Theme IV: Environment Friendly Library

How Technology Friendly are the College Libraries affiliated to Karnataka State Women's University, Vijayapura, Karnataka

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Abstract: The article identifies the availability and adoption of technology particularly ICT in various library operations and services based on a study of 117 women's college libraries affiliated to Karnataka State Women's University, Vijayapura. It also discusses various contemporary issues that are related to the issue of technology – inherent problems associated with the characteristics of colleges, strength of students, location of libraries, human resources issues, financial resources, information resources, user services, Information Literacy and open access and consortia issues. Observes that the role of first grade colleges is changing considerably over the last few years, to reflect changes in the nature of higher education and bring an increase in the GER of higher education. Also observes the very slow pace in the adoption of ICT by the college libraries. Concludes that the concern for libraries of these days should be to use technology to redefine the role of libraries in reaching out the right information to the right user at a right time and aim at addressing the issues.

Keywords: College Libraries, Women's Colleges, Karnataka State Women's University, Vijayapura, Technology, ICT

1. Introduction

Technology's impact can be seen everywhere. There is nothing left on the world which has not been influenced by the technology. Libraries are no exception to this. Since 1930's libraries worldwide have witnessed the emergence and application of technology in the library operations and services. Libraries are undergoing a major transformation due to technology induced changes and there is a necessity to incorporate these technologies in the libraries as advocated by fifth law of library science. Academic libraries in general and college libraries in particular are considered as heart of colleges, core to the academic activities of the colleges, the treasure houses of books and knowledge which are open for academicians and students round the clock, most sparkling places on the campus providing a safe, comfortable and friendly environment that enables learning and advancement of knowledge and promotes discovery and scholarship.

Present day college libraries are hybrid libraries facilitating creation of new knowledge through acquisition, organization and dissemination of knowledge resources and providing for value added services both in print and digital format. These occupy a place of pride and are an essential component of the institute's quality outstanding research and education mission. Kumbhar finds that academic libraries though are responding to the emerging trends as identified by The New Media Consortium (NMC) Horizon Report 2014 in higher education through innovative practices and services, there is still scope for the academic libraries to improve their role in the changing higher education scenario and to prove their

value. But the women's college libraries are at crossroads and in transformation status. The question is to what extent the college libraries have incorporated technology into their premises. An effort is made in this paper to know how technology friendly are our college libraries based on a survey of 117 affiliated colleges of Karnataka State Women's University Vijayapura.

Karnataka State Women's University, Vijayapura (Formerly Bijapur) is the only women's university in the state of Karnataka and the sixth in the country. The university was established in 2003 to overcome the regional imbalances and increase GER in higher education of the region with a vision of empowerment of women through higher education. This is one of the most backward areas of Karnataka. The women in this region are one the most deprived population. This socio-economic backwardness of women is having a visible impact on the society. The human development indices (HDI) and GER in general and GER in higher education in particular in Vijayapura and surrounding districts whose women's colleges are affiliated to the Karnataka State Women's University are very poor. Its jurisdiction extends over 13 districts of north Karnataka namely Bidar, Kalaburgi (Formerly Gulbarga), Yadagir, Raichur, Bellary, Koppal, Haveri, Gadag, Dharwad, Uttara Kannada, Belagavi (Formerly Belgaum), Bagalkot and Vijayapura (Formerly Bijapur). The University has as its vision, the empowerment of women through higher education. The university has as its mission, making higher education more accessible and affordable for women particularly from rural and backward regions of North Karnataka. A historical decision has been taken by the Government of Karnataka to extend the jurisdiction of the university to the entire state and the act has been amended recently to this effect.

2. Review of literature

From the literature search it is found that very few studies have been reported. Maheswarappa and Tadasad had examined the extent of availability and use of computers based on a study of 571 college libraries in Karnataka state and found that only 121 colleges had computers in 1990s, of which only 45 colleges were using computers for library activities and only 14 college libraries mainly health sciences and engineering college libraries were using the computer readable databases. Lohar and Kumbar based on a study of 30 degree college libraries in Shimoga district of Karnataka state found that these college libraries did not meet the prescribed norms in general and ICT infrastructure in particular. Singh and Singh found that status of the college libraries in Punjab and union territory of Chandigarh with special reference to the application of information technology varied from college to college depending upon their support systems. All types of colleges had started incorporating information technology (IT) to library services, but Government aided private colleges were at the advanced stage of IT application. Bansode and Periera found that majority of the college libraries in Goa did not have qualified librarians and the status of colleges in the state was not promising.

Rani noted that minority degree college libraries in Andhra Pradesh struggled to establish, promote, and maintain a range of quality services that support the colleges, mission and goals in accordance with NAAC requirements. Mondal and Bandyopadhyay had identified that application of information and communication technologies in academic institutions in

West Bengal though has increased in the recent years, the computerization work of general degree college libraries of Burdwan Sadar (North and South) was very slow particularly in Government-aided general degree college libraries. Kumar and Biradar based on a survey of 31 college libraries in Karnataka, found that application of ICT has not reached a very high level due to lack of budget, lack of manpower, lack of skilled staff and lack of training. Lohar and Papanna described the status of 10 first grade college libraries in Chitradurga and Challakere town of Karnataka and observed that none of the first grade college libraries had automated/digitized their library services.

3. Results and Discussion

3.1 Characteristics of colleges

There are 117 colleges under the jurisdiction of Karnataka State Women's University at present (Table-1). 48.7% of colleges (N=57) have been located in the district headquarters of north Karnataka, while 34.2% of colleges (N=40) have been located in the taluka headquarters and the remaining 17.1% of colleges (N=20) are located in big villages/small townships of the region. More than three fourth of colleges are un-aided in nature (75.2%, N=88) while 12% of colleges are aided (N=14) and another 12.8% (N-15) of colleges are Government colleges. 82.1% of colleges (N= 96) have temporary affiliation to the university while 17.9% (N=21) have permanent affiliation. 94.02% (N=110) colleges offer purely undergraduates courses while 5.98% (N=7) colleges offer undergraduate and post graduate courses.   20.5% of colleges (N=24) have been recognized by UGC under 2(f) and 12 (B) while 2.6% (N=3) have been recognized under 2 (f) only. A greater majority of colleges (76.9%, N=90) have neither been recognized under 2 (f) nor under 12 (B). That means only 20.5% of colleges are (N=24) eligible to receive financial assistance from UGC. 12.8% of colleges (N=15) have been accredited by NAAC while 87.2% of colleges (N=102) have not been accredited at all. A majority of colleges are less than 5 years old (44.4%, N=52) while 22.2% of colleges are less than 10 years old (N=26). 12% of colleges are less than 20 years old (N=14) and 21.4% of colleges (N=25) are more than 20 years old. Nearly three-fourth of colleges offer arts, science and commerce courses (74.36%, N= 87) while 18.8% of colleges (N=22) offer B Ed courses. 6.84% (N=8) of colleges offer other courses like BBA/BBM, BCA, BSW, BFT, etc. Nearly half of colleges (49.57%, N= 58) offer single courses. These statistical figures depict varied picture of women's degree colleges and indicate many divides rural-urban, Govt- aided- unaided, very old- old- new- very new, purely UG-UG and PG courses are some of the divides. As such they have their own inherent problems which also reflect in the libraries.
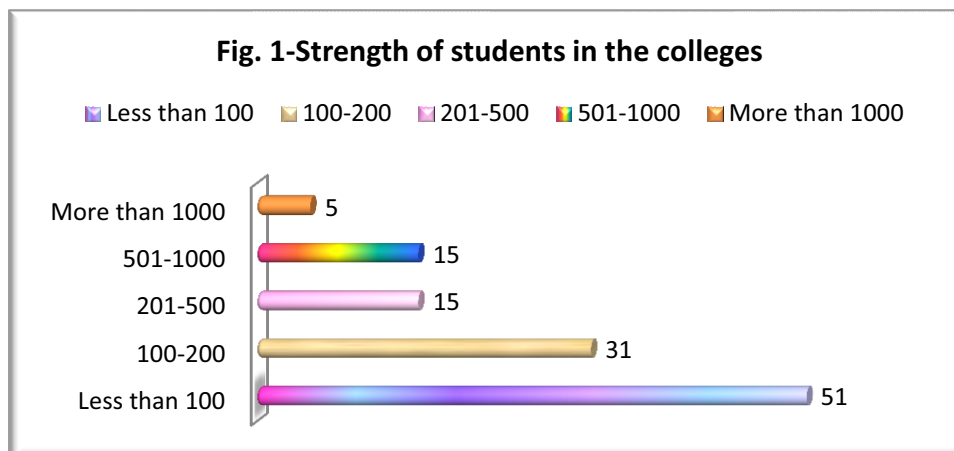
Table 1: Characteristics of Colleges (N= 117)

Characteristics	Number	Percentage
Location		
District Headquarter	57	48.7
Taluka Headquarter	40	34.2
Big villages/Small townships	20	17.1
Type of colleges		

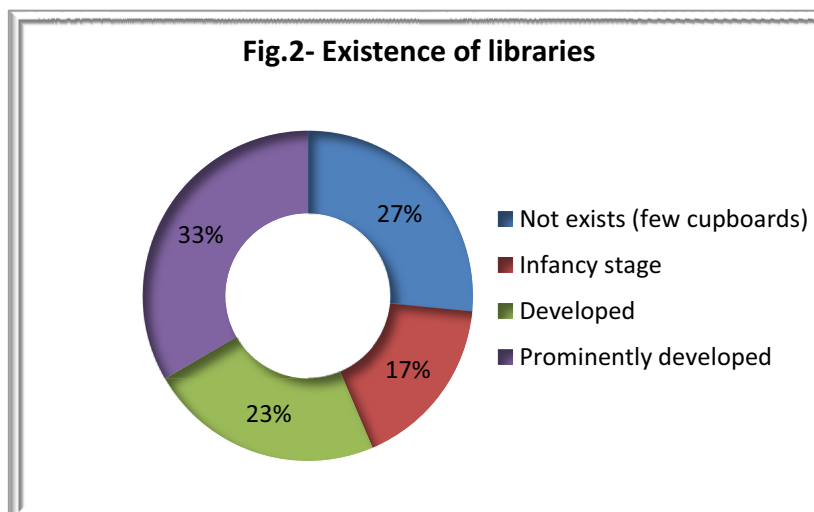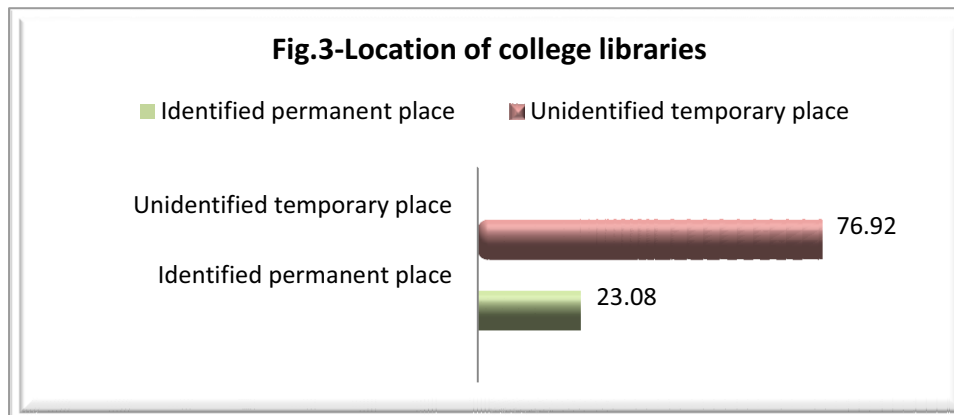|		
Un-aided	88	75.2
Aided	14	12.00
Government	15	12.8
Nature of affiliation		
Temporary	96	82.1
Permanent	21	17.9
Programmes offered		
UG only	110	94.02
UG and PG	7	5.98
UGC recognition Under section		
2 (f)	3	2.6
2 (f) and 12 (B)	24	20.5
No	90	76.9
NAAC Accreditation		
Yes	15	12.8
No	102	87.2
Age of the college		
Less than 5 years	52	44.4
5-10 years	26	22.2
11-20 years	14	12.00
More than 20 years	25	21.4
Courses offered		
Arts, Science and Commerce	87	74.36
Education	22	18.8
BBA/BBM/BCA/BSW/BFT	8	6.84
Number of courses		
Single	58	49.57
Multiple	59	50.43

