time

Collaboration among researchers is an important aspect as it aids in the sharing of expertise and resources among the researchers and also to increase the visibility of research works. In the context of this study, we have calculated the degree of collaboration as the ratio of the total number of collaborative publications to the total number of publications[12]. Frances Arnold has collaborated with 467 different authors in the conduct and publication of her research work. The author has published only 22 single-authored documents. Figure 4 shows the collaboration network of Frances Arnold.

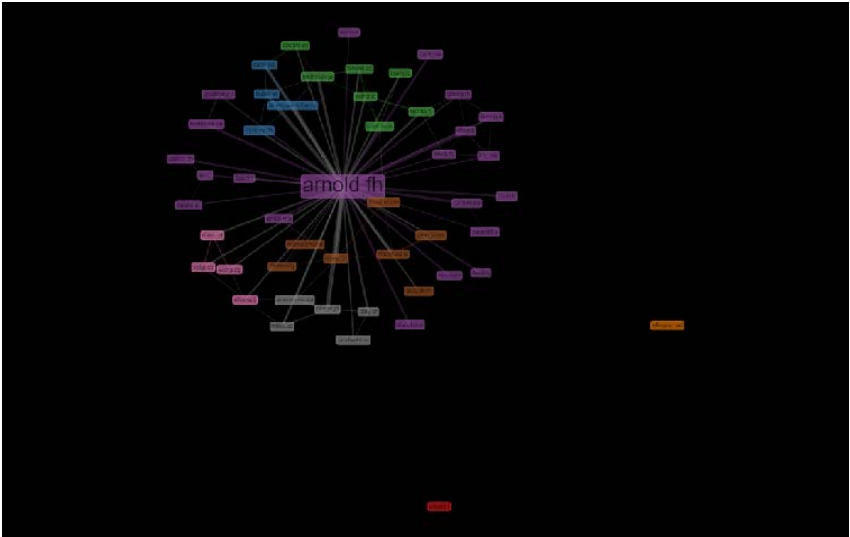


Fig. 4 Collaboration Network

The other outcomes relating to Frances Arnold are as under:

1. Documents per author	0.746
2. Authors per document	1.34
3. Co-authors per document	4.06
4. Collaboration index	1.43
5. Average citations per document	94.36
6. Average annual scientific production	8.725
7. H-index	100
8. Total citations	32933

Conclusion

The publication productivity of Frances Arnold was found to be consistent and she made outstanding contributions in the field of enzyme evolution in the 40 productive years of her life commencing from 1980. She has been consistently active in research despite many administrative responsibilities. Frances Arnold has a preference for working in collaboration and has a high degree of collaboration at institutional, national, and international levels. The high rate of citations received by her papers proves the usefulness and impact her scientific works have in the field of biophysical chemistry. It is, therefore, not surprising that Frances Arnold has attained an h-index of 100 after 40 years of scientific activity which places her in the list of successful scientists in the field of biochemistry. Arnold's research efforts have largely been concentrated on evolutionary protein design methods and using the results to reveal the principles of biological design proving her strength in this field. Frances Arnold's research productivity portrays her as an eminently qualified researcher and a role model for the younger generation. Her contributions to the field of science need to be emulated. She is, undoubtedly one of the most outstanding scientists and worthy of receiving the Nobel Prize.

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Comparative Study of Open Source Content Management Systems (CMS) in Digital Era

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Abstract - Content Management System (CMS) is the software that can be used to organize, control or manage contents of a website. The data can include texts, links, images, videos, HTML documents and other form of media. The CMS can be free open source software where it can be downloaded and installed free of cost or sometimes it may be a paid depending upon the packages of the software. The reason for the paid software is that some annual maintenance may be needed in future and to upgrade the software. Three basic CMS software Open source, Proprietary and Software as a service has been discussed with their platform of application and supported databases. It was found that this soft ware has used different types of platforms to integrate the software. The installation process of one of the free open source software WordPress also has been discussed in this topic. The purpose of the CMS is to help users to best design their websites. The aim of the study is to comparatively study the features and perspectives of different content management systems. Research and review methodology has been adapted to retrieve the contents for the above title. It was found that maximum number of CMS database used PHP or JAVA platform to design the soft ware and few CMS soft ware used other platforms like ASP.NET, PERL, PYTHON, C++ and others to design the software.

Keywords: Content Management System (CSM); Web Content Management System (WCMS); Open source software; Word Press.

Introduction

There are three basic types of CMS software (1.1) Open source (1.2) Proprietary (1.3) Soft ware as a service CMS. Here only the open source CMS has been discussed briefly.

Open source software: Open source software can be downloaded free of cost. There is no upgrade fee, contract. However, with open source soft ware one may have to pay for technical charges during installation and setup, customization of software beyond core offering, for template, add-ons, plugins, staff training, regular update of soft ware. We can install and manage open source soft ware in a web server. It helps in different business need such as plug in for e-commerce, optimize content of search engine. Examples of open source soft ware are: Word Press, Joomla, Drupal, Magneto, SharePoint, Dot CMS, Open CMS, Plone;

Proprietary software: Proprietary or commercial CMS software is built and managed by company itself. Using such CMS involves buying a license fee to use the soft ware, paying monthly or annual maintenance charge to update the soft ware. Examples of different proprietary CMS software are: Kentico; Microsoft SharePoint; IBM Enterprise Content Management; Shopify; Sitecore, etc. Few lists are given in table-II.

Soft ware as a service(SaaS) CMS: These are virtual solutions and hosted in the cloud and based on subscription model on a per-user based. These include web content management soft ware, web hosting, and technical supports with a single supplier. The pricing of the soft ware includes, amounts of data transfer, i.e. band width from customer side; data storage; ongoing supports.[2] There are two types of cloud content management system.

Fully cloud CMS: These are proprietary systems under the supplier's control, so it isn't always possible to customize or alter their functionality to suit customer's needs.

Partial cloud CMS: This is located on user cloud web server, where customer can modify the functionality, either with add-on modules or by altering the source code.

Features of the cloud CMS are: Costs are generally low; SaaS supplier deals with upgrades, maintenance and technical issues; the software is accessible from any computer, laptop or mobile with an internet connection; packages are easily scalable. User can add more sites or users as needs changes.[3]

Web content management system:

Web Content Management System is a program that helps in maintaining, controlling, changing, and reassembling the content on a web page. It provides website authoring, collaboration, and administration tools that help users with little knowledge of web programming languages or markup languages create and manage website content.

Types of web content management systems are

Offline Processing: It is purely an offline process of all content, applying template before publication to generate web page.

Online Processing: In this process templates are applied online; it may generate HTML when the user visits the page. These system supports add-on that extends system capability. These include features like blogs, wikis, web store, photo gallery.

Hybrid Processing: This system combines both off line and online processes.

Advantages of WCMS: Easy customization, low cost, easy to use, work flow management, Disadvantages of WCMS: high maintenance cost, cost of implementation, latency issue, tool mixing, security.[4]

Comparative study

(3.1) Open source (3.2) Proprietary (3.3) Software as a service CM, (3.4) CMS Platform, (3.5) Graphical presentation of CMS platform.

TABLE I COMPARATIVE STUDY OF OPEN SOURCE CMS [5]

CMS Category	Content Management system		
	Plat Form	Supported Data base	Licenses
D-Space	Java	Oracle, Postgre SQL	BSD licenses
Fedora Commons	Java	MySQL, Oracle, Postgre SQL, Mulgara	Apache License
Magnolia	Java	H2, Derby, MySQL, PostgreSQL, Oracle, MSSQL	GNU GPL & proprietary
E-Prints	Perl on mod Perl	MySQL, Maria DB	GNU GPL
Drupal	PHP	Maria DB, Microsoft SQL Server, MySQL, Oracle, Percona Server	GNU GPLv2+
Joomla	PHP	MySQL, Maria DB, Percona	GNU GPL
WordPress	PHP	MySQL, Maria DB	GNU GPL

TABLE II COMPARATIVE STUDY OF PROPRIETARY CMS

CMS Category	Platform	Supported Data base	Licenses	Web content management	Group web content management	Enterprise content management
Altitude3.Net	ASP.NET	SQL Server	Proprietary	Yes	Yes	Yes
Dot CMS	Java	Oracle, SQL Server, MySQL, PostgreSQL	Proprietary	Yes	Yes	Yes
Episerver CMS	ASP.NET	SQL Server	Proprietary	Yes	Yes	Yes
Pulse CMS	PHP	Flat-file database		Yes	No	No
Documentum	Java	Oracle, SQL Server, DB2	Proprietary	No	No	Yes
Sitecore	ASP.NET (Webforms or MVC)	SQL Server (2005, 2008, 2012), Oracle	Proprietary	Yes	Yes	Yes

TABLE III COMPARATIVE STUDY OF SOFTWARE AS A SERVICE CMS

CMS Category	Content Management system					
	Supported Data base	Operating system	Licenses	Web content management	Group web content management	Enterprise content management
Alfresco Cloud	Java, JSP, java script	Cross Platform	Proprietary	No	Yes	Yes
Cloud CMS	Java, JavaScript, Node.js	Cross Platform	Apache 2.0 open source drivers,	Yes	Yes	Yes
Crafter CMS Cloud	Java, GraphQL, and JavaScript	Cross Platform	GPL, Commercial	Yes	Yes	No
DotCMS cloud	java	Cross platform	GPLv3	Yes	Yes	Yes
Microsoft Office 365	Visual C++, C++	Windows, macOS, Android, iOS	MS SharePoint, MS Lync, MS Exchange, MS Office	Yes	Yes	Yes
O3Spaces	Java	Cross platform	Proprietary	Yes	Yes	No
OU Campus	PHP, ASP, .NET, ColdFusion	Cross platform	Proprietary	Yes	Yes	No

TABLE IV COMPARATIVE STUDY OF CMS PLATFORM

Platform of CMS	Approx. No's of Platform used for CMS	% of platforms used
JAVA	36	24
PERL	12	8
ASP.NET	16	10
PHP	64	42
PYTHON	5	3
C#	2	1
C++	3	2
Others	12	8
Total	150	

(3.5) Graphical presentation of CMS platform (Table-5)

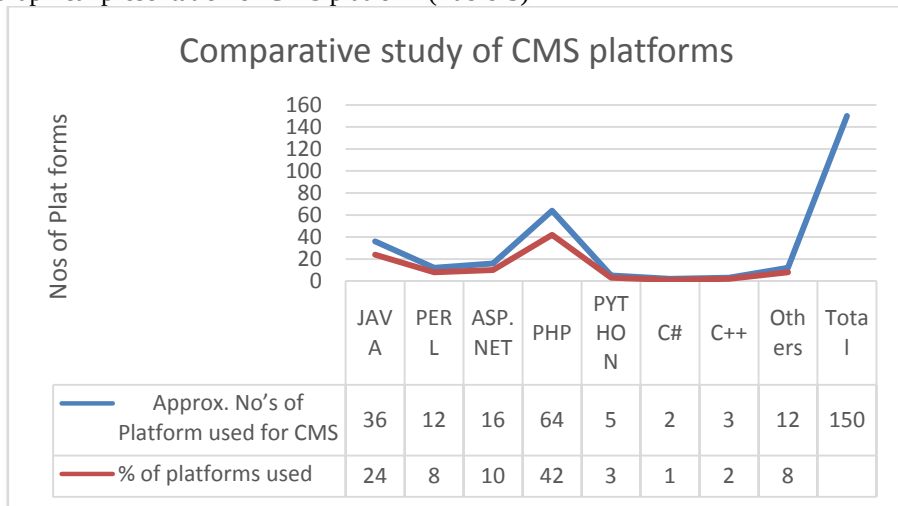


Fig.1 Comparative study of CMS platforms

(4) Installation guide to WordPress: an open source web content management software:

Word Press can be downloaded from the website <https://wordpress.org/download/>

Detailed Instructions:

Step 1: Download and Extract; Step 2: Create the Database and a User; using phpMyAdmin

Step 3: Set up wp-config.php; Step 4: Upload the files; In the Root Directory in a Subdirectory

Step 5: Run the Install Script; Setup configuration file finishing installation; install script troubleshooting.

Below you should enter your database connection details. If you're not sure about these, contact your host.

Database Name The name of the database you want to use with WordPress.