3.2 . Strength of the Students

26682 women students are pursuing 10 UG courses and 380 women students are pursuing PG courses in 7 colleges (Fig 1). The student strength (taking together all active semesters) ranges between few tens to thousand five hundred. The total strength is less than 100 in 43.58% (N=51) of colleges while it ranges between 100 to 200 in 26.5% (N=31) and the strength is between 201 to 500 in 12.82% (N=15) of colleges. Another 12.82% (N=15) of colleges have a student strength ranging between 501 and 1000 (N=15). Only 5.12% (N=5) of colleges have student strength of more than 1000 students. This is a major issue because students are the cause for which libraries exist. The libraries have to cater to the needs of such a small number of user communities in a majority of libraries and there are very few colleges that have to support a large number of students.

Fig. 1-Strength of students in the colleges

Less than 100   100-200   201-500   501-1000   More than 1000

More than 1000	5
501-1000	15
201-500	15
100-200	31
Less than 100	51

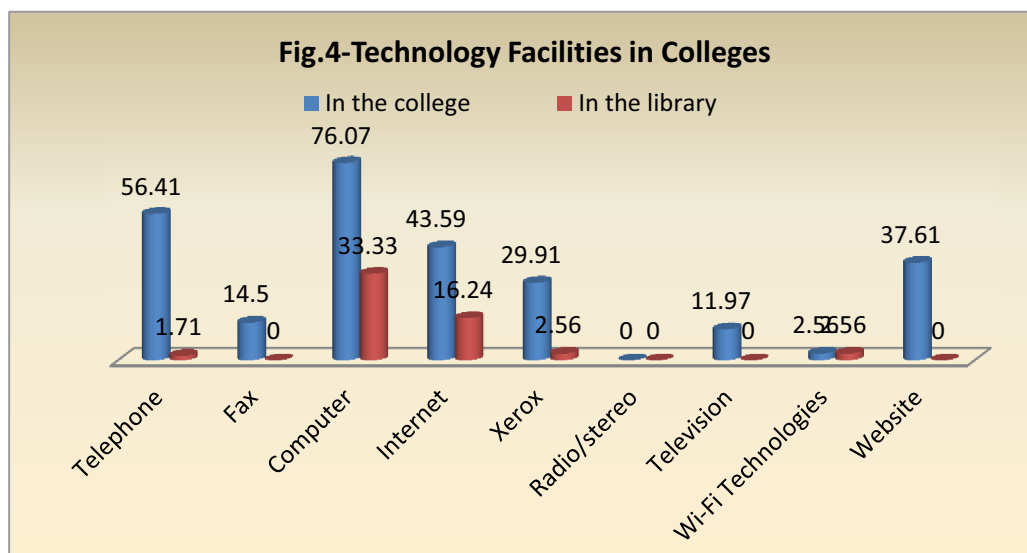## 3.3 The very existence of libraries

In more than a quarter of colleges affiliated to Women's university, (Fig 2) libraries are almost non-existent (26.5%, N=31) with one or two cupboards of books in the office rooms and in 17.09% of (N=20) colleges their existence can be seen though many of them are in the infancy stage. College libraries are well developed in 23.08% of colleges (N=27), while the visibility of libraries as a social place is prominent in the remaining (N=39) one third of colleges. Their present location is not their permanent location as they are housed as part of the main building or part of some other adjacent buildings (Fig 3). Hardly 23.08% of colleges (N=27) have their libraries in an identified permanent place while other colleges still have not made any permanent solutions to the problem. This has an impact on the libraries to create technology related infrastructure in non-permanent places.

Fig.2- Existence of libraries

27%
33%
17%
23%

■ Not exists (few cupboards)
■ Infancy stage
■ Developed
■ Prominently developed

Fig.3-Location of college libraries

■ Identified permanent place   ▧ Unidentified temporary place

Unidentified temporary place ——————————————— 76.92

Identified permanent place ——— 23.08

3.4 Technology

It can be observed (Fig 4) that though landline telephones can be found in more than half of women's colleges (N=56.41%), its availability in the libraries is hardly in 1.71% (N=2) of colleges. Though 14.53% of colleges have Fax machines, none of the libraries has it. More than three fourth (76.07%) of college have computers but availability of computers in libraries is found to be in one third of them (N=39). Internet has found place in 43.59% of colleges but their presence is also found in only 16.24% of college libraries. Xerox facility is available in 29.91% of colleges where as they are in use in hardly 2.56% of college libraries. 37.61% of colleges claim of having their own websites (N=44) but on personal visit it is found that either these are non-functional or not updated. These have been created by the colleges as it was necessary to upload DCF data of colleges on AISHE website. Again no library has its own website.

Fig.4-Technology Facilities in Colleges

■ In the college   ■ In the library

Telephone: 56.41, 1.71
Fax: 14.5, 0
Computer: 76.07, 33.33
Internet: 43.59, 16.24
Xerox: 29.91, 2.56
Radio/stereo: 0, 0
Television: 11.97, 0
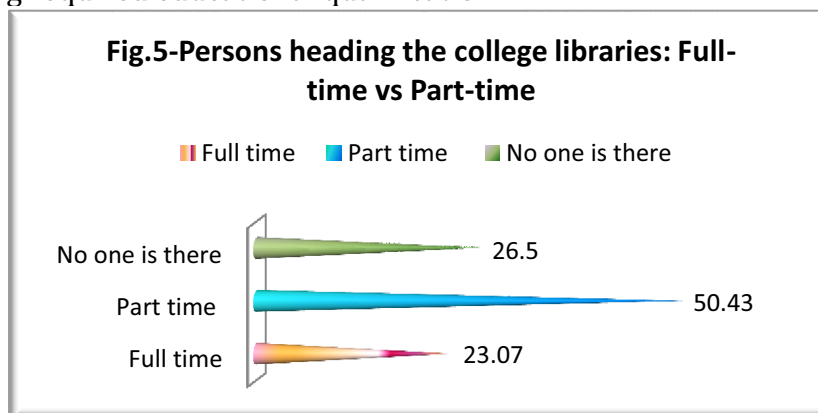Wi-Fi Technologies: 2.56, 2.56
Website: 37.61, 0

None of the colleges and their libraries has radio/stereo while televisions are available in 11.97% of colleges but surprisingly televisions are not part of any college library. A small percentage of colleges have wi-fi connectivity including their libraries. It is also observed that though one third of college libraries possess computers these are basically used for
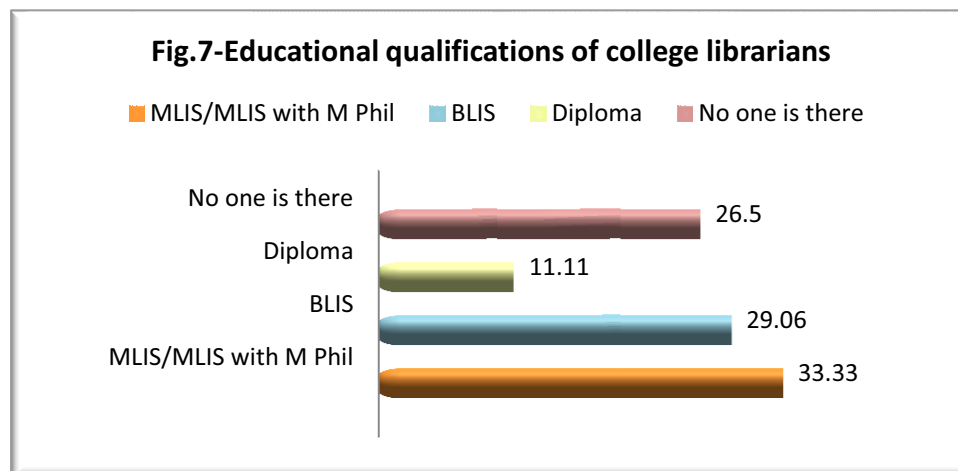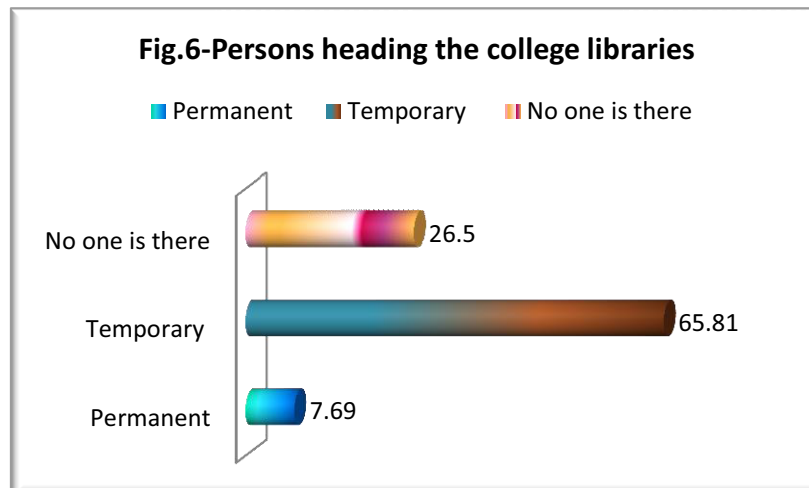
administrative purposes except in those 17.95% of college libraries (N=21) that have automated their libraries. Xerox facilities are also used in all the colleges for college administration purpose only. These are not used to provide photocopy services. Lack of staff and maintenance are the causes. The college libraries that have automated their operations (17.95%, N=21) are using various Integrated Library Softwares – E-Lib being the major ILMS used in 12.82% of college libraries (N=15). NIC- E-Granthalaya and NewGenLib are the other two ILMS which are used in the college libraries. Another 5.98% of college libraries (N=7) have planned to automate their library operations within a year. But the cause of worry is that they lack uniformity as they are using different packages. Lack of cooperation in exchange of resources or resource sharing activity among the libraries may also cause damages. Few individuals have also taken lead to digitize and create their institutional repositories. In a nutshell good infrastructural facilities are lacking in many libraries. Open access and consortia are again much debated topics but less practiced ones. Subscription to N-List through UGC-Infonet is the only means of e-resources collection, but its' utilization is unsatisfactory and as such many of the colleges have not renewed the facility. The impact of this consortium on e-resources collection development and also on print collection is yet to be analyzed by individual libraries. The same also holds well with open access. In the years to come open access sources will play a vital role as sources of information and that it is expected of LIS professionals to devise proper strategies to manage open access resources. More ever, the utility of mobile technologies, social networking and e- learning technologies have not been found in any of the women's college libraries.