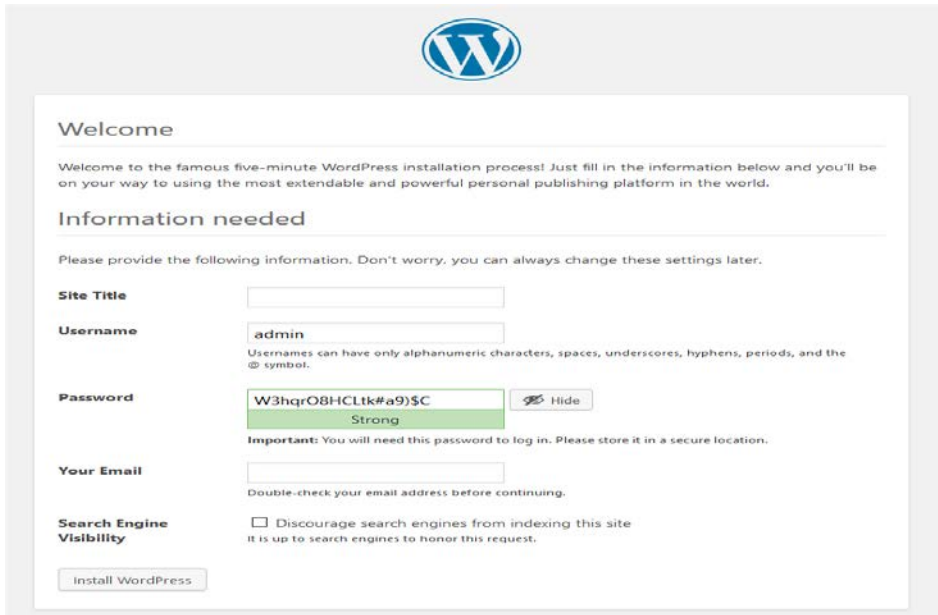
Username Your database username.

Password Your database password.

Database Host You should be able to get this info from your web host, if localhost doesn't work.

Table Prefix If you want to run multiple WordPress installations in a single database, change this.

Fig.1 Setup configuration file





Welcome

Welcome to the famous five-minute WordPress installation process! Just fill in the information below and you'll be on your way to using the most extendable and powerful personal publishing platform in the world.

Information needed

Please provide the following information. Don't worry, you can always change these settings later.

Site Title

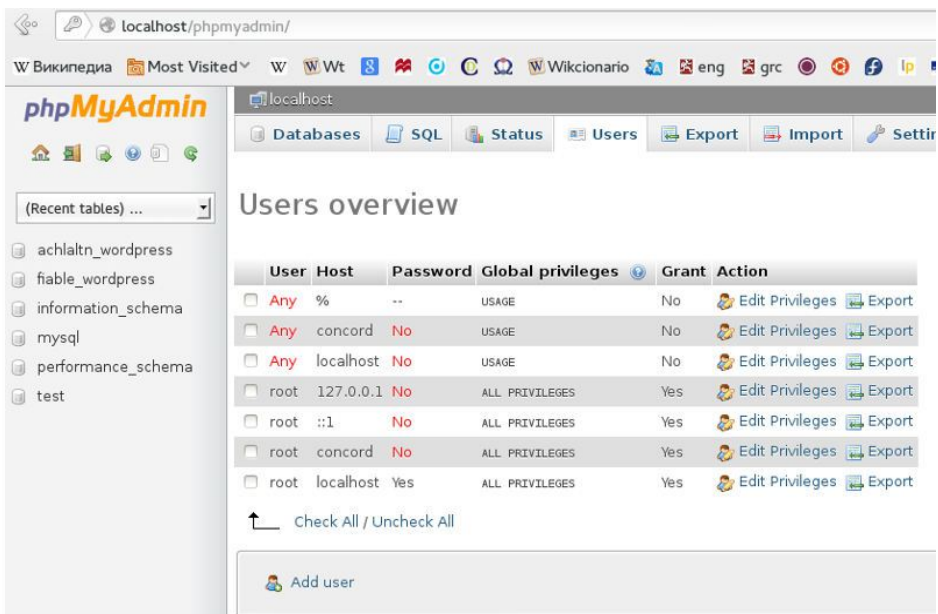
Username
Usernames can have only alphanumeric characters, spaces, underscores, hyphens, periods, and the @ symbol.

Password
Strong
Important: You will need this password to log in. Please store it in a secure location.

Your Email
Double-check your email address before continuing.

Search Engine Visibility ☐ Discourage search engines from indexing this site
It is up to search engines to honor this request.

Fig.2 finishing installation



localhost/phpmyadmin/

W Википедия Most Visited W Wt S M C W Wikcionario eng grc C f lp

phpMyAdmin

(Recent tables) ...

- achlatn_wordpress
- fiable_wordpress
- information_schema
- mysql
- performance_schema
- test

localhost

Databases SQL Status Users Export Import Settings

Users overview

User	Host	Password	Global privileges	Grant	Action
☐ Any	%	--	USAGE	No	Edit Privileges Export
☐ Any	concord	No	USAGE	No	Edit Privileges Export
☐ Any	localhost	No	USAGE	No	Edit Privileges Export
☐ root	127.0.0.1	No	ALL PRIVILEGES	Yes	Edit Privileges Export
☐ root	:::1	No	ALL PRIVILEGES	Yes	Edit Privileges Export
☐ root	concord	No	ALL PRIVILEGES	Yes	Edit Privileges Export
☐ root	localhost	Yes	ALL PRIVILEGES	Yes	Edit Privileges Export

↑ Check All / Uncheck All

Add user

Fig.3 Overview of Word Press (Image-3)

(4.4) Common Installation Problems:

- (4.4.1) It can be seen a directory listing rather than a web page.
- (4.4.2) It can have lots of headers already sent errors.
- (4.4.3) It can have an error connecting to database message.
- (4.4.4) Image/MP3 uploads may not work. [6]

Discussion

To solve the problems regarding installation of Word Press one can follow the installation guide from Word Press support. Word Press is free open source software based on PHP and MySQL. It is the most widely used CMS software in the world and as of May 2019, it powers more than 30% of the top 10 million websites and has an estimated 60% market share of all websites built using a CMS.

Conclusion

This paper represents the most commonly used content management software to develop and initiate the websites for office work, business purpose or any other institutional related management works.

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Effect of Open Source Software on Libraries

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Abstract - *Open source software is computer software where its source code is available for everyone and anyone can change and share the source code according to their benefits. Its design is publicly accessible. Its source code is released under a licence in which the copyrights allow the user to use, study, modify and distribute. It is an example of open collaboration. The OSS is technologically grown software which has spread its benefits globally. Its lower costs of marketing and logistical services are an added benefit for their users. The development of software has helped produce reliable, high quality software quickly and inexpensively. The software offers a flexible technology and quicker innovation. This paper presents a study on open source software, its effect on libraries and top software used for the function of libraries.*

Keywords: *Open Source Software, Library Automation, Digital Library.*

Introduction

Open source software (OSS) has its own scope and popularity. It is now widely spread globally. It came into existence with the development of Information and Communication Technologies (ICTs). OSS has gained the attention of research libraries and provided new opportunities for the library automation. In open source software, source refers to human readable computer code which is the origin or source of the computer application. Open refers to access to the computer source code. The OSS gives its users the right to redistribute. Though this software is freely available for its users, a developer or a distributor may charge for installation of special programs and technical support, etc. This software has its particular ability to allow its users to study, modify and improve the program to their own requirements. All open source software projects have their owner and they are governed by some type of license agreement: General Public Licence (GPL), Berkeley Source Development (BSD), etc. OSS benefits libraries by providing its resources in low cost, eliminating vendor lock-in and providing greater flexibility of use and sharing its changes to the community. Various computer programs are available for libraries to give wide range of services from library website management, library automation, knowledge management, document editing to digital library management. To maintain large amount of digital information, libraries need some efficient computer application to take care of the requirements. Maintenance of libraries, from collection of materials to organising them makes it difficult. Years before most of the libraries used Dewey decimal system which is being used even now in few small libraries. This Dewey decimal system becomes quite difficult to maintain whereas, today's growing technology makes the maintenance easier and efficient. The technologies make it easier to even locate the book in the library. It doesn't mean that every library has access to modern technologies. Some libraries fail to access the technologies because they do not have enough money if so, it often goes in purchasing additional resources. It also costs in software installation and training associated with it. Because of these expenses most of the libraries have the necessity to fund themselves to keep the library up to date with latest software. Such software cannot be modified or copied. Whereas, Open Source Software is opposite of proprietary software which helps the libraries that lack in money.

Types of Software

There are different types of software but in the cyber age freeware, shareware and open source are synonyms yet there are differences in their terminology and its use.

Proprietary Software

It is commercial software where the user has to purchase the proprietary software for its use. As processing the software, the user becomes dependent on the commercial developer. Therefore, the user has to pay for the software's further maintenance and improvement. This software cannot be modified by the user. It is copyrighted and any distribution or modification should be done only by the publisher, vendor or developer. Thus, this software becomes closed source software.

Shareware Software

Shareware software can be free of cost when downloading to try as a sample but to use it continuously, the user should pay for it. The software is published and developed by a developer who has full control of the intellectual property. The user has no access to the source code. Therefore, cannot modify it. Also there is no collaboration in shareware.

Freeware Software

Freeware software can be downloaded, copied and used by its users without any restriction but there is no source code, no community, no development and no improvement is possible. It is provided at no monetary cost to the end user.

Free/ Open Source Software

The open source software is a free software and has an open source code. It is licenced to access its users the right to use, copy, modify, improve and develop with the source code available. This software has shown an increasing recognition by individuals and corporations as free software. Such software used are called proprietary software which costs money and actual code of the software is restricted. It can be used by those who have purchased the special licence key. Such software cannot be modified or copied. Whereas, Open Source Software is opposite of proprietary software which helps the libraries that lack in money. Since, OSS is free and the software is altered according to the need by using its source code. Thus, OSS is perfectly described by sharing and collaborating. It is essential to use various software applications in libraries for the Growth of Electronic Resources, Resource Sharing and Anytime Anywhere Access. Automation of library with low cost is necessary for an efficient library. Library automation helps its users and the library staffs in reducing the job stress and provides remote and timely provision of up to date information.

Library Automation Software

When software is used to manage the books and other reading resources it is called library management software system. This software automates the traditional way of storing and transacting books from issuing the books, returning books, adding new books, collecting fine or overdue books, calculating and managing fine and balances, collecting due instalments from members, creating reports for record keeping and review purchases etc. The automation software can be created in singular application to handle single library to multiple libraries. The books and member maintenance modules can be added as subsidiary modules to the library automation system. It comes in handy if any books go missing or if there is a delay in returning the books. The software's improved and is imposed by bar code based management. The utilization of bar code facilities gives the provision for a large number of reading resources. These advanced features save time and reduce job stress.

The choice of best Library Automation Software is by the following:

1. Safe, secure and reliable
2. Easy to use
3. Packed with functional features

The best Library Automation Software manages the whole workflow of the library through easy and interactive interface. The librarian can handle basic to complex functions of the library by using this software. The users can instantly locate the books or any materials of their need through this software. Therefore, enterprise planning and resource management are easier with library automation system. Thus, there is a growing demand to automate library functions and driving the library automation software market globally. Though, there are a number of library automation software available. Few are updated regularly and has a large user base. This paper collects the top three library automation software according to the year 2020.

Koha

Koha is a full featured, best and advanced, free and open source Integrated Library Management Software (ILMS). It was introduced in 1999. It is being used by thousands libraries worldwide. Its unique feature attracts the users. Its module includes catalogue, OPAC, circulation, member management and acquisition packages. This software is viable, scalable and ideal for all kinds of libraries.

Key features:

1. Offers intuitive navigation to its users
2. Supports fine management
3. Its code is open to be circulated
4. Uses standard industrial protocol and is library standards compliant
5. No vendor lock
6. Self-checkout interfaces
7. Powerful search facility
8. Automated email notification
9. Dual authentication for remote database access
10. Facility to import badges from catalogue in a single click
11. Advanced matching

Evergreen

It is another top rated open source software used in libraries to manage the function of library. It helps users to find right reading resources, catalogue and circulate that material. It fits well with all types libraries from small to large and complex libraries. It is free to use. It is used in nearly 2000 libraries around the world. Its public catalogue interface, along with some special features helps users with the back end workflow operations. It was developed by Equinox Software. The software is a robust, enterprise level ILS solution developed to be capable of supporting the workload of large libraries. It uses OPAC interface and offers many features. It is growing big with continuous evolution to meet the needs of the users

BiblioteQ

BiblioteQ is a professional cataloguing, archiving and managing all library related transactions. This software is being used by all libraries from small to large. The software is compatible with different QT supporting systems. BiblioteQ is developed using the Qt4 compiler. It can research papers, videos, catalogue books and many more.