3.5 Human Resources:

A larger majority of women's college libraries are managed by part time professionals. More than half of the librarians are part-timers. 23.07% of women's college libraries (N=27) are managed by full-time professionals (Fig 5) of which 7.69% (N=9) of them are permanent staff while two third are managed by temporary staff (N=77) in nature (Fig 6). There are at least 26.5% (N=31) colleges which do not have anyone to take care of libraries either professional or semi-professional or non-professional. One third of college librarians possess MLIS (N=39) and show interest in introducing technology into the library (Fig 7). Under the circumstances one cannot expect enthusiasm towards ICT from temporary, part-times not having required educational qualification.

Fig.5-Persons heading the college libraries: Full-time vs Part-time

■ Full time   ■ Part time   ■ No one is there

No one is there — 26.5

Part time — 50.43

Full time — 23.07

Fig.6-Persons heading the college libraries

■ Permanent   ■ Temporary   ▯ No one is there

No one is there — 26.5

Temporary — 65.81

Permanent — 7.69

Fig.7-Educational qualifications of college librarians

■ MLIS/MLIS with M Phil   ■ BLIS   ▯ Diploma   ■ No one is there

No one is there — 26.5

Diploma — 11.11

BLIS — 29.06

MLIS/MLIS with M Phil — 33.33

3.6 Financial Resources

Limited financial resources in all women's college libraries is another major worry as a large number of colleges are unaided/self financed. With very limited or totally meager funding how one can expect the library to be a technology friendly state-of-the –art library. The sources of library finance are very limited with library fees being the major source in a majority of college libraries. No budgetary provisions are made for earmarking expenditure on technology. If the women's college libraries do not plan well for generating financial resources it really becomes very difficult in the years to come to manage the libraries and introduce technology in the libraries.

3.7 Information Resources

Women's college libraries are totally print dominated. Book collection is a major collection among all the libraries. Periodicals collection is totally negligible. These libraries subscribe general magazines. Not a single library has e-resources in its collection acquired by means of purchase, based on user demand except those that have been received as complimentary CDs along with books. 16.24% (N=19) of colleges are subscribing to UGC-N-List. Few

enthusiastic librarians on their own help the students to get some material from Internet on demand. Even the print collection is a cause of worry as the size is far from satisfactory – less than 1000 books in 30.77% of women's college libraries (N=37). It is not known how women's college librarians will balance the print collection with that of e-resources in the years to come. The other issue includes the mode of book acquisition. Again there is no involvement of technology and it is done in the most traditional way – direct purchase from the book seller. The Government colleges on the other hand (12.8%, N=15) invite e-tenders through Karnataka e-portal and this is the only example of use of technology in the Government colleges. Colleges that have automated their operations using E-Lib ILMS claim that acquisition process is also automated. However it is not so, as they enter the data after the process to generate reports.

3.8 User services including support services

The women's college libraries have not gone beyond book circulation services. 17.95% (N=21) of college libraries have automated their library operations from acquisitions to circulation to serials control to financial management. Though these libraries claim fully automated, these have semi-automated their operations. A significant number of college libraries still have problems in retrospective conversion (12.82%, N=15) and having an up-to-date OPAC. More than one fifth of women's college libraries do classify and catalogue the books using classification schedule and catalogue code (21.37%, N=25). A small number of colleges that have automated the library operations (5.98%, N= 7) maintain OPAC's up-to-date and in some cases the OPACs are not functional and no library had put its OPAC on the web. It's really a matter of worry. Lack of uniformity in the bibliographic formats used and bibliographic information provided in individual library's databases is a major worry as it may affect resource sharing. Another matter of concern is that OPAC's are used negligibly by the user community.

The remaining colleges still follow manual circulation system for charging and discharging process. Though the college librarians' claim of providing reference service it is done manually with no evidence of use of technology is found in any of the colleges under study. One thing is evident that there is a growing willingness of the librarians to share the resources and services through network systems and automate the library operations. But the major question that remains unanswered is the extent of availability of adequate ICT infrastructure in the libraries.

3.9 Information Literacy

Very few individual librarians are conducting information literacy programmes in the women's college libraries. These are isolated examples of success stories. But again there is no use of technology and the whole process can best be described as 'user orientation'. In no way it can be called either information literacy programme or user education.

3.10 Attitude of the authorities

At the outset, this a major cause for the slow pace of technology introduction in the colleges as a majority of colleges are unaided. Whenever the question arises of bringing technology into the libraries, it is the authority's apathy towards libraries that has made the situation very grim. They do not encourage the library staff by saying "There are no complaints from students, It's going on. So continue with the existing". As far as aided and Government colleges are concerned authority's stress on library staff to find relevant schemes from UGC and other funding agencies to introduce technology into the libraries. But the same authorities show lot of enthusiasm if they have to go for NAAC accreditation. A best example for this: 96% of our affiliated colleges have filled the DCF data onto the AISHE website of MHRD, GOI as it was made mandatory.

4. Conclusion

The role of first grade colleges is changing considerably over the last few years, to reflect changes in the nature of higher education and bring an increase in the GER of higher education. Towards this end the importance and the central role of the library has not recognized by the authorities except those colleges that have got NAAC accreditation or that are planning for it in the years to come. The very nature of affiliated colleges – a majority of them are temporarily affiliated, un-aided, located in taluka headquarters/big villages/small townships, not recognized by UGC under 2 (f) or 12 (B), offer single courses mostly B Ed or BA affirms the fact that they do not require technology. Added to this is the low student strength in a significant number of colleges.

In a nutshell the college libraries are very slow in the adoption of ICT due to lack of qualified permanent librarians, lack of budget, lack of skilled staff and lack of training, and lack willingness of the authorities. In spite of all these impediments there is a brighter part as a significant number of colleges have gone for automation and have provided space for Internet in the libraries. There are many issues which need to be addressed with due emphasis. Hence the concern for libraries of these days should be to use technology to redefine the role of libraries in reaching out the right information to the right user at a right time and aim at addressing the issues.

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About Author

Prof P G Tadasad, presently working as Professor and Chairman in the Department of Library and Information Science, Karnataka State Women's University, Vijayapura. He has published 125 research papers and edited 6 books. *8* students have successfully completed their Ph D under his guidance and 8 are presently working under his supervision. He has served the university in various capacities as University Librarian, Director, PME Board and Nodal Officer for the University under NMEICT project. He is the University Nodal Officer of University for RUSA. He is a recipient of AG Motiwale Award for Young Professionals 2002 for Best Paper at 48th All India Library Conference of ILA held at NIMHANS, Bangalore, 2003. His area of interest include: User Studies, Knowledge Organization Systems, Digital Divide and Academic Libraries. He possesses relevant ICT skills, and also sound knowledge of Research Methods

Redesigning Libraries to Handle the Environmental Challenges of the Future: *Green Libraries*

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Abstract: Libraries are the trusted information centres for the community. They are not only repositories of knowledge, but also important information centres for raising awareness about environmental concerns. Green libraries, also known as sustainable libraries, are the libraries built with environmental concerns in mind. They educate the public about environmental issues through their collections, sustainability, environmental friendly facilities, and library programs. The technology used to design green library, should be LEED certified, which means that it must be long-lasting, ecological, energy-water saving, and sustainable. Concept of green libraries is an emerging trend in library buildings, and librarians are becoming more and more interested in making their buildings environment friendly. This paper is an attempt to trace out the importance of green libraries, its features, aim, challenges, benefits and of course bird's-eye view of some green libraries across the world.

Keywords: Sustainability, green buildings, natural resources, environmental issues, renewable energy, LEED (Leadership in Energy & Environmental Design).

1. Introduction

Winston Churchill has rightly said "We shape our buildings and thereafter they shape us". Green libraries are a part of the larger green building movement. They are shaped (designed) in such a way that they minimize the use of energy and water by maximizing the use of natural and renewable resources. Now days, along with Library 2.0**,** green design is an emerging trend as it provides the ground for sustainable communities. Word "sustainability" reciprocities the word 'green'. Sustainably designed libraries are built in such a way that they are, flexible to respond to changing demands of users and provide an environment which is inspiring and safe. So, green libraries are required to promote green concept within the library, curtail energy cost of the library and provide more comfortable reading environment to the users within the library.

2. Green Libraries: Conceptual Framework

There is no clear cut definition of a green library. But there are central themes that run hand in hand with them, minimizing the negative and maximizing the positive effects of the building on the environment. When we talk about green libraries what usually comes in mind are green library buildings. The **Oxford English Dictionary** defines the term "green" as "pertaining to, or supporting environmentalism". According to **Indian Green Building Council (IGBC)** "A green building is one which uses less water, optimizes energy efficiency, conserves natural resources, generates less waste and provides healthier spaces for occupants, as compared to a conventional building." According to **US Green Building Council's LEED performance system**, a green building is one having sustainable site

selection and development, water conservation, energy efficiency, local resources, material conservation, indoor environmental quality and innovative in design. **The California Integrated Waste Management Board** defines a green or sustainable building as "a structure that is designed, built, renovated, operated, or reused in an ecological and resource efficient manner" (California Integrated, 2008). In 1999-2000, American Library Association President **Sarah Ann Long**, initiated a project, entitled "**Libraries build sustainable communities**". According to her, the definition of "**sustainable**" is the use and stewardship of resources today that preserves them for tomorrow, and a sustainable community is one that is healthy and prosperous over the long term.

3. Aim of Green Libraries

Now a day's libraries are undergoing major changes. These changes are, in concept of working, providing information, and identity transformation. Libraries are not only fulfilling their role as information providers but are also becoming sustainable institutions (institutions that are inevitable part of the community of twenty-first century). So, its green design will further help in its growth in the following ways:

- A green and sustainable building gives a clear expression that the library is investing in the future of the community.

- Green and sustainable buildings are smartly designed, aesthetically pleasing, and are powered by state-of-the-art technology. So it will change the concept and mind of public who considered libraries as stereotyped.

- As more and more people are becoming environment friendly, so a green library can improve the image and increase the clients of the library.

- Green libraries can actively educate the community about environmental concerns through their collection development and public programs.

- Green libraries can help in building sustainable communities through economy, ecology, and equity. So they must be thoughtfully designed while taking into consideration structural design, energy use, and human health effects.

4. Need for green libraries

All buildings use resources such as land, water, energy, and materials to fulfill the functional needs of a space. As such, there can be no buildings without environmental impact. A building is green when it is resource-efficient and fulfills the functional requirement of the space with minimum negative impact on the environment over the longest possible time. Since libraries are public buildings meant for the betterment of all, so they have the responsibility to reduce stress on the environment, by creating healthier and resource-efficient buildings. There are several other reasons why libraries want to incorporate green features in their buildings:

- **Affordable cost**: Cost of constructing green buildings have become affordable. It is now possible for libraries to build green buildings on conventional budgets.

- **Conservation of energy**: Most of the readily available energy resources are finite resources. They are indispensable for the health of the planet so it is our moral duty to use these energy sources carefully and reasonably.

- **Reduction of carbon footprints**: The carbon footprint is an important aspect to understand the impact of personal behavior on global warming. So it is important that we reduce the carbon footprint of our buildings.

- **Economic and Environmental factors**: Economic inconsistency, energy evacuation, and planetary decadence are transforming societies and libraries too. So it is right time for librarians to step up and help communities become green and sustainable. The role of the library is to serve its community. So it is the time right time, for librarians to build green and sustainable libraries and support "Green Library Movement".

5. Features of green library

The main aim of the green and sustainable library is to create a building that supports environment and is flexible in its nature. Green library buildings can provide libraries, an opportunity to educate their clients and public regarding clean and green environment. So now a day's trend of green libraries is emerging rapidly. Given below are some of the features of green libraries.

- **Environmentally Sustainable Design:** Green buildings should have environmentally sustainable design (ESD), which means:
  - Reducing energy consumption and its cost
  - Providing a natural environment like natural lighting for users.
  - Passive and active ventilation, heating and cooling.
  - Reduction in water usage

Typically green library buildings use 26% less energy, and emit 33% less greenhouse gases than traditional buildings.

- **Saving of finances and funds:** Libraries are constantly in need of funds and finances, for their development and future existence. Sustainable design can offer libraries a way to reduce maintenance and energy costs, so that they can use these funds in improving their services and collections.
- **Renewable Energy:** Energy (power) can be generated by solar, wind and hydro (water) sources. These renewable efficient energy systems can help in:
  - Cost effectiveness
  - Reducing greenhouse emissions,
  - Decreasing demand on conventional energy resources.

So, a sustainable design having properly designed ventilation systems, climate and temperature controlling systems, energy efficient light fittings and passive heating and cooling can save lots of energy.

6. Challenges of Green libraries

A green and sustainable library comprises of not only redesigning and regeneration of library buildings, but it is also improving day to day functions and procedures of the library. While green buildings are related to the overall green building movement, green libraries have specific needs that raise some extra challenges, which are the following:

- **Environmental preservation of books and other collections**: Books must be kept away from sunlight, moisture and temperature change for their preservation. But some users find sunlight, the most pleasant light for reading. Sunlight also plays a major role in green design, because it is a natural light and can reduce artificial lighting. New developments in glass technology over the past ten years have given librarians much more flexibility to keep their collections of books, journals, magazines protected from direct ultra-violet rays of the sun

- **Books weight**: Another challenge the library faces is the weight of the books. A common strategy in green design is to raise the floors to increase circulation, but the weight of the stacks can be an obstruction in this strategy. To deal with this challenge, many designers have started zoning the library into designated areas; so that some strategies can be enacted in particular areas and alternatives can be used in other areas.

- **Flexibility**: Libraries must be built flexibly, in order to keep pace with expansions in size, for future use. Library buildings are long term investments made to benefit the community, so while designing library buildings architects must keep in mind, the future needs and growth of the library. The special needs of the library must be taken into consideration from the beginning of the construction, so that the effective use of building can be made.

7. Importance of Green and Sustainable Libraries:

Green and sustainable practices are being implemented throughout society. Libraries are also not exempted from these trends, because they are service oriented institutions. Green libraries are gaining attention because of its following benefits:

- Libraries are essential to the communities as librarians have a mandate to ensure access to   economical library services.

- Libraries that demonstrate good stewardship of the resources can build their base (support) in the communities that leads to sustainable funding.

- Scientific community has clearly communicated that current trends in climate change are of great concern to all human beings. So both, the staff and users of library deserve a healthy environment.

- An eco-friendly building saves a substantial amount of money in electric bills.

- Green libraries also improve the productivity of the workforce. Libraries providing more natural light, cleaner air, less-toxic or non-toxic materials, and sustainable

cleaning practices have fewer workers getting sick, which increases reputation and workability of library.

8. Benefits of Green and Sustainable Libraries:

Green libraries are the buildings where user's needs are not only met but fulfilled in such a way that sustains the environment. So its main benefit is to *provide a unique and green environment for reading.* Other benefits of green and sustainable libraries include the following:

- It creates environment-friendly ecological architectural space.

- It upgrades the quality of reading spaces and furniture.

- It increases the number of library users, visitors and their visits.

- It maximizes the effects of natural sun light and natural air flow.

- It attracts experts and scholars from all over the world.

- It increases the visibility of the library and changes the concept of stereotype of library in public's mind.

- It embodies the principles of ecological education so it has become a multi-faceted learning center.

8. Role of libraries in educating public regarding Green environment

- Libraries are associated with reading, learning and discovery process so they can help public to know and share the practices of preserving and sustaining environment. Libraries can use a variety of methods to educate the people about responsible environmental practices. Some of these methods are:

- **Library Programmes:** In order to educate the community about sustainability, libraries can plan and execute programs of inviting guest speakers on various topics like recycling, energy efficiency etc.

- **In-Library Displays & display window:** A library that has successfully implemented green practices and sustainable building design can create displays within the library. These displays will help people to know and understand the sustainable practices employed and their favorable impact on the environment.

- **Book displays:** Organized and attractive book displays are also an excellent way of educating people on sustainability. It is an efficient way to communicate with clients.Creative, inspiring displays of collection like building green homes, water and energy saving, and recycling can inculcate interest and awareness about environmental issues.

9. Examples of Green Libraries
In the last ten years, focus of libraries has shifted to green and sustainable libraries. Many green libraries have been designed and many others were renovated to become green and sustainable buildings. Mentioned below are some green libraries (with birds-eyeview):

- BIBLIO-Centrum: A Green-Roofed Solar-Powered Library for Helsinki's City Center

- Golden Gate Valley Library of San Francisco

- Canada Water Library

- The LEED Gold Anna Centenary Library

10. Panjab University Library is one of the Best example of Green Library in India

It has two readings halls and one Outer Reading Hall for studying personal books. These reading halls mainly rely on day lighting as one wall in these halls, is totally made of glass. This provides natural light and panoramic view of the natural surroundings in these reading halls. Building is centrally air-conditioned and equipped with computer and communication network. Water used in air conditioning of the building is reused in fountains, to keep the surroundings cool and pleasant. A spiral staircase connects all the floors together. Natural light comes to this staircase through the wide windows that run across the wall. The great height, vast open areas, thick walls, wide glass windows, all these are some green gestures that are in built in the building structure of A.C Joshi library. Project of rainwater harvesting has already been started in Panjab University. In future rain water will be preserved and waste water will be reused in gardens and in toilets of Panjab University buildings. Library proposes to use 'green power' or use of solar energy (photovoltaic system) to cover the total energy requirement of the library in future.

11. Conclusion

The concept of "green building" has developed over time. A green library, or sustainable design, is the practice of increasing the efficiency with which buildings use energy, water, and reduce building impacts on human health and the environment. Libraries by their nature are "green" because their resources are shared by the larger community. They (libraries) serve as symbols of the attitudes and values of their creators and also extend those attitudes and values to future generations. Communities with the opportunity to build a new library or update an existing library must inculcate sustainable design measures. Sustainability has many meanings, including preservation of natural resources for the future, living in a carbon-neutral way, and meeting the needs of the community in such a way that the needs of future generations are met accordingly. Librarians should act as role models for sustainability by providing suitable and relevant information related to green issues and concerns. Sustainable strategies should be integrated into library collections, buildings, digitalization, equipments, and library networking services. To remain relevant to the community, and to assure organizational sustainability, librarians must understand, listen to, and develop services that create a better life for their clients.

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Green Library: *A Conceptual Overview*

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Abstract: The "Green Library" is a emerging concept with the mission to save the global environment. Our challenge isn't so much to teach children about the natural world, but to find ways to nurture and sustain the instinctive connection they already carry. The objective of this paper is to provide the state of the art about the concept "Green Libraries". It is introductory paper which put light on the importance of green libraries; indentify the standards for green libraries; to identify the major green library initiative at international and national level. The paper concludes that librarians have to make the public aware about environmental issues and create the practices to exemplify the Green practices.

Keywords: Green library; Sustainable library; Green library standards; LEED; Environmental issues.

1. Introduction

The nature is the most beautiful gift to the mankind. Our survival and quality of life depends on a healthy natural environment. The impact of environment degradation is visible and we are well aware about the term Global Warming and its effect on our ecosystem. We are facing the sudden climate changes and its impact on the health of the human beings. It is the most concerned issue these days. And we should take it as wake up call to safeguard our living system; it is our social responsibility to play its role for the betterment of our environment. "The struggle to save the global environment is in one way much more difficult than the struggle to vanquish Hitler, for this time, the war is with ourselves, we are the enemy, just we have only ourselves as allies"--Al Gore. As library professional, what can we do for our society and especially for our ecosystem? Libraries are lifelong learning centers for people of all ages in local communities. Libraries are not only storehouse of knowledge, but are also important information resources for raising awareness about environmental issues through their collections, sustainable and environmental friendly facilities and public library programs. Among other things, green libraries maximize the effects of natural sun light and natural air flow; green libraries are thoughtfully designed while taking into account site selection to structural design, energy use, materials used and human health effects. Here comes the concept of Green Libraries, which is emerging area in the field of librarianship.

What is Green a library?

A Green library is also known as sustainable library, which is built with environmental concern in mind. Green libraries are a part of the larger green building movement. In the Oxford English Dictionary (1989), the term green is defined as pertaining to or supporting

environmentalism. The term sustainable relates to form of human economic activity and culture that do not lead to environmental degradation, especially avoiding the long term depletion of natural resources. Developing a green building is the practice of creating structures and using processes that are environmentally responsible and resource efficient throughout a building life-cycle from site selection to design, construction, operation, maintenance, renovation and deconstruction. It is important to recognize that the context for sustainability in this discussion extends beyond just developing green or sustainable services as part of the ongoing life cycle of library service. (Genovese&Albanse)

2. Objectives of building green libraries

- To control the pollution and green house gases in the environment.

- To play a proactive role in becoming the planet green.

- To work for the betterment of the mankind.

- To establish a new image of the library in the modern world.

- To bring the concept into mainstream and create awareness about safeguarding the environment.

3. Designing Green Library building

Incorporating "green" element successfully and cost effectively into any project is an art that requires a multi disciplinary, integrated approach for an efficient and successful design process with clear understanding of, not only the operational concerns, but also develop a long term strategic plan for the physical building. The set of design elements has been considered while designing green library building:

- **Site location**: The location of site plays an important role in building eco-friendly green library. The library building should be in east-west location so that proper fresh air ventilation and day sun light reach inside.

- **Water conservation**: Reduce potable water use by considering alternative on-site water sources (for example rainwater, storm water and air conditioner condensate) for custodial uses and toilet flushing, planting native and adaptable vegetation reduces the need for irrigation.