Key features

1. User friendly interface
2. Supports SRM architecture
3. Customized display facility
4. Customized item data facility

5. Localized and advanced search facility
6. File exporting and file attachments
7. Facility to retrieve cover image via Amazon
8. Language translation
9. Item listing
10. Support for multiple SRU and Z39.50 sites
11. Notification of unavailable items
12. Data Queries

Digital Library Software

DS pace

DS pace has a collection of tools for managing the digital assets and is usually used in building institutional repositories. It was designed and developed by Massachusetts Institute of Technology (MIT) and Hewlett Packard (HP) to host, manage, preserve and enable distribution. DSpace has more features than E Prints. Therefore, it is used globally. The software supports unique identification number for every digital document that is added in DSpace repository. It also provides digital preservation support and has excellent work-flow management. The access has control privacy and management, support authentication and authorisation policies at all level. It supports the long-term preservation of the digital material stored in the repository. It makes submissions easy and access to digital content.

E Prints

The software is generic archive software developed by University of Southampton School of Electronics and Computer Science and released under a GPL license. Initially when EPrints was released it was the most widely used free open access, institutional repository software for archiving preprints and post-prints of faculty members. The software shares many of the features commonly seen in document management systems but is primarily used for institutional repositories and scientific journals. Its simple installation process makes it usage in many libraries globally.

Greenstone Digital Library Software

The greenstone software is an open source software for construction and presentation of information collections. It has effective full text searching and metadata-based browsing facility which is easy to use. They are easy maintenance and can be augmented and rebuilt automatically. The aim of this software is to empower users particularly in universities, libraries and other public service institutions to build their own digital library. The system has provisions to “plugins” which

Web Publishing

Word press

Word press started just a few years ago as a quick, free, open source blogging solution. Today it is a perfect alternative for building a website from scratch. The software is free, easy to install, easy to use and content management system. It allows their users and programmers create custom themes and plugins to completely change the way the user wants.

Its visual rich editor makes anyone publish to the website. Other options of the software include multiple authors with separate log-ins, built in RSS (Real Simple Syndication) technology to keep subscribers updated and also comment system that allows the readers interact with the site contents.

Drupal

Drupal is also an open source web publishing option written in PHP and distributed under the GNU licence. That makes an individual or a community of users to easily manage, publish and organize a wide variety of content in the website. Systems use Drupal for business collaboration and knowledge management. Drupal runs on a computing platform that supports web server and a database.

Need of Open Source Software

1. The source code is open to modify, improve and redistribute.
2. Libraries outlive any software vendor or producer
3. More reliable
4. Not dependent on vendor or producer
5. Better performance
6. Secured
7. Use without any restriction
8. Low cost

Therefore, its flexibility makes OSS an ideal software to be used in libraries.

Advantages of Open Source Software

1. The ability to alter the code according to the needs
2. Simplified licence management
3. Unified management
4. Scaling/consolidation potential
5. Quality software
6. No contractual restriction to use
7. No cost for the software to use

Disadvantages of Open Source Software

1. Unanticipated works
2. Installing and maintaining OSS requires technical knowledge
3. No vendor is responsible for the software
4. Documentation manuals are not simple
5. Lack of coordination
6. Inadequate technical support

Conclusion

Open source library software's does not need the initial cost of commercial software and enables libraries to have greater control over their working environment. Library professionals should be aware of the advantages of open source software and should involve in their development. They should have basic knowledge about the selection, installation and maintenance. Open source software requires a greater degree of computing responsibility than commercial software. Library professionals do not think seriously about the advantages of open source software for automation and hence are reluctant to use it. They do not have the expertise to support open source software.

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Classical Grounded Object-Oriented Software Testing

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Abstract - *Testing is an important phase of quality control in Software development. Software testing is necessary to produce highly reliable systems. The use of a model to describe the behavior of a system is a proven and major advantage to test. In this paper, we focus on model-based testing. The term model-based testing refers to test case derivation from a model representing software behavior. We discuss model-based approach to automatic testing of object oriented software which is carried out at the time of software development. We review the reported research result in this area and also discuss recent trends. Finally, we close with a discussion of where model-based testing fits in the present and future of software engineering.*

Keywords: *Testing, Object-oriented Software, UML, Model-based testing.*

Introduction

The IEEE definition of testing is "the process of exercising or evaluating a system or system component by manual or automated means to verify that it satisfies specified requirements or to identify differences between expected and actual results." [16]. Software testing is the process of executing a software system to determine whether it matches its specification and executes in its intended environment. A software failure occurs when a piece of software does not perform as required and expected. In testing, the software is executed with input data, or test cases, and the output data is observed. As the complexity and size of software grows, the time and effort required to do sufficient testing grows. Manual testing is time consuming, labor-intensive and error prone. Therefore, it is pressing to automate the testing effort. The testing effort can be divided into three parts: test case generation, test execution, and test evaluation. However, the problem that has received the highest attention is test-case selection. A test case is the triplet [S, I, O] where I is the data input to the system, S is the state of the system at which the data is input, and O is the expected output of the system [17]. The output data produced by the execution of the software with a particular test case provides a specification of the actual program behavior. Test case generation in practice is still performed manually most of the time, since automatic test case generation approaches require formal or semi-formal specification to select test case to detect faults in the code implementation.

Code based testing not an entirely satisfactory approach to generate guarantee acceptably thorough testing of modern software products. Source code is no longer the single source for selecting test cases, and nowadays, we can apply testing techniques all along the development process, by basing test selection on different pre-code artifacts, such as requirements, specifications and design models [2], [3]. Such a model may be generated from a formal specification [7, 14] or may be designed by software engineers through diagrammatic tools [15]. Code based testing has two important disadvantages. First, certain aspects of behavior of a system are difficult to extract from code but are easily obtained from design models. The state based behavior captured in a state diagram and message paths are simple examples of this. It is very difficult to extract the state model of a class from its code. On the other hand, it is usually explicitly available in the design model. Similarly, all different sequences in which messages may be interchanged among classes during the use of a software is very difficult to extract from the code, but is explicitly available in the UML sequence diagrams.

Another prominent disadvantage of code based testing is very difficult to automate and code based testing overwhelmingly depends on manual test case design. An alternative approach is to generate test cases from requirements and specifications. These test cases are derived from analysis and design stage itself. Test case generation from design specifications has the added advantage of allowing test cases to be available early in the software development cycle, thereby making test planning more effective. Model based testing (MBT), as implied by the name itself, is the generation of test cases and evaluation of test results based on design and analysis models. This type of testing is in contrast to the traditional approach that is based solely on analysis of code and requirements specification. In traditional approaches to software testing, there are specific methodologies to select test cases based on the source code of the program to be tested. Test case design from the requirements specification is a black box approach [14], where as code-based testing is typically referred to as white box testing. Model based testing, on the other hand is referred to as the gray box testing approach.

Modern software products are often large and exhibit very complex behavior. The Object-oriented (OO) paradigm offers several benefits, such as encapsulation, abstraction, and reusability to improve the quality of software. However, at the same time, OO features also introduce new challenges for testers: interactions between objects may give rise to subtle errors that could be hard to detect. Object-oriented environment for design and implementation of software brings about new issues in software testing. This is because the above important features of an object oriented program create several testing problems and bug hazards [3]. Last decade has witnessed a very slow but steady advancement made to the testing of object- oriented systems. One of the main problems in testing object-oriented programs is test case selection. Models being simplified representations of systems are more easily amenable for use in automated test case generation. Automation of software development and testing activities on the basis of models can result in significant reductions in fault-removal, development time and the overall cost overheads.

The concept of model-based testing was originally derived from hardware testing, mainly in the telecommunications and avionics industries. Of late, the use of MBT has spread to a wide variety of software product domains. The practical applications of MBT are referred to [18]. A model is a simplified depiction of a real system. It describes a system from a certain viewpoint. Two different models of the same system may appear entirely different since they describe the system from different perspectives. For example, control flow, data flow, module dependencies and program dependency graphs express very different aspects of the behavior of an implementation. A wide range of model types using a variety of specification formats, notations and languages, such as UML, state diagrams, data flow diagrams, control flow diagrams, decision table, decision tree etc, have been established. We can roughly classify these models into formal, semiformal and informal models. Formal models have been constructed using mathematical techniques such as theory, calculus, logic, state machines, markov chains, petrinets etc. Formal models have been successfully used to automatically generate test cases. However, at present formal models are very rarely constructed in industry. Most of the models of software systems constructed in industry are semiformal in nature. A possible reason for this may be that the formal models are very hard to construct. Our focus therefore in this paper is the use of semiformal models in testing object-oriented systems.

Pretschner *et al.*, [3] present a detailed discussion reviewing model based test generators. Barsel *et al.*, [20] study the relationship between model and implementation coverage. The studies by Heimadahl and George [19] indicate that different test suites with the same coverage may detect fundamentally different number of errors. This paper has been organized as follows. The next section presents an overview of various models used in object-oriented software testing. The key

activities in an MBT process are discussed in section 3. Section 4 discusses the key benefits and pitfall of MBT. Section 5 focuses use of model-based testing in the present and future of software engineering. Section 6 concludes the paper.

Models Used in Software Testing

In this section, we briefly review the important software models that have been used in object-oriented software testing.

UML Based Testing

Unified modeling language (UML) has over the last decade turned out to be immensely popular in both industry and academics and has been very widely used for model based testing. Since being reported in 1997, UML has undergone successive refinements. UML 2.0, the latest release of UML allows a designer to model a system using a set of nine diagrams to capture five views of the system. The use case model is the user's view of the system. A static /structural view (i.e. class diagram) is used to model the structural aspects of the system. The behavioral views depict various types of behavior of a system. For example, the state charts are used to describe the state based behavior of a system. The sequence and collaboration diagrams are used to describe the interactions that occur among various objects of a system during the operation of the system. The activity diagram represents the sequence, concurrency, and synchronization of various activities performed by the system. Behavioral models are very important in test case design, since most of the testing detect bugs that manifest during specific run of the software i.e. during a specific behavior of the software. Besides the behavioral models, it is possible to construct the implementation and environmental views of the system. The object constraint language (OCL) makes it possible to have precise models.

The work reported in [1-3, 5, 8] discuss various aspects of UML-based model testing. A vast majority of work examining MBT of object – oriented systems focuses on the use of either class or state diagrams. Both these categories of work overwhelmingly address unit testing. Class diagrams provide information about public interfaces of classes, method signatures, and the various types of relationships among classes. The state diagram-based testing focuses on making the objects all possible states and undertake all possible transitions. Several work reported recently address use of sequence diagrams, activity diagrams and collaboration diagrams in testing [9].

Finite State Machines

FSM (Finite State machines) have been used since long to capture the state –based behavior of systems. Finite state machines (also known as finite automata) have been around even before the inception of software engineering. There is a stable and mature theory of computing at the center of which are finite state machines and other variations. Using finite state models in the design and testing of computer hardware components has been long established and is considered a standard practice today. [13] was one of the earliest, generally available articles addressing the use of finite state models to design and test software components. Finite state models are an obvious fit with software testing where testers deal with the chore of constructing input sequences to supply as test data; state machines (directed graphs) are ideal models for describing sequences of inputs. This, combined with a wealth of graph traversal algorithms, makes generating tests less of a burden than manual testing. On the downside, complex software implies large state machines, which are nontrivial to construct and maintain. However, FSMs being flat representations are handicapped by the state explosion problem. State charts are an extension of FSMs that has been proposed specifically to address the shortcomings of FSMs [13]. State charts are hierarchical models. Each state of a state chart may consist of lower-level state machines. Moreover, they support specifications of state-level concurrency. Testing using state charts has been discussed in [21].

Markov Chains

Markov chains are stochastic models [24]. A specific class of Markov chains, the discrete-parameter, finite-state, time-homogenous, irreducible Markov chain, has been used to model the usage of software. They are structurally similar to finite state machines and can be thought of as probabilistic automata. Their primary worth has been, not only in generating tests, but also in gathering and analyzing failure data to estimate such measures as reliability and mean time to failure. The body of literature on Markov chains in testing is substantial and not always easy reading. Work on testing particular systems can be found in [22] and [23].

Grammars

Grammars have mostly been used to describe the syntax of programming and other input languages. Functionally speaking, different classes of grammars are equivalent to different forms of state machines. Sometimes, they are much easier and more compact representation for modeling certain systems such as parsers. Although they require some training, they are, thereafter, generally easy to write, review, and maintain. However, they may present some concerns when it comes to generating tests and defining coverage criteria, areas where not many articles have been published.

A Typical Model-Based Testing Process

In this section, we discuss the different activities constituting a typical MBT process. Fig.1 displays the main activities in a life cycle of a MBT process. The rectangles in Fig. 1 represent specific artifacts developed used during MBT. The ovals represent activities/processes during MBT.