- **Energy conservation**: Energy efficiency is considered by many to be the most important category in becoming sustainable. In the LEED rating system, it is the heaviest weighed of all categories. On site renewable energy systems, including solar, wind and geothermal, provide an independent supply of energy. Natural day light conserves the energy and electricity in the library.

- **Building materials**: The primary responsibility in selecting materials which can be quickly renewable. And that can be made without causing too much damage to the natural environment.

- **Indoor air quality**: Along with energy inefficiency, poor air quality has been another side effect of the post air-conditioning building design. The most modern buildings are designed to be airtight. The air conditioners omit harmful toxins that can do serious damage to respiratory systems. Traditional buildings provide more fresh air outlets and ventilation. Now green buildings designed in a way in which air gets recycled. And it also saves electricity too. Windows opening at the eastern & southern direction ushers natural breeze& sunlight. Indoor plants should be installed in the library premises, it creates a lively environment. There is psychological factor both for the patrons and staff. Working in a building with natural light creates a better and more comfortable work and learning environment. All this results into efficiency and performance of task.

- **Vegetated Green Roof**: It makes convention cooling in the libraries and save electricity.

4. Standards for Green Libraries

- **Indian Green Building Council (IGBC):** Indian green building council established in the year 2001 to promote and rate Green Buildings in India. There are about 2190 registered buildings, 398 rated buildings and also 1082 IGBC aggregated professionals.

- **Leadership in Energy and Environmental Design (LEED-India):** LEED certification is the most widely accepted standard for environmentally friendly building design. Leadership in Energy and Environmental Design (LEED-India) green building rating system is a nationally and internationally accepted benchmark for the design, construction and operation of high performance green buildings. There are four certification levels (certified, silver, gold, platinum) awarded according to achievement as evaluated by points using LEED scorecard.

LEED rate on 100 points and certify the buildings on the followings criteria:
25-40 points as Certified
41-50 points as Silver
51-60 points as Gold
61-80 points as Platinum

LEED-India promotes a whole building approach to sustainability by recognizing performance in the following five key areas namely:
1. Site location
2. Water conservation
3. Energy efficiency
4. Materials
5. Indoor air quality

LEED also uses various categories to judge the buildings sustainability through Design Elements.
In 2004 Fayetteville Public Library, CAR & Semiahm, Branch of Surrey Public library became two of the first LEED Certified library building in North America.

- **Building Research Establishment Environmental Assessment Method (BREAM)** based in the UK from 20 years. It has 5 levels.

- **Green Building Council of Australia (GBCA)** The Green Star System is the most commonly used certification system in Australia which is administered by Green Building Council of Australia. This system is holistic, national and voluntary. Buildings can achieve a maximum of 6 stars. The star system indicates:
    - 4 Star: Best practice in environmentally sustainable design and/ or construction.
    - 5 Star: Australian excellence in environmentally sustainable design
    - 6 Star: World leadership in environmentally sustainable design and/ or construction.

5. Associations working on Green Libraries

The Task Force on the Environment (TFOE) has been working on the greening ALA for almost 20 years. TFOE was established in 1989 in recognition of the 20th anniversary of Earth Day, and is a Social Responsibilities Round Table Task Force. Terry Link was the first TFOE coordinator and a driving force in the creation of the Task Force.

- To make librarians and others more aware of diverse environmental information sources.
- To recognize environmental concerns within libraries and seek solutions to them.

Since 1990, TFOE has hosted a variety of green library programs at ALA conferences. "How Green is Your Library: Environmentalists at work" (1990); "Environmentally and Socially Responsible Business: Finding the information to make the decision to buy or invest" (1996); "Earth day in the 21st Century: Environmental activism, with Denis Hays, Founder of the First Earth Day in 1970" (2001); The first green pre-conference tool place in 2000. ALA hosted a pre-conference titled Libraries Build Sustainable Communities. The program was funded through a grant from the U.S.Agency for International Development and Global Learning of New Jersey. The objective of the pre-conference was "to envision how local libraries as places for public discussion, and an information resource in community decision making. Attending librarians were trained to conduct a workshop that could be replicated at state or regional conferences (Raymer 2001) SLA: Knowledge to go green" initiative implemented at June 2008 Conference. At the SLA Conference sessions were presented on a variety of environmental issues such as renewable resources, sustainability and corporate accountability. In an effort to reduce waste, SLA purchased 3,000 reusable water bottles that were handed out to attendees. In addition, the conference tote bags were made from 65% recycled materials (Davis 2008) . The ACRL Green Conference Committee is committed to reducing the environmental impact of the 2009 National Conference in Seattle, Washington, Conference attendees will be asked to take the ACRL Green Pledge and commit to reducing the meeting's ecological footprint. To help librarians select a green hotel, ACRL created an official list of hotel eco-friendly practices.

- **Eco-friendly Libraries of India:** Traditional library buildings of India itself provide the salient features of Green Libraries. The architecture of antique buildings provides open space and outlets for sunlight.

- **Calcutta University Library**: Calcutta university library is a good example of traditional eco-friendly library. The building carries great heights, vast open areas, thick walls, windows all through the eastern wall are some green gestures. Use of open space and installation of pot plants creates a soothing and eco- friendly environment. The wood is mostly used as material for library furniture, which is bio-degradable and environment friendly.

- **Mumbai University Library**: Library provides vast area of open space for its reader. The heavy wooden furniture mostly with antique values mingles well with the environment. Natural light comes through the wide windows that run through the wall. The electric lights are also used to facilitate reading but not to cause glare.

- **Madras University Library**: There is ample scope for letting in natural air has been provided. Windows are large and too many accelerating both fresh air and sunlight. Enough amount of open space is provided. Sunshades are there outside the windows that prevent the direct sunlight but allow adequate natural lights.

- **Delhi University Library**: The building is naturally cool and pleasant with broad opening for natural light. Dessert coolers are brought used to prevent the excessive heat of the summers. The Khus Khus material is traditionally used as a curtain material that deters heat.

6. **Green library initiative at International level**

- **Seattle Central Library:** The Seattle Central Library designed by Rem Koolhaas opened in May 2004. It uses a number of innovative techniques to achieve the status of a green library. It is located in a dense urban area, accessible by public transportation. It has triple glazed glass, used to reduce heat buildup.

- **National library, Singapore:** The Singapore National Library has been known as the greenest building on the planet, designed by Ken Yeang. It opened in July 2005. It was designed using light shelves that allow the light to filter into library without any negative effects. During the moments that sun is either too bright or not bright enough, sensors are programmed to dim or brighten the lights and raise and lower the shades to maximize comfort and reduce costs.(Anisko& Willoughby,2006)

- **Minneapolis Public Library** : The central branch of the Minneapolis public library system was designed by Cesar Pelli, and it opened in May 2006. The green roof is planted with vegetation that does well in Minnesota harsh climate, and it reduces rainwater runoff, the building's heating and cooling load, the building's heat island effect and adds green space to the downtown cityscape.

- **Public library of Charlotte and Mecklenburg County:** The Joe and Joan Martin Centre is the first public building certified by the US Green Building Council, and was awarded LEED Certification at the Silver level.

- **Children's Museum of Pittsburgh:** The children's Museum of Pittsburg underwent extensive expansion and renovation in 2004 using sustainable techniques and guiding principles thereby earning silver LEED-Certification, one of largest museums in the country to receive the designation, and the first children's museum in America to do so.

7. Green Library Challenges

In the era of information and technology, the image of library comes in our mind is that of fully automated library, which depends on the computer technology for day to day functions; and another picture lies in our mind is of fully air-conditioned, wi fi enabled digital library. The challenge is to make choice between environment friendly libraries or fully air-conditioned automated library. The gases omitted through air condition are dangerous for our health. And the waste comes out of obsolesce of computers and other gadgets also put bad impact on the environment. We have to make use of eco-friendly technology gadgets. But we have to do something to safe guard our environment.

8. Conclusion

All the libraries have the mission, whether it is explicitly stated or not, to improve the condition of mankind. Librarians should act as role models for sustainability by providing suitable and relevant information related to environmental issues and concerns. A library that has successfully implemented green practices and/ or sustainable building design can create displays within the library that help to educate the public about the sustainable strategies employed and their positive impact on the environment. Books displays are also an excellent way of addressing the community on sustainability.

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Green Library: *An Overview*

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Abstract: This paper deals with the concept of Green Library, why Green Libraries are required, available certification programmes for Green Libraries across the globe and its benefits. The paper presents the basic overview about the Green Library.

Keywords: Green Library, Green Building, Sustainable Library, Sustainable Building.

1. Introduction

The Green Library or Sustainable Library is an emerging trend which defines the Library(s) of 21ˢᵗ century. It is the part of Green building movement. The concept of Green Library is design to reduce the harmful impact on the environment and it also improve the environment inside the Library building by means of choosing the appropriate site for constructing Library building, use of natural material and biodegradable products for construction, conservation of resources i.e. water, energy, paper etc. and responsible for recycling of waste materials.

2. Some Certification Programmes for Green Building across the globe

- **BREEAM:** BREEAM stands for Building Research Establishment's Environmental Assessment Method. It was developed in the United Kingdom in 1990.it is one of the earliest building environmental assessment methods. BREEAM covers a range of building types including - offices, homes, industrial units, retail units, and schools. In this certification building is assessed by awarding the points for various criterion and these points are added for a total score. On the bases of scores achieved by the building, overall performance is awarded a 'Pass', 'Good', 'Very Good' or 'Excellent' rating.

BREEAM major categories of criteria for Design and Procurement include the following:

- Management (commissioning period and process adopted, monitoring of commissioning, energy use in site activities, waste management, pollution minimization)

- Health and comfort (adequate ventilation, humidification, presence of controllable blinds, energy efficient lighting, thermal and visual comfort, low noise levels)

- Energy (sub-metering)

- Transport (modes of transport to and from site, alternative transport facilities)

- Water (consumption reduction, metering, leak detection)

- Materials (asbestos mitigation, storage facilities, reuse of structures, specifications of envelope, use of crushed aggregate and sustainable timber)

- Land use (previously used land, use of re mediated contaminated land)

- Ecology (land with low ecological value or minimal change in value, maintaining major ecological systems on the land, minimization of biodiversity impacts)

- Pollution (leak detection systems, on-site treatment, local or renewable energy sources, light pollution design, avoid use of ozone depleting and global warming substances)

- **CASBEE:** CASBEE stands for Comprehensive Assessment System for Building Environmental Efficiency. It was developed in Japan, in 2001. This assessment tools is based on the life cycle of the building and it includes pre-design, new construction, existing buildings, and renovation. CASBEE presents a new concept for assessment that distinguishes environmental load from environmental quality and building performance. Under CASBEE spaces are divided as internal space and external space, the basis of this division is hypothetical boundary, which is defined by the site boundary and other elements, with two factors related to the two spaces, in which the 'negative aspects of environmental impact and 'improving living amenity for the users' are considered side by side.