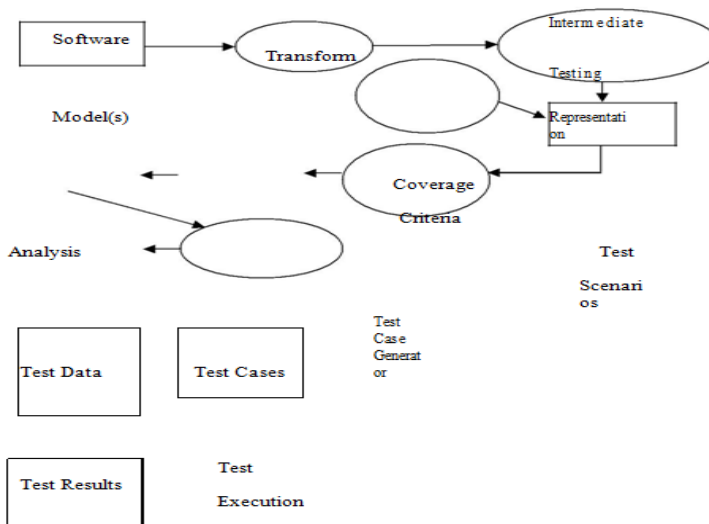


Fig. 1 A Typical Model Based Testing Process

Construction of intermediate model

Several strategies have been reported to generate test cases using a variety of models. However, in many cases the test cases based on more than one model type. In such cases, it becomes necessary to first construct an integrated model based on the information present in different models.

Generation of test scenarios

The test cases generated from models are in form of sequences of test scenarios. Test scenarios

specify a high level test case rather than the exact data to be input to the system. For example, in the case of FSMs, it can be the sequence in which specifies states and transitions must be undertaken to test the system-called a transition path. The sequences of different transition labels along the generated paths form the required test scenarios. Similarly, from the sequence diagrams the message paths can be generated. The exact sequence messages in which the classes must interact for testing the system is shown.

Test Generation

The difficulty of generating tests from a model depends on the nature of the model. Models that are useful for testing usually possess properties that make test generation effortless and, frequently, automatable. For some models, all that is required is to go through combinations of conditions described in the model, requiring simple knowledge of combinatory. There are a variety of constraints on what constitutes a path to meet the criteria for tests. It includes having the path start and end in the starting state, restricting the number of loops or cycles in a path, and restricting the states that a path can visit.

Automatic test case execution

In certain cases, the tests can even be performed manually. Manual testing is labor-intensive and time consuming. However, the generated test suite is usually too large for a manual execution. Moreover, a key point in MBT is the frequent regeneration and re-running of the test suite whenever the underlying model is changed. Accordingly achieving the full potential of MBT requires automated test execution. Usually, using the available testing interface for the software, the abstract test suite is translated into an executable test script. Automatic test case execution also involves test coverage analysis. Based on the test coverage analysis, the tests generation step may be fine tuned or different strategies may be tried out.

Test Coverage Analysis

Each test generation method targets certain specific features of the system to be tested. The extent to which the targeted features are tested can be determined using test coverage analysis [10,12]. The important coverage analysis based on a model can be the following: all model parts (or test scenarios) coverage is achieved when the test reaches every part in the model at least once. Important test coverage required based on UML models can be the following: path coverage, message path coverage, transition path coverage, scenario coverage, dataflow coverage, polymorphic coverage, inheritance coverage. Scenarios coverage is achieved when the test executes every scenario identifiable in the model at least once.

A Critique of MBT

Some important MBT advantages can be summarized in the following points. It allows achieving higher test coverage. This is especially true of certain behavioral aspects which are difficult to identify in the code. Another important advantage of model-based testing is that when a code change occurs to fix a coding error, the test cases generated from the model need not change. As an example, changing the behavior of a single control in the user interface of the software makes all the test cases using that control outdated. In traditional testing scenarios, the tester has to manually search the affected test cases and update them. As even when code changes, the changed code still confirms to the model. Model based test suite generation often overcomes this problem.

However, MBT does have certain restrictions and limitations. Needless to say, as with several other approaches, to reap the most benefit from MBT, substantial investment needs to be made. Skills, time, and other resources need to be allocated for making preparations, overcoming common difficulties, and working around the major drawbacks. Therefore, before embarking on a

MBT endeavor, this overhead needs to be weighed against potential rewards in order to determine whether a model-based technique is sensible to the task at hand. MBT demands certain skills of testers. They need to be familiar with the model and its underlying and supporting mathematics and theories. In the case of finite state models, this means a working knowledge of the various forms of finite state machines and a basic familiarity with formal languages, automata theory, and perhaps graph theory and elementary statistics. They need to possess expertise in tools, scripts, and programming languages necessary for various tasks. For example, in order to simulate human user input, testers need to write simulation scripts in a specialized language.

In order to save resources at various stages of the testing process, MBT requires sizeable initial effort. Selecting the type of model, partitioning system functionality into multiple parts of a model, and finally building the model are all labor-intensive tasks that can become prohibitive in magnitude without a combination of careful planning, good tools, and expert support. Finally, there are drawbacks of models that cannot be completely avoided, and workarounds need to be devised. The most prominent problem for state models (and most other similar models) is state space explosion. Briefly, models of almost any non-trivial software functionality can grow beyond management even with tool support. State explosion propagates into almost all other model-based tasks such as model maintenance, checking and review, non-random test case generation, and achieving coverage criteria. The generated test cases may in many cases get irrelevant due to the disparity between a model and its corresponding code. MBT can never displace code based testing, since models constructed during the development process lack several details of implementation that are required to generate test cases. Fortunately, many of these problems can be resolved one way or the other with some basic skill and organization. Alternative styles of testing need to be considered where insurmountable problems that prevent productivity are encountered.

MBT in Software Engineering: Today and Tomorrow

Good software testers cannot avoid models. MBT calls for explicit definition of the testing endeavor. However, software testers of today have a difficult time planning such a modeling effort. They are victims of the ad hoc model, either in advance or throughout the nature of the development process where requirements change drastically and the rule of the day is constant ship mode. Today, the scene seems to be changing. Modeling in general seems to be gaining favor; particularly in domains where quality is essential and less-than-adequate software is not an option. When modeling occurs as a part of the specification and design process, these models can be leveraged to form the basis of MBT.

There is promising future for MBT as software becomes even more ubiquitous and quality becomes the only distinguishing factor between brands. When all vendors have the same features, the same ship schedules and the same interoperability, the only reason to buy one product over another is quality. MBT, of course, cannot and will not guarantee or even assure quality. However, its very nature, thinking through uses and test scenarios in advance while still allowing for the addition of new insights, makes it a natural choice for testers concerned about completeness, effectiveness and efficiency. The real work that remains for the near future is fitting specific models (finite state machines, grammars or language-based models) to specific application domains. Perhaps, special purpose models will be made to satisfy very specific testing requirements and models that are more general will be composed from any number of pre-built special-purpose models. However, to achieve these goals, models must evolve from mental understanding to artifacts formatted to achieve readability and reusability. We must form an understanding of how we are testing and be able to sufficiently communicate that understanding so that testing insight can be encapsulated as a model for any and all to benefit from.

Conclusion

Good software testers cannot avoid models. MBT has emerged as a useful and efficient testing method for realizing adequate test coverage of systems. The usage of MBT reveals substantial benefit in terms of increase productivity and reduced development time and costs. On the other hand, MBT can't replace code based testing since models are abstract higher level representations and lack of several details present in the code. It is expected that in future models shall be constructed by extracting relevant information both from the design which can automate the test case design process to a great deal. Not surprisingly, there are no software models today that fit all intents and purposes. Consequently, for each situation decisions need to be made as to what model (or collection of models) are most suitable. There are some guidelines to be considered that are derived from earlier experiences. The choice of a model also depends on aspects of the system under test and skills of user. However, there is little or no data published that conclusively suggests that one model outstands others when more than one model is intuitively appropriate.

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Open Source Software for Libraries

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Abstract - *In this Information Society, Libraries have lots of challenges to face. In the present scenario, the users want information in a single window of knowledge. The library changed the collection of books into a single window for this library needs automation. Open-source software is the better option to automate library services. Open-source library software's does not need the initial cost of commercial software and enables libraries to have greater control over their working environment. This paper discusses the definition of open source software, the selection criteria of the Open source software, and the advantage of OSS. The paper also describes the brief features of KOHA, DSpace, Greenstone, PhpMyLibrary, NewGenLib, etc.*

Keywords: *Open Source Software, KOHA, DSpace, OSS for Library, Advantage of Open Source.*

Introduction

In the present scenario library services are software-centric. For managing all kinds of information, resources, the library requires high-quality integrated software. The software can manage all the library activities like Acquisition, Circulation, Budgeting, Serial Control, etc. Library uses various types of software to manage their databases. The use of the software is based on the collection and the size of the library and also depends on the library's economic condition.

As per the ability of the software, it can be divided into two types of software- commercial software/ closed source and commercial software/ open source. Commercial or closed source software is the types of software that are provided a domain of library activities which is available against huge license fee included with an annual maintenance contract and other charges and the open-source software is the computer software whose source code is available under a license that permits the user to study and improve the software.

For every library, organizing their documents, information, books, and media is a very difficult task, and Ranganathan's five laws of library science also said that "Library is a growing organism". And according to this rule library grows with its materials. Software plays a vital role to organize the library material easier and more efficiently. But the budget is the main problem for many of the libraries. Libraries have not a sufficient budget to purchase software, and open-source software permits them to organize their library free of cost.

What is Open Source Software

Open Source Software is Software with source code that anyone can modify, inspect and enhance. Open source software typically includes a license that allows programmers to modify the software to best fit their needs and control how the software can be distributed. OSS is code that is designed to be publicly accessible. Anyone can see and distribute the code as they are fit. Open-source software is software for which the underlying programming code is available to the user. Open-source software can be defined as any computer software, generally developed as a public collaboration whose source code is made freely available.

Definition of Open Source Software

Open Source Software is a type of computer software in which source code is released under a license in which the copyright holder grants users the rights to use, study, change, and distribute the software to anyone and for any purpose. Open source software may be developed in a

collaborative public manner. Open source software is a prominent example of open collaboration. (Wikipedia) Analysis of definitions given by chudnov (1999), Raymond (1996), Moody (2001), and Morgan (2002), identifies the following attributes of open source software-

1. OSS is typically created and maintained by developers crossing institutional and national boundaries, collaborating by using internet-based communication and development tools.
2. OSS development process follows the famous Linus's Law- "Release early, release often and listen to users."
3. Quality, not profit, drives open source developers who take personal pride in seeing their working solutions adopted.
4. Intellectual property rights to open source software belong to anyone who helps to build it or simply use it and it is not locked to any single vendor or institution.

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 Softwares Used By Libraries

Koha

Koha was created in 1999 by Katipo Communication and the first installation in 2000. Koha is the world's first open-source integrated library system. KOHA is written by 'Katipo Communication' for Horowhenua Library Trust. Any of the Libraries can use KOHA according to their requirement. KOHA released under the General Public License (GPL).

KOHA is designed to work on Linux operating system but it can be installed on a system with WINDOWS2000 and WINDOWS NT also. KOHA used Apache web server, MySQL and SQL based Relational Database Management System. KOHA Supports all the housekeeping operations of the library. Many libraries can not afford to purchase, install and maintain an ILS, and KOHA is the perfect alternative.

KOHA Supports various modules, some of which are listed below

1. Acquisition
2. OPAC
3. Circulation
4. Cataloging
5. Serials
6. Administration
7. Reports

Features of KOHA

1. Easy barcode printing.
2. Customizable search.
3. Web 2.0 Supports.
4. Union Catalog Facility.
5. Online Circulation.

NewGen Lib

It is an integrated library management system developed by verus solutions Pvt. Ltd. In march 2005 New Gen Lib version 1.0 was released. New\Gen lib works on Linux and Windows. It has

been declared Open source Software under GNU GPI Licence by the Verus Solution Pvt Ltd Hyderabad, India.

Features of NewGen Lib-

1. RSS Feed in OPAC.
2. Android Mobile and Tablet Supports.
3. RFID Supports.
4. Unicode 4.0 Complaint.
5. Allow Digital Attachment to Metadata.

DSpace

DSpace is a digital institutional repository. Which stores the intellectual output f a University's research faculty in digital format. DSpace is designed and developed by the Massachusetts Institute of Technology (MIT) Libraries and Hewlett-Packard (HP). It is an open-source application that organizations can run easily. DSpace Supports a wide variety of data including Film,videos, graphs, books, theses, and other forms of digital content.

Features of DSpace

1. DSpace uses postgre- SQL or ORACLE.
2. DSpace supports various Standards such as OAI-PMH, OAI-ORE, SWORD, Web DAV, Open Search, Open URL, RSS, ATOM.
3. DSpace can be used for self-archiving by institutions and faculties. It provides long-term physical storage and management of digital items in a repository.

PhpMyLibrary

PhpMyLibrary is a PHP/MySQL web-based library automation application. The program consists of cataloging, circulation, and the Webpac Module. The software also has import and export features. It is developed by Polerio. Babao III as his academic undergraduate thesis in Institute of Library and Information science university of Philippines, in 1998-2003. The PhpMyLibrary is now part of the three popular open-source library systems worldwide which include koha, open Biblio, and PhpMyLibrary.

Greenstone

GSDL software stands for Greenstone Digital Library Software. Greenstone was developed by the New Zealand Digital Library Project at the University of Waikato in early 2000. Greenstone is now well developed and distributed in cooperation with UNESCO and the Human Info, a non-governmental organization. Greenstone builds collections with effective full-text searching and metadata-based browsing facilities that are attractive and easy to use. GSDL aims to empower users to build their digital libraries. GSDL is issued under the terms of the GNU General Public License. Greenstone runs on Windows, Unix/Linux, Apple Mac, etc.

Why Library Prefer Open Source Software

1. Flexibility.
2. Lower Cost.
3. No vendor lockin.
4. Transparency.
5. User Friendly.
6. Freedom to Customize.
7. Affordability.
8. Stability.

Some Open Source Software Tool For Library Blog/Website

1. Wordpress
2. Blogger
3. Drupal

Selection Criteria Of Open Source Software For Library

Software Selection is not an easy task for the librarian. The librarian should select the software that covers the requirements of their need. The success of Automation always depends on the right software and its implementation. The cost of commercial software grows everyday. Each software has its features and limitations, hence it is important to select the software according to the requirements and need of the library.

Some of the points are given below to select the open-source software for the library-

1. Cost of Installation.
2. Technology.
3. Service and Support provided by the Supplier.
4. Features and Functions of the Software
5. Performance of software.
6. Supplier Durability.
7. Support and Maintenance.
8. Training.
9. Security.
10. User Friendly of not,
11. Equipment.
12. Portability.
13. Supporting International Standards.

Advantage Of Open Source Software

1. Lower Hardware cost.
2. Quality Software.
3. Benefits for Staff and Patrons.
4. No restriction to use.
5. OSS is available almost free of cost.
6. Open Source Software is Audited.
7. Supports and Maintenance costs of open source software are often lower.

Conclusion

With the development of ICT, several open-source software is developed. Open source software has brought a revolution in the field of libraryscience. Most libraries prefer open source software to automate the library services. The selection of open source software is not an easy task. KOHA is one of the best open source software and used by a huge number of libraries. The library always has a budget issue, hence the development of OSS is an effective way to automate the library. There are lots of open source software which can fulfill the requirement of the libraries. Open source software is the software that is modified by the users and its code is available to all.

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An Effective Content Management System (ECMS) for Web Portal

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Abstract - Website is the most important component of the marketing strategy. It serves as the hub of all of the online activity of a business. All the exchange of information between a seller and a customer takes place in an online medium through a website. My paper describes about web development company start-up concept by using custom personal hosting storage servers. Final outcome from this paper is to generate the most conversions for a business by delivering an attractive Design, Responsive Theme, and User-friendly website. The total implementation process has been implemented by using Custom Hosting Servers, HTML5, JSS, PHP and MySQL Databases. An Effective Content Management System (ECMS) based on three phases in its life cycle: content, managing things and services to the customer phases. ECMS is a web application that run on my own web server to help facilitate creating websites by multiple users from outside. All the development issues are available in www.basixone.com

Keywords: www.basixone.com.

Introduction

An Effective Content Management System (ECMS) is a system used to manage the content of a web site. ECMS is a web application that is used to allow to publish, modify, edit, organize, delete and maintaining content from a central Server. Such kind of systems of content management provide measures to accomplish the work flow in a collaborative environment. In the Effective Content Management System, Administrator is the responsible person to manage the creation, modification, and removal of content from a web site. The features of a CMS system must include Web-based publishing, format management, publishing, revision control, indexing, search, and information retrieval. An ECMS is treated as a central repository for content with a Server, which can consist documents, textual data, movies, pictures, music files, and/or systematic data. So, all the things in ECMS are functional and there are some composite functions working to develop the content management system. ECMS plays an important role in the Electronic commerce (ecommerce) which designates the buying, elling, and exchanging of products, services, and information via computer networks, primarily through Internet. In this situation, content management system plays an important role to allow publishing, organizing, editing, and modifying the content.



Fig. 1 Services provided by ECMS [5]

Services provided are

1. Web Design - for a customer who has an existed hosting and domain. But needs Web developing services.
2. E-Commerce - provide a complete package which includes domain, hosting, and development support.
3. Hosting Services - provide storage space for an existing website which has its own domain.
4. Domain Registration - Provide a domain for a user which has an existing hosting.

Role of a Business Website

Improving sales for a business will profit the business enormously. Websites are a productive method to attract more customers. It builds the business success. A Website will expand the accessibility. A business website plays a role in the basic requirement for online marketing. This is where the engagement between a customer and seller takes place. A business website consists of everything regarding the branding and products available in a particular business and acts as the major hub for growing the business sales. Website is used to establish authority and credibility through the information provided.

Websites created

1. akhilmunnava.com
2. blockheadfacts.in
3. directlinks.in
4. electronics zone.in
5. fityouroutfit.in
6. footwearlove.in
7. gleemoments.in
8. gullyboy.in
9. healthaswealth.in
10. its12.in
11. manifestoevents.in
12. panceramics.co.in
13. pauseit.in
14. tradekliff.in
15. visualarttree.com
16. whynoteverything.in
17. yourkasm.in

Steps involved in Web Content Management [4] is as follows:

1. Identifying the requirement of Content
2. Creating a relevant structure for the content
3. Managing Content in a proper manner
4. Ensuring Content Compliers with good standards and protocols
5. Collaborating the content on demand to encounter your customer's requirement.

Model-View-Controller (MVC)

The Model View Controller (MVC) design pattern specifies that an application consist of a data model, presentation information, and control information. The pattern requires that each of these be separated into different objects. MVC stands for Model, View, and Controller. MVC separates an application into three main logical components: the model, the view, and the controller. Each

of these components are built to handle specific development aspects of an application. MVC is one of the most frequently used industry-standard web development frameworks to create scalable and extensible projects. Model represents the shape of the data. A class in C# is used to describe a model. Model objects store data retrieved from the database. View in MVC is a user interface. View display model data to the user and also enables them to modify them. View in ASP.NET MVC is HTML, CSS, and some special syntax (Razor syntax) that makes it easy to communicate with the model and the controller. The controller handles the user request. Typically, the user uses the view and raises an HTTP request, which will be handled by the controller. The controller processes the request and returns the appropriate view as a response.

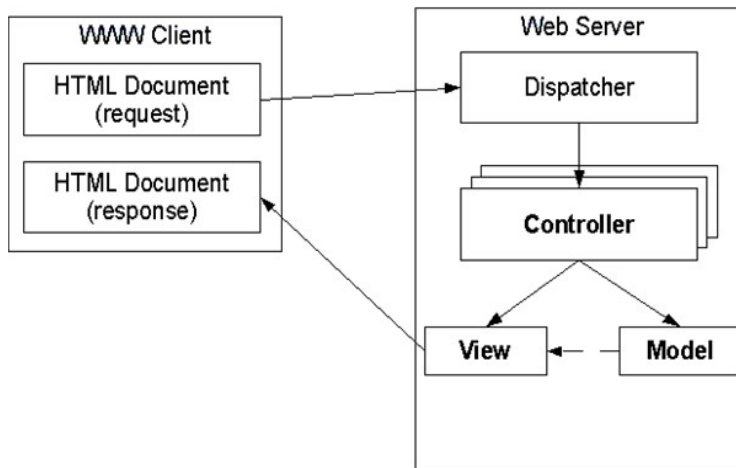


Fig.2 MVC Architecture

In MVC, the view is the interface provided for the users. It controls the corresponding relationship of view and model and transmits the information collected by the view to the corresponding model. The model deals with the received information and re-transmits the results back to the view [3]. MVC is an impression of program development. Nowadays, some development frameworks approve it, such as CherryPy, Cakephp, Spring MVC, CodeIgniter, Catalyst Symphony, Rails and ECMS also reflects this awareness.

In spite of applying MVC schema to give a modular design to the application, code layers do depend on each other. In this pattern, View and Controller both depend upon the Model. Multiple methods are possible to apply the MVC pattern in the project:

1. Method 1: Activities and fragments can perform the role of Controller and are responsible for updating the View.
2. Method 2: Use activity or fragments as views and controller while Model will be a separate class that does not extend any Android class.

It splits the program into model, view and controller. Its objectives are to increase the reusability of the codes and decrease the connection of the data description [2]. MVC makes the preservation, extensibility, suppleness and encapsulation of database improve largely.

Effective Content Management System for Web Portal

An Effective Content Management System for web Portal is organized as:

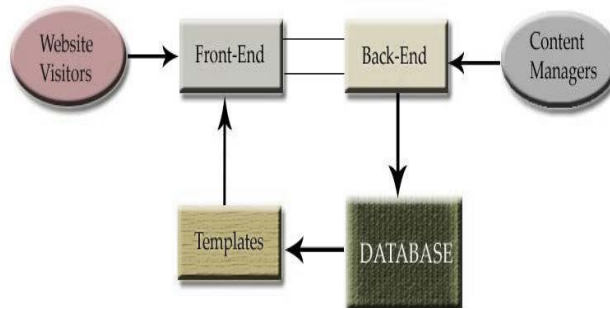


Fig. 3 working of visitors and web ECMS [6]

The entire process is divided into mainly two parts:

1. Server part- Administrator
2. User/Customer part

A Web content management system is based on programming language to get the information stored in the database, arrange it and then deliver it to the viewer. There are numerous programming languages that can be used in the background of a website. A web content Database. There are different databases available and some are only well-suited with certain operating systems.

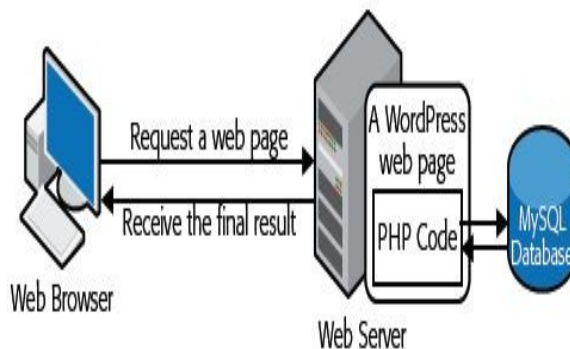


Fig. 4 Working relation of client, server and database in web ECMS [8]

Administrator Part

First, an administrator needs to login into the Server, there are many functions in ICMS for administrator, including view problem reporting, disables specific portal, system parameter configuration, system performance reporting and system usage reporting. It has four-step process which has been shown below. The administrator has to login to the admin panel and has to create a new package that meets the requirements of the customer.

Step 1

The new Package consists of:

1. Disk Quota to be allotted
2. Monthly Bandwidth
3. Max FTP Accounts to be allowed
4. Max email Accounts
5. Max databases to be allowed

6. Max Addon domains to be allowed
7. Max email lists that can be created
8. Max sub domains to be allowed
9. Selection of C-panel theme

Step 2:

Now, the admin has to Add a new user to the server. The steps involved to add a new user are:

1. Choose Account Functions
2. Create a new user
3. Add domain information
4. Create username and password
5. provide user email
6. Go to Package Section and choose the required package created earlier.
7. Save information

And a new user gets created.