CASBEE major categories of criteria include

Building Environmental Quality and Performance
- Indoor environment (noise and acoustics, thermal and visual comfort, and indoor air quality)
- Quality of services (functionality and usability, amenities, durability and reliability, flexibility and adaptability)
- Outdoor environment on site (preservation and creation of biotope, townscape and landscape, local characteristic and outdoor amenities)

Building Environmental Loadings
- Energy (Building thermal load, utilization of natural energy, efficiency in building service systems, and efficient operations)
- Resources and materials (water conservation, materials of low environmental loads)
- Off-site environment (air pollution, noise and vibration, odour, sunlight obstruction, light pollution, heat island effect, and load on local infrastructure)

- **GB Tool:** GB Tool stands for Green Building Tool. It was developed by the International Framework Committee for the Green Building Challenge. This is an international project that has involved more than 25 countries since 1998. It

includes criteria in categories such as Site Selection, Project Planning and Development; Environmental Loadings; Energy and Resource Consumption; Indoor Environmental Quality; Functionality; Long-Term Performance; and Social and Economic Aspects. Criteria are assessed using scales that are based on local benchmarks of 'typical' practice. With this tool buildings can score –1 if below typical practice or from +1 to +5, representing good to very high performance.

GB Tool major categories of criteria include the following.

- Resource consumption is assessed through materials use (salvaged, recycled, bio-based and sustainably harvested, locally produced, designed for disassembly, re-use, or recycling) and water use for irrigation, building systems, and occupant use.

- Environmental loadings include GHG emissions, other atmospheric emissions, solid wastes, storm water, waste water, site impacts, and other local and regional impacts.

- Indoor environmental quality is assessed through indoor air quality, ventilation, temperature and relative humidity, daylight and illumination, and noise and acoustics.

- Energy consumption is assessed through total use of non-renewable energy (embodied and operational), electrical demand, usage of renewable energy, and commissioning.

- Other criteria include selection of appropriate site (in terms of land use, brown fields, access to transportation and amenities), project planning, urban design (density, mixed uses, compatibility, native species, and wildlife corridors), building controls, flexibility and adaptability, maintenance of operating performance, and a few social and economic measures.

- **LEED:** LEED stands for "Leadership in Energy and Environmental Design". It was developed and piloted in the United States in 1998 as a consensus-based building rating system based on the use of existing building technology. This rating system addresses specific environmental building related impacts using a whole building environmental performance approach. The following are key components of the LEED system.

    - Sustainable sites (construction related pollution prevention, site development impacts, transportation alternatives, storm water management, heat island effect, and light pollution)

    - Water efficiency (landscaping water use reduction, indoor water use reduction, and waste water management strategies)

    - Energy and atmosphere (commissioning, whole building energy performance optimization, refrigerant management, renewable energy use, and measurement and verification)

- Materials and resources (recycling collection locations, building reuse, construction waste management, and the purchase of regionally manufactured materials, materials with recycled content, rapidly renewable materials, salvaged materials, and FSC certified wood products)

- Indoor environmental quality (environmental tobacco smoke control, outdoor air delivery monitoring, increased ventilation, construction indoor air quality, use low emitting materials, source control, and controllability of thermal and lighting systems)

- Innovation and design process (LEED accredited professional, and innovative strategies for sustainable design)

There are four levels of LEED certification - the number of points a project earns determines the level of LEED certification that the project will receive. Typical certification thresholds are:

POINTS	RATING
40-49	Certified
50-59	Silver
60-69	Gold
80+	Platinum

LEED certification is widely recognized across the globe as the premier mark of achievement in green building. The Indian Green Building Council has adapted LEED system and has launched LEED India version for rating of new construction. In addition, Indian Green Building Council (IGBC) has launched several other products for rating of different typologies of buildings including homes, factories, among others.

- **HK–BEAM:** HK-BEAM stands for "The Hong Kong Building Environmental Assessment Method".   (HK-BEAM) is a voluntary scheme first launched in December 1996. HK–BEAM is a performance based system that takes holistic view of building performance with emphasis on life cycle impacts. In HK–BEAM, the assessment for any building is finalized on the completion of the building ensuring that 'Green and Sustainable' practices are implemented through the entire project cycle and the project meets the desired goals and performance.

The 'New Building' certification system of HK–Beam is also well synchronized with its 'Existing Building' certification, for example, a new building certified under the HK–BEAM existing and suitably operated and maintained would attain a similar grade under HK–BEAM New some years later.

HK–BEAM integrates the assessment of many key aspects of building performance embracing

- Hygiene, health, comfort amenity

- Land use, site impacts and transport

- Use of materials, recycling and waste management

- Water quality, conservation and recycling

- Energy efficiency, conservation and management

- **GRIHA:** As most of the international building rating systems have been tailored to suit the building construction of the country where they were developed. In India TERI, is responsible for developing a tool called GRIHA (Green Rating for Integrated Habitat Assessment) for measuring and rating a building's environmental performance in the varied climate and building practices. This tool, by its qualitative and quantitative assessment criteria, would be able to 'rate' a building on the degree of its 'greenness'. The rating shall evaluate the environmental performance of a building holistically over its entire life cycle, thereby providing a definitive standard for what constitutes a 'green building'. The rating system, based on accepted energy and environmental principles, seeks to strike a balance between the established practices and emerging concepts, both national and international. The guidelines/criteria appraisal may be revised every three years to take into account the latest scientific developments during this period. On a broader scale, this system, along with the activities and processes that lead up to it, will benefit the community at large with the improvement in the environment by reducing GHG (greenhouse gas) emissions, improving energy security, and reducing the stress on natural resources.

The rating applies to new building stock – commercial, institutional, and residential – of varied functions. Endorsed by the Ministry of New and Renewable Energy, Government of India as of November 1 2007, GRIHA is a five star rating system for green buildings which emphasizes on passive solar techniques for optimizing indoor visual and thermal comfort. In order to address energy efficiency, GRIHA encourages optimization of building design to reduce conventional energy demand and further optimize energy performance of the building within specified comfort limits. A building is assessed on its predicted performance over its entire life cycle from inception through operation.

3. Green Libraries

Fayetteville (AR) Public Library: The Fayetteville Public Library was designed by Meyer, Scherer and Rockcastle, Ltd. in Minneapolis opened in October 2004. This library was the first building in Arkansas to register with the U.S. Green Building Council and achieved the silver LEED certification in 2006. To earn this certification the library employed many green-design techniques. The library was built on an empty lot a few blocks away from the city's bustling square, making it a textbook infill project. During construction, any trees removed were harvested and used for furniture or donated to local parks. Throughout the project, almost 99% of the construction waste was recycled or reused. More than 65% of

the materials used to build the library were made within 500 miles (800 km) of the city. By incorporating a green roof and using alternative roofing materials, the design team reduced air temperature as much as 20 degrees. Water collected on the roof is reused for

landscape irrigation. The library's green roof saves about $4,000 a year in energy savings. The building's reading spaces and circulation desks were situated to take advantage of the natural sunlight without over-working the building's air conditioners, reducing energy costs by 25% and the overall building's energy consumption by 30%. Sunlight streams through 75% of the building's public spaces.

Seattle Central Library: The Seattle Central Library designed by Rem Koolhaas opened in May 2004. It employs a number of innovative techniques to achieve the status of a green library. It is located in a dense urban area, accessible by public transportation. Rainwater runoff is stored in a 40,000 gallon tank, and used to irrigate the landscape. It has triple glazed glass, used to reduce heat buildup. Seventy-five percent of the demolition and construction waste was recycled.

National Library, Singapore: The Singapore National Library has been called the greenest building on the planet. Designed by Ken Yeang, it opened in July 2005. It is designed using light shelves that allow the light to filter into the library, without having any harsh effects. During the moments that the sun is either to bright or not bright enough, sensors are programmed to dim or brighten the lights, and raise and lower the shades to maximize comfort and reduce costs.

Children's Museum of Pittsburgh: The Children's Museum of Pittsburgh underwent extensive expansion and renovation in 2004 using sustainable techniques and guiding principles thereby earning silver LEED-certification, one of largest museums in the country to receive this designation, and the first children's museum in America to do so.

University of California, Merced Kolligian Library: Opened in August 2005, University of California Merced's Kolligian Library was awarded Gold Leeds Certification in 2007. The 180,000-square-foot (17,000 m²) glass-and-concrete building uses 42% less water and 50% less energy than comparable buildings. The building's carpet contains 37% recycled content, while its acoustical ceiling tiles contain 66% recycled content that includes telephone books and newspapers. Nearly 30% of the materials used to construct the building were manufactured locally, resulting in significant transportation and energy savings.

Anna centenary library: Anna centenary library building is constructed as a state of art library building by Department of public libraries, Tamil Nadu State Government. The building is located in a well developed area in Kotturpuram. The building has been developed in 8 acres land with world class facilities with approximate built up area of 3.8 lakhs sft. The library building complex consists of Library building (G+8) and an

auditorium (G+1) to accommodate 1200 persons. To improve the thermal comfort of the occupants, the building has been provided with adequate air conditioning. This project achieved the prestigious LEED Gold rating given by Indian Green Building Council under New Construction rating. This is a unique achievement for the Tamil Nadu State Government and happens to be the first library building in the Asian region to get this in demand rating. This building would consume 30% less energy and 20% less potable water consumption without affecting the indoor condition and occupants comfort.

4. Benefits of Green Library building

4.1. Environmental benefits:
- Enhance and protect ecosystems and biodiversity
- Improve air and water quality
- Conserve natural resources
- Reuse and recycle water, paper etc.
- Optimize the use of natural light
- Roof water can restore (water harvesting) for further use i.e

4.2 Economic benefits:
- Reduce electricity costs by using natural lights and controlled temperature.
- Enhance profits in terms of electricity and water consumption charges
- Improve employee productivity and satisfaction as it is proven that work efficiency improves if you are working in good environment.
- Optimize life-cycle of Library building and other resources
- Waste water can be reuse for landscaping and other work after treatment.

4.3 Health and community benefits:
- Improve air, thermal, and acoustic environments
- Control the pollution and green house gases in environment
- Contribute to overall quality of life
- User's orientation programme for better environment

5. Conclusion

Libraries are established for the betterment of the society. It served the generations in the past, it serves the present generation and it will serve the generations of the future. Libraries have the responsibility to work for the society and set example for the users to contribute in making of better atmosphere and healthy environment.

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Greening the Libraries *for sustainable development: a case study of Technical University libraries in Od*isha

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Abstract: Green library refers to library that contributes towards maintaining the natural ecological balance in the environment, and preserving the planet and its natural systems and resources. They are built for environmental protection which is a practice of protecting the natural environment on individual, organizational or governmental levels, for the benefit of both the natural environment and humans. It also serves in the way libraries have always served as landmarks in their communities*.* The main objectives of this paper are to analyze the importance of green libraries; to identify the standards for green libraries in India; to identify the major green library initiatives at the international and national level; to explain various techniques and methods for greening the library; and to make suggestions for building green libraries for sustainable development in the technical university libraries of Odisha. The paper concludes that librarians have to be keen on updating themselves on sustainability trends in the field of librarianship and should provide awareness and create the space in the libraries to exemplify the Green practices.

Keywords: Green Library, Environmental protection, Environment Quality, Energy Efficiency, Sustainable Development

1. Introduction

The Online Dictionary of Library and Information Science (ODLIS) defines green/sustainable libraries as "A library designed to minimize negative impact on the natural environment and maximize indoor environmental quality by means of careful site selection, use of natural construction materials and biodegradable products, conservation of resources like water, energy, paper, and responsible waste disposal recycling, etc". Creating green libraries is approaching a tipping point and transforming into a library movement by building green library buildings, by greening existing library facilities, providing green library services, and embracing environmentally supportive and sustainable practices within the library.