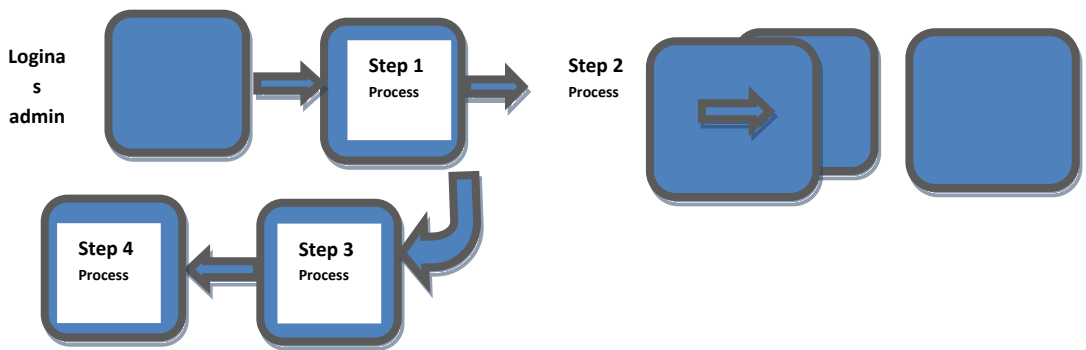


Fig. 5 Administrator storyboard

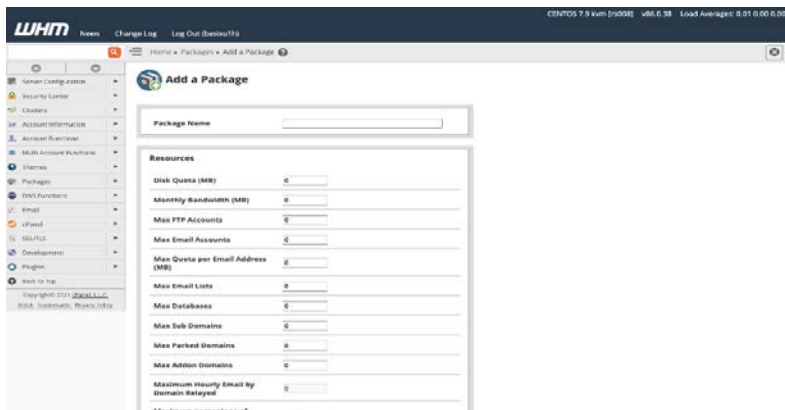


Fig. 6 Add Package by Administrator

Step 3:

Now the admin has to Login to the c-panel created for the user. And update the following DNS records for successful pointing of domain with hosting package.

Name Servers Used

rns15.webhostbox.net
rns16.webhostbox.net

DNS Records Used

A Records

*.basixone.com IN - A - 162.241.85.86
basixone.com IN - A - 162.241.85.86
www.basixone.com IN - A - 162.241.85.86

1. MX Records

Basixone.com.basixone.com IN - MX - us2.mx3.mailhostbox.com
basixone.com IN - MX - us2.mx2.mailhostbox.com
basixone.com IN - MX - us2.mx1.mailhostbox.com
basixone.com IN - MX - basixone.com

2. CNAME Records

Smtplib.basixone.com IN - CNAME - us2.smtp.mailhostbox.com
pop.basixone.com N - CNAME - us2.pop.mailhostbox.com
imap.basixone.com N - CNAME - us2.imap.mailhostbox.com
webmail.basixone.com N - CNAME - us3.webmail.mailhostbox.com

Step 4:

The Admin should now navigate to the softaculous installer in c-panel and choose WordPress for installation. Once all the details such as Site Name, Site Description, Username, Password and email are provided. WordPress gets installed into the directory and the creation of a Website with WordPress interface gets completed.

Customer Part

Login to the Website with provided credentials.

Login can be accessed with two ways depending on the purpose of work to be done.

1. C-Panel
2. WordPress Interface

>> Purpose of Logging in to C-Panel:

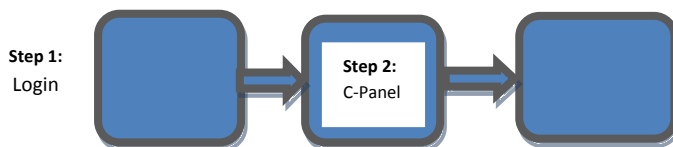


Fig.7 Customer storyboard

We can see the registered Users Information according to their website wise like this. It consists Domain, Ip Address used, Username, E-Mail, setup date, Partition, Quota, Disk used, Theme etc.,

If the user wants to check the back-end data such as Disk Usage, Directory Access, Backup Wizard, DNS Zone Editor, Bandwidth Metrics, Cron Jobs, APACHE Handlers and Available MySQL Databases for installing new Softaculous Applications.

The Softaculous applications include:

1. WHMCS
2. MyPHPAdmin
3. Joomla
4. Abantecart
5. SMF
6. pH7CMS
7. OsClass
8. MODX
9. Piwigo
10. PhpBB
11. ClipBucket

The user can install any application into the available databases as per the requirements.

>> Purpose of logging in to WordPress Interface:

The user can directly access the WordPress Login Panel by adding a “/wp-admin” extension to the website domain.

e.g.: “https://(website_domain).com/wp-admin

All the Website Information and Content such as Themes, Pages, Plug-ins, HTML5 Coding is done by logging into the WordPress Interface. It is where the complete Website is Designed and Developed.

Advantage of Web Content Management System

1. **Fast** - The servers used for designing and implementing the data storage for the websites are very fast and data is accessed at very high relative speeds which makes the websites load efficiently.
2. **Optimized** - All the Websites created at Basixone are optimized, which means that the websites load very conveniently in any device making them desktop and mobile-friendly.
3. **Flexible** - Many widgets, themes and plugins can be used for a Web based on CMS at a secondary stage to change the outlook and design of the websites which make it very flexible.
4. **SSL Secured** - All the Websites created with Basixone are SSL (Secure Socket Layer) Protected. A website with SSL protection enables HTTPS (Hyper Text Transfer Protocol Secured) which meets the PCI requirements. Payment Card Industry (PSI) checks 12 primary requirements for allowing a website for accepting E-Payments out of which the most primary and important requirement is about having an SSL protection. So, all the websites developed by Basixone have SSL protection and hence are ready for the users to start with an E-Commerce website with online E-payments accepting.

Conclusion

A Website development with using Content Management System makes it easier to up-bring offline retail businesses by providing them with E-Commerce portal for better sales and growth. A custom storage server cut downs the charges required for hosting with third party companies hence making it very affordable for small businesses. Using WCMS as back-end makes it convenient for the admin to create and design well established and dynamic websites. And using WordPress as the medium for Front-end development makes it easier to edit and update data in the website for any user without having advanced knowledge of web technology or

programming of any sort. Considering the importance of Affordability, Flexibility, Security and Optimization. We have created a platform where both the web designer and customer can accomplish a successful website development with ease. Also, we expect that there is a future scope to bring this idea and concept as a startup business by registering with a firm.

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Library Automation Using Koha Open Source Integrated Library Management System: A Study

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Abstract - *Integrated library management systems act as the major tool to efficiently acquire, organize, retrieve, and disseminate information so as to cut costs and enhance the efficiency of library services. The main aim of any library management systems is to provide better services by providing enhanced access to library resources. Koha is a freeware library automation package with its impressive features evolving and expanding to meet all the ever-growing needs of its user base. Literature that is relevant to the study is taken with utmost care. The study examines the various features of Koha in general and gives a brief overview on the various modules of Koha.*

Keywords: *Library Automation, Koha Integrated Library Management System, Open-source integrated systems.*

Introduction

Library management system has now become an inevitable part of information society. Library professionals now have to utilize technological advancement to organize information, improve access to information and maintain library systems to fulfill the ever-growing information needs of the user. Every Library now use integrated library management system as the major tool to efficiently acquire, organize, retrieve, and disseminate information. Integrated library management systems are software applications and hardware that organize, track, and make accessible library information resources (Breeding, 2008). It is widely accepted that libraries can serve their users' needs at a lower cost by adopting open source software rather than proprietary software. Open source software (OSS) is gaining importance and has been adopted widely in the automation of libraries worldwide. Open-source integrated library system is a cooperatively developed, web-based, and open-source software package that automates facets of library services and designed to coordinate and automate such library functions as the online catalogue, the circulation system, and the acquisitions system. It is a system that provides access to the source code and librarians can modify the codes to transform it to suite local needs (Khatun, 2014). Koha is the oldest open-source library management software which provides all essential modules for the automation of a library. Most of the libraries select Koha because it is free open-source online software that has reasonable assurance of being well supported and is being used by many academic libraries. It has a formal user group who discusses common problems and offer solutions to them. It is continually improved by its software producers and library technology staff from around the world (Abdussalam&saliu, 2014).

Objectives of the study

1. To give an overview of Koha integrated library management system and examine the various features of Koha
2. To analyze the different modules of Koha integrated library management system

Koha Integrated Library Management System

Koha is an open-source integrated library system developed by Katipo Communications for the Horowhenua Library Trust in New Zealand in 1999. It is a web-based ILS, with a SQL database backend with cataloguing data stored in MARC and accessible via Z39.50 or SRU. Koha is the first open source fully featured Integrated Library System (ILS) written in the LAMP paradigm. It

has all the expected features of an ILS such as simple clear interface for librarians and members (patrons), union catalog facility, customizable search, circulation management and serials system. Koha also has Web 2.0 facilities like tagging, comment, social sharing and RSS feeds. Koha software is gaining popularity because of its web-based architecture, Unicode compatibility, user friendliness and extensive customization possibilities. It is under GNU License and can be accessed its website address www.koha.org (Koha, 2011). Koha user's interface is very configurable and adaptable which has been translated into many languages. This adaptability has encouraged many public, school and special libraries all over the world to adopt and improved the capabilities of the software by adding their own features and functions.

Koha System Architecture

Koha is designed to work with a minimum of hardware resources. It runs on the Linux operating system in conjunction with the Apache Web server, uses the popular MySQL open-source database management system, and is written in Perl. The Koha ILS can also be installed on Windows operating system. Koha supports MARC21 and UNIMARC bibliographic records. Koha is based on client-server architecture. It can be installed on a server running Linux, UNIX, and Mac. The recommended operating system is stable version of Debian Linux, although Koha can run on any modern operating system. Koha requires only a web browser on the workstation (a graphical browser, or even a text browser for the OPAC). It can run on Windows, Linux, Macs, or even UNIX workstations. Koha runs over any TCP-IP network. Koha accommodates low-bandwidth connections. It is completely usable on ordinary telephone line connections (Jisna, 2017). Koha requires a recent Internet browser with enabled java script. The public interface (OPAC) conforms to XHTML1.0 standards making it compatible with any browsers. OPAC can also be used by people needing special assistive technology (Braille browsers, voice synthesis, text based browsers, etc.).

History of Koha Integrated Library Management System

Koha is an ILS, with the first installation in January 2000 and more than 20 companies are now providing commercial support for kohalib. In 2001, Paul Poulain (of Marseille, France) began adding many new features to Koha for supporting multiple languages. By 2010, Koha has been translated from its original English into French, Chinese, Arabic and several other languages. Support for the cataloguing and search standards MARC and Z39.50 which was developed initially for Nelsonville Public Library, US was added to Koha main software in 2002. In 2005, an Ohio-based company, Metavore, Inc., trading as LibLime, was established to support Koha and added many new features. The Crawford County Libraries in Pennsylvania chose to support the integration of the ZebraXML storage and retrieval environment into Koha. Features required for academic libraries were developed by Westchester Academic Libraries Director Organization (WALDO).

Features of Koha

Koha is an open source project with its source code available in public domain. Koha ILS projects are expanding its features list receiving the advantages of innovative technology and growing number of users. Each successive version of open source ILS tries to manifest user requirements based on suggestions. And, with the help of open source developers, now Koha is known as the most powerful ILS of the world of Information & Library system. Major features of Koha are as follows:

1. **Full-featured ILS:** Koha can be used in any kind of library. Koha includes modules for circulation, cataloging, acquisitions, serials, reserves, patron management and branch relationships.

2. **Dual database design:** Koha database design supports both texts based & Real time database management system.
3. **Library standards compliant:** Koha is capable of the interoperability between Koha and other systems and technologies, while supporting existing work flows and tools.
4. **Web based interface:** Koha has a very user-friendly web-based interface as it uses web technologies like XHTML, CSS & JavaScript
5. **No vendor lock in:** Koha is an open source project and anyone can participate & develop Koha in any time.
6. **Robustness:** The public front-ends are sufficiently stable and badly formed queries or poorly done operations do not affect integrity of the system.
7. **Online public access catalogue (OPAC):** The OPAC is web based and there is no need to install any software on a user's machine. It also provides Multilingual OPAC support allowing patrons to view the OPAC in different languages depending on the language chosen by the library
8. **Copy cataloguing and z39.50.** MARC21 and UNIMARC for professional Cataloguers
9. **Web based circulation interface.** Can handle issues, returns, transfers, etc. There is no need to install any special software on staff computers once there is an intranet in place.
10. **User records management.** It allows management of detailed information about each person that is registered as a library user.
11. **Online renewals and reservations of item by users.** Library patrons can self-renew their checkouts and make reservations. This has reduced the traffic at the circulation desk and has freed some circulation staff for other duties.
12. **Branches.** Since the software is web based it is easy to borrow a book in one branch and return it in another branch.
13. **Borrower history comments and tags:** Users can comment and review books, tag them and view their reading history. They can also view their records and make purchase suggestions.
14. **Customizable search:** A library can choose the fields they want on their search form. For example, a search by author, title, subject, and keywords. There is also an advanced search option.
15. **Acquisitions are Simple and comprehensive.** It includes orders from vendors, budgets, and pricing information.
16. **Serials module** allows easy cataloguing of journals and user can view holdings information through the OPAC.
17. **Book bag and virtual shelves** help users to have a virtual library where they keep books specific to their needs.
18. **Overdue fines and notices:** Koha manage overdue fines and notices that can be sent to users by email.
19. **Barcode printing and reader** is fully supported in Koha thereby removing the chances of human error.
20. **Koha provides effective security measures** to protect unauthorized persons from accessing the system. For example, registered patrons are required to sign in with their user name and password to perform certain functions on the library database.
21. **Reports and statistics.** Koha can generate management reports and statistics in cataloging, acquisitions, serials, and circulation.
22. **The additional features** in newer version are news, label/user card creator, upload patrons' images, task scheduler, overdue notices, log viewer, SQL builders, comments, export Biblio, RSS feeds and many others.

Modules in Koha Integrated Library Management System

A module is a software component or part of a program that contains one or more routines. One or more independently developed modules make up a program. Each module serves unique and separate library operations. Each of them integrated with a unified interface. Koha Modules Include:

Acquisitions (ordering, receiving, accessioning, invoicing materials, etc.)

Acquisition is the most important module of an integrated library management system and includes activities related to obtaining various library materials. Major requirements of this module include selection of items, duplicate checking, and selection of vendor, ordering, receipting, claiming, fund control, report and statistics. Koha has a simpler and user-friendly acquisition module. It includes options such as currencies and exchange rates, budget heads, budget sources/funds, budget planning/allocation, vendors and managing suggestions by new patrons. Acquisitions system preferences in Koha include vendor contracts, acquisition policy for creating an item; currency and gist along with printing. In Koha, process request is normal budget-based/bibliographic data acquisition. Acquisition search by vendor and order is another feature in Koha. The module helps to keep track of all vendor information and ordering can be done directly from vendor files or using EDI or by searching Z39.50 targets. Using this module multiple copies or copies of existing records can be ordered, acquisition process can be monitored including the generation of late reports and claim letters. Accept purchase suggestions can be accepted from library users and they can be kept notified as the item moves through the Acquisitions process.

Cataloguing (cataloguing, indexing materials, etc.)

Cataloguing module in Koha maintains full MARC record, follows the Dewey decimal classification and incorporates AACR2 rule; security and data protection are accomplished at the system, terminal and user code level. Features of the module help to provide effective workflow to the library by processing various types of materials such as audio, video, web pages, CD-ROMs and others like books, thesis, dissertation etc. A staff can find duplicate books by comparing two materials using Duplicate checking option. Catalogue administration in Koha is based on MARC bibliographic frameworks including Koha to MARC mapping, keywords to MARC mapping, MARC bibliographic framework test and authority types; classification sources which allow adding/editing of classification sources, classification filing rules, record matching rules.

Koha can process items which are ready for technical processing and also allow for Copy cataloguing or import of catalogue records. Z39.50 is available in Koha. The back-office library staff can also perform item accession, weeding, maintenance, and item purchase and post-purchase tracking from this module. Reports on materials which are imported from other library or exported to another one can also be generated using Import and Export data function available in this module (Cataloguing of Koha, 2018).

Circulation

The next important module is the circulation module. Circulation module is used by staff in the circulation section to process book returns and checkouts, as well as assist patrons in catalog searches. Circulation module of Koha offers various features such as Check in and out with a barcode scanner or manually, Book drop mode to backdate check ins, ability to forgive fines on check in, holds pull list generated on your schedule, course reserves, offline circulation for Windows and/or Firefox, Transfer materials between branches, Perform collection inventory, POS connectivity and Communication with collection management companies, Web-based self-check out module and Checkout by keyword, title, call number, etc. (Circulation of Koha (2018).

Serials Control (ordering, receiving, tracking magazine and newspaper holdings, etc.)

Serials include journals, periodicals, magazines, almanacs, annual reports, numbered monographs, and other materials. This module includes activities such as Ordering, Receipting, and Collecting, Claiming and Binding of serials. Serial module of Koha can register subscriptions with reviews and track the arrival of periodicals. Koha manages late issues, skipped issues, and claims with the suppliers. Koha manages complex classifications, allowing the librarian to work with eleven different publication periods (from daily newspapers to annual publications), with delayed publications, and with publications out of sequence. Serial module in Koha can create subscriptions with full prediction patterns, receive issues one at time or bulk, barcode serials on receipt if desired, generate late issue reports and claim emails, see full serial history, print routing lists for each subscription, duplicate subscriptions for multiple branches and library defined numbering frequencies and patterns.

OPAC (public interface of users for search and retrieval)

Koha provides a full-functioned Online Public Access Catalog (OPAC). Online Public Access Catalog is the electronic card cataloging system to look up library resources. OPAC users can carry out searches using Keyword, Subject, Title, Class, Barcode, author, publisher, etc. OPAC users who are logged-in members can place reservations on library items. Biblio basket is another feature for Logged-in members who can select records from an OPAC search and retrieve them by e-mail, either in human-readable form or in an ISO2709 format file. Suggestions for acquisition can also be submitted through OPAC. Koha automatically informs the OPAC user (by e-mail) of the action taken on each suggestion.

Patron Module

The Patrons of Koha stores the information about the patrons. It allows adding the patrons of the library and search/browse screen for patrons. The search can be made by any part of their name of the patron or their card number. It also provides patron search with more filters including the ability to limit to a specific category and/or library. Patron category is defined with the minimum and maximum ages for patron of the given category. Searching the patron's card number provides the details like financial standing of the patron, charges due, patron's reservations, and outstanding loans against the patron.

Administration (administrative interface for the administrators)

Parameter's administration is a very important feature of the intranet module of Koha. Various default parameters can be changed using this functionality. It allows us to define different parameters for the functioning of Koha like the library branches, book funds, currencies, item types, the categories of borrowers, the charges taken for the different types of items etc. Global System preference is the most important module of Koha which deals with administration and maintenance and manages preferences like MARC, date format, administrator email and various templates. Only Chief Librarian, Chief Administrator or person of similar designation can hold access rights to this module. Another important parameter is Koha Basic Operating Parameters, Patron and Circulation Parameters, Catalog Parameters, Acquisition parameters and Z39.50 Servers Administration (Koha- Open Source Integrated Library Software, n.d.).

Tools module

Tools in Koha all perform some sort of action. Koha provides three categories of tools relating to Patrons and Circulation; Catalog tools and additional tools. These tools are alternative for the Koha Reports. (Koha- Open-Source Integrated Library Software, n.d.). It includes Notices & Slips Tool, Patron Card Creator, Label Creator, MARC Modification Templates, Calendartool, CSV Profiles, Log Viewer and Task Scheduler.

Adoption of Koha in India

Koha open-source library management system is a new entrant into library automation marketplace in India. First Koha installation in India was deployed in St. Joseph's College, Devagiri, Kerala. Thereafter, there have been a number of Koha installations in India and the group of active Koha users in India is growing. Koha is relatively more popular in India due to its active users' community. Many prestigious library automation projects in India have adopted Koha due to its capability to handle Indian languages. In India only very few commercial library system vendors provide advanced systems and services, but the price of the systems are very high.

Conclusion

Integrated Library management system is used by library professionals to improve and customize the services as per the needs of users through automating the various information services provided by the library. Librarians can lead and implement Integrated Library Management system like koha without any involvement of any experts. Financial and technical feasibility has also prompted many libraries to change from proprietary library management systems and the adoption to Koha. Technical platform for Koha installation such as MySQL database, Apache web server, Perl programming language and Linux operating system does not need any additional investment. This paper analyzes various aspects of Koha Integrate library management software, its features, different modules of koha and its adoption in India.

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Contribution of UK and USA towards Open Access Theses and Dissertations (OATD)

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Abstract - *Open Access Thesis and Dissertations (OATD) is a digital repository of electronic thesis and dissertation created in digital format by faculty members, scientists and research scholars of an institution that is freely available to everyone via internet. The present study is an attempt to evaluate a comparative study of United Kingdom (UK) and United States of America (USA) thesis and dissertation on various parameters like time series wise, department wise, university wise, degree wise, level wise and language-wise contribution towards OATDs. The OATD was selected as a source of data collection of the thesis and dissertations from UK and USA. The results reveal that there is a total of 5031307 theses available in OATD that is contributed from all over the world. It is observed that out of total, USA contributes (24.74 percent) and UK contribute (8.25percent) to the global share of thesis and dissertation in OATD. USA has more number of thesis as compared to UK and the majority of these thesis from both the countries belong to the period of 2011-2015. The maximum number of these thesis and dissertations are published from prestigious universities including University of Glasgow (UK) and MIT (USA). The results further show that majority of the thesis submitted from UK and USA for attaining Ph.D. degree. The thesis from UK accepts content only in two languages- English and Welsh whereas as thesis from USA accepts content in 11 different languages.*

Keywords: Open access, ICT, Thesis and Dissertations, OATD, Repositories, UK, USA.

Introduction

Contemporary era has been much driven by information and knowledge on every forefront that directly or indirectly made research an inevitable part of every nation. To sustain in the ever-changing scenario of technologically driven era, societies are putting in efforts to explore the vast dimensions of information and knowledge through the process of research which led to the real development of nations. In view of the fact, not only in present era but from time immemorial novel and nascent ideas are produced and recorded in order to be disseminated in some form or another. However, among varied research resources Thesis and Dissertations are the most valuable, but these reserves of information remain concealed due to a lack of appropriate channels of dissemination. Since, it is generally un-justifiable to keep research work hidden from public access besides, wasting of efforts and endowments expended for carrying out the research (Kumar & Pradeep, 2013). However, as a result of the technological revolution and the revolutionary idea of Open Access (OA), these barriers are gradually dissipating that inturn paved way for the development of electronic Thesis and Dissertations (ETDs) (Jan and Khazer, 2020). In view of the fact, ETDs broaden access and visibility of doctoral research and presents a podium for researchers to both deposit as well as make their work accessible globally (Kumar & Pradeep, 2013). Accordingly, "The submission of thesis and dissertations in electronic format has expanded the open door for the user community to have an entrance to the knowledge implanted in these works through different national and international ETDs and databases" (Khan & Pillia, 2018). In this milieu owing to the importance of ETDs a vast amount of literature clearly reveals that the research Institutions are by and large addressing this problem by making their ETD's available online or by achieving membership of various online repositories like Shodhganga, OpenDOAR, etc and thus not only increasing its visibility but access also (Sengupta, 2012).

Literature Review

Schopf (2013) while attempting to highlighting the importance of ETD's affirms that these not only highlight the intensive research but also represents a mounting part of accessible open content archived in institutional repositories where they potentially add to the general impact as well as ranking of their particular institutions. A Study by Satyanarayana & Babu (2007) reviews contemporary developments of E-theses & Dissertations in India and recommends a representational plan to speed up the process. In line with same Ramdas & Lihitkar (2014) conducted a comparative study on ETDs in India and reveals institutional repositories are gaining momentum and key research institutes have already created their own institutional repositories. Mishra, et al. (2007) highlighted the key challenges and innovations in establishing an ETD repository. A study by Sankar & Kavitha (2015) explored varied facets on Shodhganga repository. Ahmed, Alreyaee and Rahman (2014) highlights the status of OA repositories with particular reference to Asia reveals that although some of the Asian countries are lagging behind in terms of development of OA ETD repositories however, at the same time, OA ETD system is budding fast in a number of Asian countries like India, Japan, China and Taiwan indicating that regions have become sensitized about the importance of OA ETD repositories. In tune with same a study by Swain (2010) evaluated the global adoptions of ETDs and explored the issue of ETD initiatives, adoption, and subsequent implications from studies carried out in different parts of the world.

Objectives of the Study

1. To identify the geographical distribution of the open access thesis and dissertations in the Open Access Thesis and Dissertations (OATD) with special reference to United Kingdom and United States of America.
2. To ascertain the country and language-wise contribution to the total OATD collection.
3. To evaluate and discover the open access thesis and dissertations of UK and USA on following varied parameters like
 - a) Time series wise contribution
 - b) University wise contribution
 - c) Department wise contribution
 - d) Degree wise contribution
 - e) Level wise contribution, and
 - f) Linguistic pattern of OATD

Methodology

The online survey was conducted to collect the data for the present study. To fulfill, the above objectives Open Access Thesis and Dissertations (OATD) was selected as the source for the collection of data from UK and USA. The data was gathered from the official website of OATD by limiting the search only UK and USA. There are a total of 5031307 thesis and dissertations, out of that 428856 thesis are from UK and 1243207 theses from USA during the period of study (January 2021). The required data was thoroughly analyzed based on the chosen parameters viz; Time series wise, University, Department, Degree, Level, and Language of thesis and dissertations. The data from these repositories were manually collected and tabulated to draw logical findings

Data Analysis and Interpretation

Contribution by Country

Open Access Thesis and Dissertations (OATD) lists 5031307 thesis and dissertations in total contributed by all countries of the world. The majority are contributed by USA (1243207; 24.74

percent) acquired at 1st rank followed by UK (428856; 8.52 percent) at 2nd rank and Canada (418707; 8.32 percent) at 3rd rank respectively as shown in Table 1. The USA and UK together contributed (1243207; 33.26 percent) thesis and dissertations to the total global share of OATD. Brazil is also the main contributor of thesis with (390399; 7.75 percent) occupied at 4th rank and the least number of thesis is contributed (2.65%) occupied at 10th rank in the top 10 productive country list. The other countries beyond the top 10 list contributed (1255508; 24.95 percent) thesis to the total share of OATD. However, the present study confirms that the USA and UK is the top contributor in terms of a number of thesis and dissertations in the OATD.