The Green Library Movement emerged in the early 1990s and gained popularity in the library profession around 2003. It is comprised of a growing number of librarians, libraries, cities, towns, college and university campuses committed to greening libraries by reducing their environmental impact on the planet. This innovation is happening by building green library buildings, by greening existing library facilities, providing green library services, and embracing environmentally supportive and sustainable practices within the library. Green buildings are measured according to a rating system like the LEED (Leadership in Energy and Environmental Design) certification system, which was developed by the U.S. Green Building Council. It helps building owners and operators to measure operations,

improvements and maintenance on a constant scale, with the goal of maximizing operational efficiency while minimizing environmental impacts.

2. Reasons to Build Green Libraries

There are several reasons why libraries would want to build green or incorporate green features into their buildings.

- The cost of constructing green buildings has become affordable. It is now possible for libraries to build green buildings on conventional budgets.

- Most readily available energy resources are finite resources. It is vital to the health of the planet and our libraries' budgets that we use these energy sources prudently.

- It is important that we reduce the carbon footprint of our buildings. The term carbon footprint is defined as "the total amount of greenhouse gases produced to directly and indirectly support human activities, usually expressed in equivalent tons of carbon dioxide ($CO2$)".

- Renovating an existing library building is an option which could even lead to LEED certification under the LEED for Existing Buildings (LEED-EB) option.

3. Literature Review

According to Oxford English Dictionary the term "green" is defined as "pertaining to, or supporting environmentalism" (p. 811). The term "sustainable" relates to "forms of human economic activity and culture that do not lead to environmental degradation, esp. avoiding the long-term depletion of natural resources" ;**Oxford English(2008). James and Suzanne LeRue(1991)** wrote the lead article entitled "The Green Librarian" and explained in detail how to be environmentally supportive at home and in the library." Noise in the Library: Effects and Control" by **Ann Eagan (1991)** examined noise pollution in the library. **Steven Smith(1991)** discussed the spatial limits of the library and nature, and the role libraries need to play in preserving both. **Bill Brown(2003)** discussed the emerging trend of green libraries and proclaimed that libraries were on the cutting edge of green design. The article "Public Input Yields Greener Library Design" by **Louise Levy Schaper (2003)** described how the Fayetteville Public Library's Blair Library was the first building in Arkansas to be a registered LEED building. **Dorthy Waterfill Trotte (2008)** [12] in a paper entitled "Going for Green", discussed three environmentally friendly libraries and offered tips on how librarians could make their libraries greener. **Sahavirta (2012)** [9] in an article revealed that commitment to green values may increase environmental sustainability and help libraries to take a new and visible role in changing society. In a paper **Divya and Vijayakumar (2013)** rightly pointed out that this is the right time for librarians to support green library movement. **Aulisio (2013)** [2] in a paper argued that a green library is more than what the architecture entails by using example initiatives and providing recommendations for green library operations. In the article **Atton (1993)** describes the green librarianship activities in the US and warns librarians in the UK against embracing a business consumer model in the library. **Amy Cantú and Beth Andersen (2003)** focused

on a program series titled "Sustaining Ann Arbor: Think Globally, Act Locally." Some of the highlights from the program included alternative fuel vehicles, a wildlife ecology puppet show, a sustainable home tour and green journaling. The Library's position as a community center and its mission to serve as an educational resource "proved to be ideal for exploring the interconnected topic of sustainability".

4. Objectives

- To analyze the importance of green libraries in the Technical University libraries of Odisha.

- To ensure that all the collections become discoverable to all the users and researchers.

- To create a sustainable digitisation operation which is essential for the technical university libraries?

- To identify the major green library initiatives at the international and national level.

- To explain various techniques and methods for greening the library.

- To make suggestions for building green libraries for sustainable development.

5. Standards For Green Libraries:

Some of the standards of green libraries are:

5.1 Indian Green building Council (IGBC): Indian Green Buildings Council (IGBC) was set up in the year 2001.According to IGBC "A green building is one which uses less water, optimizes energy efficiency, conserves natural resources, generates less waste and provides healthier spaces for occupants, as compared to a conventional building."

5.2 Leadership in Energy and Environmental Design (LEED-India): LEED is considered a performance standard, which means it allows a building owner or planner to choose how to meet certain benchmark numbers without prescribing specific measures. Leadership in Energy and Environmental Design (LEED- India) green building rating system is a nationally and internationally accepted benchmark for the design, construction and operation of high performance green buildings. It is a point-based system in which projects earn LEED points for meeting green building criteria. The six credit categories for new building construction are sustainable sites, water efficiency, energy and atmosphere, materials and resources, indoor environmental quality, and innovation in design (U.S. Green, n.d.). There are currently six types of building certification under LEED including LEED for New Construction (LEED-NC), LEED for Commercial Interiors (LEED-CI), LEED for Core and Shell (LEED-CS), LEED for Existing Buildings (LEED-EB), LEED for Neighborhood Development (LEED-ND), and LEED for Homes (LEED-H) (Yudelson, 2007). There are four certification levels (Certified, Silver, Gold, Platinum) awarded according to achievement as evaluated by points using the LEED scorecard.

LEED-India promotes a whole building approach to sustainability by recognizing performance in the following five key areas

- **Site selection:** Before building a library, a site must be chosen. The selection of the site has a large impact on how ecologically friendly the library will be. What kinds of impact will construction have on the local environment, will there be erosion, what can be done with storm runoff, and is the site already green? Also, the library should be located in a densely populated area, near a number of other service related buildings.

- **Water conservation:** Reduce potable water use by considering alternative on-site water sources (eg. Rainwater, storm water and air conditioner condensate) for custodial uses and toilet flushing, planting native and adaptable vegetation reduces the need for irrigation.

- Energy conservation: Energy efficiency is considered by many to be the most important category in becoming sustainable. In the LEED rating system it is the heaviest weighted of all the categories. On site renewable energy systems, including solar, wind, and geothermal, provide an independent supply of energy.

- Building materials: The primary responsibility in selecting materials for the library is to contribute as little waste as possible. Another responsibility is to choose materials that can be produced without causing too much damage to the natural environment. Reusing and recycling are going to become increasingly necessary in the future. Another material option is using quickly renewable materials such as bamboo in place of wood whenever possible.

- Indoor air quality: Along with energy inefficiency, poor air quality has been another side-effect of the post air conditioning building design. Because most modern buildings are temperature controlled, they are designed to be airtight. The lack of ventilation can not only make buildings expensive to cool, it also traps harmful toxins that can do serious damage to people's respiratory systems. To improve air quality, materials can be bought that have a low VOC content, and CO_2 monitors can be installed to ensure that CO_2 levels remain at a safe level. The benefits cover a spectrum from physically cleaner air to direct beneficial effects on psychological health, task performance, illness reduction, productivity, lower stress and negative feelings, reduce noise and contribute to fulfilling at least 75% of Indoor Environmental Quality (IEQ) Criteria.

6. Green Library Initiatives in National And International Level

- **Situation in India:** TERI envisioned the need for development of an indigenous tool for rating of green buildings in India. This rating system - GRIHA – has been adapted by the government of India as the National rating system. Globally, green building rating systems have been instrumental in raising awareness and popularizing green building designs. Keeping in view of the Indian agro-climatic conditions and in particular the preponderance of non-AC buildings, GRIHA has

been developed as a rating system which is suitable for all kinds of buildings in different climatic zones of the country. TERI fulfills its mandate of sustainable development by advocating the concept of green buildings, which register minimal impact on the environment. TERI has constructed its buildings, in Gurgaon, Bangalore and Mukteshwar which includes resource- and energy-efficient, demonstrating the sustainable implementation of green practices.

In Kerala COSTFORD (Centre of Science and Technology for Rural Development) a nonprofit organization established in 1985 focus on improvement of housing and made significant gains in providing alternative philosophy and technologies for providing cost- effective , energy efficient and more appropriate housing for all groups. Similarly, Habitat Technology Group established in 1987 is a non-governmental organization is totally committed to the concept of green and human architecture. It has been accepted as a nodal agency to carry out green buildings in Kerala.

- **International situation:** Tang Gengsheng, the general secretary of Library Society of China (LSC), launched a new project named Energy Saving and Emission Reduction of Libraries (ESERL). The project convened some experts from Academic Professional Committee of LSC, Beijing Zhongguancun International Environmental Protection Industry Promotion Center Co., Ltd (ZIEPC), China Institute of Building Standard Design & Research, Beijing Institute of Architectural Design (BIAD), Virtelwise Technology Inc. and some libraries to research and practice how can become energy-conserving and environment-protective buildings.

The research also indicates high energy cost caused by air-conditioning systems, lighting systems, elevators, computers, servers, security, package of counter and fire monitoring. Therefore, solutions of solving higher energy cost will be suggested from research analysis in library: Firstly, high energy-consuming libraries should be reconstructed by energy management contract (EMC) thereby reducing large expense of energy. The Heilongjiang Provincial Library is a good example. Supply the water storage and automatic air-conditioning system will be rebuilt at the second phase, which is followed by a reconstruction of solar domestic hot water system. In addition, an energy-saving reconstruction plan of air conditioning system for Nanjing Library has been conducted by experts from ESERL. Secondly, other solutions also include choosing energy saving technology and products when construction of the new building.

7. Techniques Used For Greening the Library
In order to make the libraries green the following techniques are used:

7.1 Materials & Equipments

- Take advantage of windows: Strategically placed windows will provide natural light and may help with heating or cooling costs.

- Use eco-friendly light bulbs which will save money and electricity.

- Use of geothermal heater and solar tubes that capture daylight and deliver it inside to illuminate interior space saves money and energy

- Put soft pads on the feet of chairs to protect the floor and reduce noise.

- Purchase eco-friendly computers: When you need new computers, search for ecofriendly versions.

- Use laptops which use less electricity than desktop versions.

- Eco-friendly, safe computer cleaning materials can be used for cleaning the computers such as biodegradable dust cloths and old t-shirts.

- Improve areas with insufficient lighting; reposition light fixtures to improve lighting.

- Replacement of outdated appliances.

- Cut down on paper by moving card catalog onto computerized catalogue, instead of paper newsletters use e- versions, provide online services by making use of web-2.0 technologies, use e-receipts instead of paper receipts.

- Promote roof vegetation and start an organic garden: Grow a garden to spread awareness on sustainability and provide a healthy eating option for participating library patrons and workers.

- Use natural pesticides for preservation of books and keep the plants and flowers healthy without damaging the health or the environment.

7.2 Energy:

- Use Energy Star products for saving energy.

- Terminal energy control of Central air-conditioning can remotely set temperature, on-off function, and timing control online, so as to reduce management cost on the premise of comfort.

- Use of alternative energy sources such solar energy will save money.

- Automate power down. When procuring new PCs, buy those with intelVPro.

- Find efficient CPUs. Computer companies are producing far more energy efficient CPUs.

- Have a server strategy that guarantees power reduction.