TABLE I COUNTRY-WISE NUMBER OF OATDS

Country	No.	Percentage
USA	1243207	24.74
UK	428856	8.52
Canada	418707	8.32
Brazil	390399	7.75
Sweden	282855	5.62
Finland	256561	5.09
Japan	256467	5.09
Netherlands	206128	4.10
Portugal	159079	3.16
Germany	133540	2.65
Other Countries	1255508	24.95
Total	5031307	100

TABLE II LANGUAGE WISE NUMBER OF OATDS

Languages	No.	Percentage
English	2124211	42.21
Portuguese	415219	8.25
Finnish	186322	3.70
Swedish	186311	3.70
Japanese	153014	3.04
Spanish	150161	2.98
French	148178	2.94
German	103389	2.05
Czech	54338	1.07
Hungarian	46114	0.91
Other Languages	1464050	29.09
Total	5031307	100

Contribution by Language

The OATDs are predominantly available by all types of languages in the world, the maximum thesis and dissertations are contributed in English (2124211; 42.21 percent) thesis rank at 1st followed by Portuguese (415219; 8.25 percent) thesis rank at 2nd, Finnish (186322; 3.70 percent) and (186311; 3.70 percent) thesis, both acquired at 3rd spot respectively. The other languages like Japanese, Spanish, French, German, Czech and Hungarian collectively contribute (12.99 percent) thesis and dissertations to the total language share of OATD.

Time Period Contribution towards OATD

USA has more open access thesis and dissertations than UK. However, majority of thesis from both UK (30.14 percent) and USA (30.36 percent) belong to the period of 2011-2015 followed by (19.85 percent) from UK and (18.52 percent) thesis belong to 2016- 2020 and (15.50 percent) from UK and (18.801 percent) belong 2006-2010 respectively as shown in Table 3. It is found that the majority of the thesis and dissertations from both the countries belong to the period of 2006-2010, 2011-2015 and 2016-2020. Furthermore, (3.74 percent) thesis from USA belong to 1971 - 1975 as compared to UK (2.48 percent) thesis followed by (3.52 percent) thesis from USA belongs to 1976-1980 as compared to UK (2.95 percent) thesis and (3.68 percent) thesis belong to period 1981-1985 as compared to (3.40 percent) thesis. It is observed that USA contributed more number of thesis and dissertations as compared to USA during these periods.

TABLE III TIME SERIES WISE CONTRIBUTION OF OATDS

Time-Period	UK		USA	
	No.	Percentage	No.	Percentage
1971-1975	10673	2.48	46534	3.74
1976-1980	12655	2.95	43796	3.52
1981-1985	14602	3.40	45774	3.68
1986-1990	19902	4.64	52321	4.20
1991-1995	22911	5.34	61930	4.98
1996-2000	30454	7.10	64329	5.17
2001-2005	36748	8.56	96804	7.78
2006-2010	66492	15.50	223941	18.01
2011-2015	129258	30.14	377534	30.36
2016-2020	85161	19.85	230244	18.52
Total	428856	100	1243207	100

University wise Contribution towards OATD

The thesis and dissertations are contributed by prestigious institutions of UK and USA, out of the total 428856 thesis and dissertations from UK, (29124;6.79 percent) thesis contribute from University of Glasgow followed by (27006;6.29 percent) contributed from University of Edinburgh and (19233;4.48 percent) thesis from Durham University respectively. The other important institutions like Imperial College London which form (17774;4.14 percent) to the total count followed by University of Manchester that contribute (15012; 3.50) and University of Leicester that contribute (14504;3.038 percent) to the total thesis and dissertation share from UK. The remaining institutions beyond the top 10 list count (258239; 60.21 percent) to the total number of thesis from UKs far as USA is concerned, it is evident from the Table 4 that majority of the thesis and dissertations with (53474;4.30 percent) contribute from MIT followed by Ohio

State University with (51603;4.15 percent) thesis and Michigan State University with (43316;3.48 percent) thesis respectively. The other institutions like Texas A&M University, University of Arizona, Virginia Tech, Navel Postgraduate School, University of Florida, Oklahoma State University and Iowa State University contribute (17.3 percent) to the total share of thesis and dissertation from USA. Meanwhile, remaining institutions outside the top ten list contribute (879150; 70.71 percent) to the total collection of OATD from USA. The fact from this finding reveals that institutions from UK contribute more as compared to USA in terms of a number of thesis and dissertations.

TABLE IV UNIVERSITY WISE CONTRIBUTION OF OATD

Universities	UK		Universities	USA	
	No.	Percentage		No.	Percentage
University of Glasgow	29124	6.79	MIT	53474	4.30
University of Edinburgh	27006	6.29	Ohio State University	51603	4.15
Durham University	19233	4.48	Michigan State University	43316	3.48
Imperial College London	17774	4.14	Texas A&M University	34134	2.74
University of Manchester	15012	3.50	University of Arizona	33875	2.72
University of Leicester	14504	3.38	Virginia Tech	33667	2.70
Loughborough University	13309	3.10	Navel Postgraduate School	32053	2.57
University of Birmingham	12497	2.91	University of Florida	28370	2.28
University of College London	11345	2.64	Oklahoma State University	26975	2.16
University of Sheffield	10813	2.52	Iowa State University	26590	2.13
Other Universities	258239	60.21	Other Universities	879150	70.71
Total	428856	100		1243207	100

Department wise Contributions towards OATD

The OATD accept thesis and dissertations from various departments and faculties. However, the different departments from UK contribute less than one percent to the total share of thesis from UK. As far as the USA is concerned, the majority of the thesis contribute from Graduate school (26840;2.15 percent) followed by Psychology with (22745; 1.82 percent) and Mechanical Engineering with (22322;1.49 percent) to the total share. The other departments that rank between 4th to 10th contribute less than (7.63 percent) to the total count of thesis and dissertations from USA.

Degree wise Contribution towards OATD

UK contributes 428856 thesis and dissertations in which (294414;68.65 percent) are Ph.D thesis and (6171;1.43%) are Thesis (M.D). The other degree like Thesis (Clinical Psychology), Thesis (EdD), Thesis (DBA), Thesis (M.S), Thesis (D. Prof.), Thesis (Eng.D), Thesis(D. Psychology), Thesis (D.Ss) and Thesis (D.Litt.) contribute (2.18 percent) to the total thesis output share from UK. Whereas, majority of thesis from USA (359646;28.92 percent) are Ph.D thesis followed by MS (216438;17.40 percent) and MA (80503;6.47 percent) respectively. The other degrees that contribute less than one percent each to the total output share from USA.

TABLE V DEPARTMENT WISE CONTRIBUTION TOWARDS OATDS

Departments	UK		Departments	USA	
	No.	Percentage		No.	Percentage
Department not mentioned	2060	< 1	Graduate School	26840	2.15
College of Engineering &Physical Sciences	1860	< 1	Psychology	22745	1.82
College of Arts & Law	1211	< 1	Mechanical Engineering	22322	1.79
College of Life & Environmental Sciences	1155	< 1	Chemistry	18109	1.45
College of Medical & Dental Sciences	966	< 1	Education	14879	1.19
College of Social Sciences	855	< 1	Electrical Engineering	14006	1.12
Department of Chemistry	600	< 1	English	13261	1.06
School of Education	463	< 1	Computer Science	12896	1.03
Department of Physics	366	< 1	Physics	11538	0.92
School of Natural Sciences	338	< 1	Electrical & Computer Engineering	10810	0.86

TABLE VI DEGREE WISE CONTRIBUTION TOWARDS OATDS

Degrees	UK		Degrees	USA	
	No.	Percentage		No.	Percentage
Ph.D	294414	68.65	Ph.D	359646	28.92
Thesis (M.D)	6171	1.43	MS	216438	17.40
Thesis (Clinical Psychology)	3180	0.74	MA	80503	6.47
Thesis (EdD)	2599	0.60	EdD	12123	0.97
Thesis (DBA)	852	0.19	MFA	6752	0.54
Thesis (M.S)	578	0.13	MED	6405	0.51
Thesis (D. Prof.)	542	0.12	M. Arch.	4667	0.37
Thesis (Eng.D)	532	0.12	MFA	4055	0.32
Thesis(D. Psychology)	443	0.10	M. Eng.	3602	0.28
Thesis (D.Ss)	425	0.09	MSW	3047	0.24
Thesis (D.Litt.)	410	0.09	DMA	3039	0.24

Level wise Contribution towards OATD

The majority of the thesis and dissertations from UK are Doctoral (361065;84.19 percent) followed by Maters(general) (28227;6.58 percent) and Masters in Philosophy (14924;3.47 percent) respectively. The other level Maters (Medical Science), Masters (Science) and Student thesis contribute just meager percentage (5.72 percent) to the total UK share. It is also evident from Table 7 that in USA also majority of the thesis are Doctoral (449619;36.16 percent) followed by Masters (413283;33.24 percent) and Thesis (353888;28.46 percent) respectively. About (97.86 percent) of the thesis are contributed by these three degree levels. The remaining levels including

Dissertation, Project, Project/Capstone, Open Access, Restricted Thesis and Honors College Thesis contribute (2.14 percent) to the total thesis share from USA

TABLE VII LEVEL WISE CONTRIBUTION TOWARDS OATDS

Level	UK		Level	USA	
	No.	Percentage		No.	Percentage
Doctoral	361065	84.19	Doctoral	449619	36.16
Maters (general)	28227	6.58	Masters	413283	33.24
Masters in Philosophy	14924	3.47	Thesis	353888	28.46
Maters (Medical Science)	11042	2.57	Dissertation	15248	1.22
Masters (Science)	10030	2.33	Project	2403	0.19
Student thesis	3548	0.82	Project/Capstone	794	0.06
			Open Access	790	0.06
			Restricted Thesis	773	0.06
			Honors College Thesis	293	0.02
Total	428856	100	Total	1243207	100

Language wise Contribution towards OATD

The OATD has thesis and dissertations in different languages. However, UK accept thesis only in two languages only English (420930;98.15 percent) and Welsh (7926;1.85 percent) whereas thesis from USA accepts content in 11 languages including English (858162;69.03 percent) followed by German (370397; 29.70 percent), Spanish (11707;0.94 percent) and French (2364;0.10 percent) respectively. The other languages include Chinese, Castilian, Italian, Portuguese, Spanish English, Latin and French English that contribute less than 0.01 percent share to the total. The linguistic analysis shows that English is the dominant language in both countries because English is their official language in their educational system.

TABLE VIII LANGUAGE WISE CONTRIBUTION TOWARDS OATDS

Languages	UK		Languages	USA	
	No.	Percentage		No.	Percentage
English	420930	98.15	English	858162	69.03
Welsh	7926	1.85	German	370397	29.70
			Spanish	11707	0.94
			French	2364	0.10
			Chinese	60	<0.01
			Castilian	37	<0.01
			Italian	34	<0.01
			Portuguese	26	<0.01
			Spanish English	21	<0.01
			Latin	18	<0.01
			French English	12	<0.01
Total	428856	100	Total	1243207	100

Conclusion

Open access momentum is gaining reputation day by day as the large number of thesis and dissertations are added to Open Access Thesis and Dissertations (OATD) at global level. The study attempted to analyze the various parameters of open access thesis and dissertations of two developed nations, i.e. USA and UK. The results of the study revealed that majority of the contribution of OATD come from USA (24.74%) followed by UK (8.52%) and Canada (8.32%) respectively. As far as linguistic analysis is concerned, English being as international language emerges out to be the most dominating language by majority of the thesis and dissertations. As time period study shows that majority of the thesis and dissertations from both USA (30.36%) and UK (30.145) are published between the period of 2011-2015. The institution wise contribution depicts that top contributing institutions from UK are University of Glasgow, University of Edinburgh and Durham University; while as top contributing institutions from USA are MIT followed by Ohio State University and Michigan University. It was also found that majority of the OATDs from both USA and UK are published for the sake of Ph. D degree.

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