- Reduce heat islands by eliminating or shading blacktop paving and dark roof surfaces.

- Motion and light sensors, timers and energy saving dimmers can be easily and inexpensively retrofit to existing buildings.

- The energy measurement and monitoring system efficiently monitors operation effect of the energy-saving methods in the building, thereby making a better combination of system energy-saving control and use.

- System monitors quality of environment in real-time and adjusts automatically to ensure human safety, healthy and comfort and to maintain a quiet reading environment.

- Combine with the building control systems such as group control of central air-conditioning host machine, frequency energy-saving control of pumps, intelligent

control of fresh air, intelligent control of lighting; finally achieve the best result of energy-saving control.

There are three energy-saving measures in illuminating system:

- Energy-saving products minimize the energy consumption.

- Usage of lighting control system to cooperate with energy management system.

- Energy supply from the PV system supports garden and lawn light outside

7.3 Waste Management:

- Recycle computers: Safely recycle computers instead of harming the environment when you throw them away. Buy recycled ink cartridges and other supplies.

- Discard weeded books by selling it to used book dealers, exchange library materials with other participating libraries or donate to other libraries.

- Get rid of waste by composting and stop using plastic bags.

- Start a paper drive: Ask the members of the library to bring in old newspapers and other papers to recycle: they may even be turned into books one day.

- Books from the shelves and the books deliberately hidden by library users were recovered from the top of shelves were dusted carefully. Shelves and floor were washed and mopped. This result in clean, bright, refreshed collection with no dirt.

8. Suggestions

The final outcome of the Sustainable Development in the Technical University libraries is given below:

- Spread awareness about the library's green activities through social media or other methods regularly.

- Evaluate the library's cleaning and maintenance routine to identify and reduce the use of hazardous chemicals.

- Libraries can use a variety of tools to popularize the 'green concept' and educate their patrons about the features of their green buildings. These include in-library displays, publications, and library programs relevant on 'going green'.

- Libraries can arrange strategic thinking and planning sessions to ensure sustainability.

- Identify the librarians who are willing to promote green library techniques and encourage them.

- Librarians should focus on the chance to transform an adaptable building to a high level ecological-friendly library.

- Sustainability in library buildings should be taught to LIS students so that new generation librarians will adapt these ideas.

- Make better use of cloud computing services in order to avoid print materials.

- Government should take steps to promote green libraries through award and financial aid to maintain such libraries.

- Librarians have to be keen on updating themselves on sustainability trends in the field of librarianship.

- UGC should make it mandate for all colleges to get the approval to go for Green Libraries and also green buildings.

- Government/Universities should make all the efforts to transform Libraries into Green buildings/Libraries, wherever it is possible .

- Librarians should provide awareness and create the space in the libraries to exemplify the Green practices.

- All Librarians should suggest and help in creating landscape around the building.

- Library building architecture should be planned well with such environmental friendly material & build at low cost with recycled materials.

- Some sign boards should be reflected to make awareness on green buildings and Libraries maintenance.

- Electronic document management reduces paper consumption considerably.

- Locally available environmentally friendly material should be promoted for constructing Library buildings.

- Recycling concepts should be promoted and practiced & encouraged to implement the same practices by the unemployed youth.

- Green concepts should promoted, become examples in Libraries attached to Organizations, Universities and Industries

9. Conclusion

The current important issue of the world is environment issue that is to save earth & save life of the earth. Libraries can take good initiative to inspire people, individuals to work towards environment protection. The challenge for the future would be to find new services and activities that would create a foundation for sustainable development. Finding new indicators that evaluate the sustainability of libraries is also another challenge for the future. Librarians should act as role models for sustainability by providing suitable and

relevant information related to green issues and concerns. For the next generation, library professionals should move beyond environmental sustainability exemplified by various practices of "greening libraries" and focus on proactive steps to guarantee future sustainable development of libraries.

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Environment Friendly Library: *Green Signal for Green Libraries in Digital Environment*

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Abstract: The concept of Green Libraries is an advanced modern transformation of existing traditional libraries of India that were built decades ago and the digital technology started in 1980's faced difficulties for change over to new system, viz., the Green Libraries. The architecture of traditional Libraries (such as Bangalore University Visvesvaraya College of Engineering Library, the Mythic Society Library, the United Theological College Library and the State Central Public Library, Bangalore) built on Western Classic Architecture Style, present a unique combination of aesthetics and utility. The concept of Green Library applied to these traditional Libraries will serve as a cut-above-the-line incorporating State-of-the-Art features. The creation of a Green Library warrants many approaches and different points of imagination and thoughtfulness. If a green Library is constructed with a standard like LEED, the Green Library would become sustainable. Environmental challenges like Energy depletion, Global Warming, including Climate Change will have greater influential effect on information resources and programmes that the Green Library will provide to the users.

Keywords: Aesthetics, Traditional Library, Green Library, Green Signal, LEED, Library Architecture and Design.

1. Introduction

In the International agreement called the "Kyoto Protocol" (1997) the concept of "going green" emerged. In the later part of the ninetees "going green" was more a theoretical approach. But years later the concept of Green Libraries acquired world wide significance. It was said that Green Libraries were ment to acquire knowledge and practical uses that would lead to environmentally and ecologically friendly Library Life Styles. It was also pointed out that going green would help in protecting the environment and natural resources which would contribute for current and future generation.

Sometimes, the words "Sustainable" and "Green" are complementary and exchangeable – both meaning protecting an ecological balance by avoiding depletion of natural resources. The IGBC – Indian Green Building Council gives certain salient but only basic concepts of Indian Green Building System – Such as use of less water, energy, Conservation of natural resources avoiding less waste that would provide healthy atmosphere for the Library users, as compared to a Conventional Library building. Living close to nature is poetically defined as "Let Nature be my Teacher" (William Wodsworth who was a Pantheist). This paper tries to find out three important factors of the system of Green Libraries such concept of Green Library, Principles of Green Library, Going Green of Indian Libraries – the Present Scenerio.

2. Concept of Green Library

As said above the Kyota Protocol gave the concept of going green. The United Nations Frame Work Convention on Climate Change, which is mandatory for all the countries of the world to reduce Global Warming, emission reduction, ecologically balanced and an excellent Life Style, is a point in focus for the Library users. Green Libraries save energy and power. The United Kingdom's Commission on Architecture and Building Environment gives the definition of 'Going Green" as:

- Well – architecture Public Libraries.
- 'LEED' Certification for Green Libraries.

These require a large number of standards, which go to explain the definition of 'Going Green'. Andrew Garnegie a Philanthropist and a designer himself required the Green Libraries as a representation of rising sun, and above 'LET THERE BE LIGHT'. The most important point made by him takes us back to many decades. He observes that Libraries built 2,000 years ago (Alexandria Library, Nalanda Library in Ancient India) made the most of natural day light and natural ventilation and natural surrounding which are attributed now as hall marks of current Green Design.

3. Principles of Green Libraries:

- It is ironical that going green started in the early 1990's (The Green Library Journal authors like C. Atton (Anotnelli) did not have much response in the beginning. It was only in 2003 that the concept of going Green was recognized as an important aspect of Libraries Going Green.
- Well-designed Green Library buildings cost less to operate and maintain than conventionally constructed Library buildings. They should be more comfortable, enjoy more day light and more attractive to Library users.
- Public Libraries referred to as 'Cradles of Democracy' 'Peoples' University' or the Life-Long Learning Centres' of any nation in particular the developing countries. Cradle of Democracy or Peoples' University would cater much more to the Users when they go Green.

PADC is responsive to the present need to refocus attention in adding a performance dimension to form, rather than only aspects of style, construction methods, local materials, selection, conservation methods used and HVAC consumption natural lighting conservation of rain water and various techniques that are applied. One of the resources – efficient trends is 'Urban Mining' as it pertains to Information Technology. It is a platform where product life-cycle management meets the need for wise utilization of resources.

4. Traditional Libraries Vs Green Libraries

Architecture in India today is exploding, with the rise of materials availability and access to ever increasing, platforms for information dissemination, the built environments seem to

be running further ahead and faster to try out new technologies and follow fresh trends. Increasing energy demands add pressure to systems running at capacity to feed the electronic hunger of the nation. Keeping in mind these issues, research in building performance plays an ever more important role in discovering, testing and innovating better ways to use and save energy as we move towards greener pastures.

"Architecture is the Learned game, correct and magnificent, of terms assembled in the light" (Lecorbusier).

Technologies are being directed to achieve net zero-energy consumption and net zero-carbon emissions in the new evolving green building Landscape.

5. Green Features

The Library buildings should consist of skylit diminish floor plates with cutouts to fill floors with dynamic sunlight creating divine spaces. Large skylights can be used strategically to fill up the spaces with dynamic sunlight with high thermal efficiency glass. Considering the importance of good indoor air quality, indoor plants inside the Library Building do wonders in terms of bringing low power costs for fresh air toxin removing plants can be grown indoor.

Materials: Building should have been conceived in 'rustic untouched' exposed brick work and form finished exposed R.C.C. The unique system for drainage should be developed for the terraced building form. The water collected through R.C.C. be brought down through RCC acqua ducts on walls.

Sky Library: A unique feature like the Sky Library can be located on the top most floor with Light-passing ceiling, open spaces provided for intermittent relaxation through reading books in fiction and discussion over a cup of coffee. The users can enjoy the Sky Library during exotic phases of day light, Twinkling stars, monsoon and warmth, and feel elated to be on top of the world. The terrace can be converted to a lush green extension of the building one could bring books away from the confines of the traditional Library stock and read on the refreshing grass, sun bathing on these winter foothills. The greens keep the latent temperature of the structures in check.

The furniture layout and design shall not be rigid. It will have flow, variety and flexibility. The students shall carve out their own preferred spaces to study, interact and create.

Traditional Libraries and Green Libraries are not opposed to each other the latter is an improved version of the former. Sometimes, a curious though emerges. Is it old wine in a New Bottle or vise versa? In a fast developing country like India going Green with International Standards could be difficult, if not impossible, the main bottle neck, being availability of required funds. One gets a curious thought whether such Green Libraries can really be built in rural districts such as Tumkur, Kolar, Chintamani etc, let alone the Bangalore Metropolitan. In European countries or USA a number of Non-Government projects are available to go Green. But in India such projects are rare. Man should have eco-centric thinking – with new horizon insight, leading the ways to a bright, bold future –

as 'Brave New World' of Aldous Huxley. It should have a forward shift, an insight into resource efficient Library buildings. These Green Libraries should serve as the Poet said : "Foot Prints on the Sands of Time".

6. Sustainable Green Architectural Features

The following sustainable building elements:

- Appropriate Orientation.
- Local Building materials.
- High thermal efficiency Glass on peripheral glazing.
- Ample natural dynamic day light through skylights of clear thermal, efficient glass.
- High end Air conditioning equipments.
- Toilet fixtures chosen to resulting in low water consumption.
- White tiles on terraces to bring down interior temperature.

7. Green Computing Initiative

Desktops, Laptops and hand held devices which touches all aspects of our lives 24/7 most devices never get powered off and because of impact that computers now play with respect our environment may green initiative have emerged.

- Power off devices when not in use.
- Power up energy intensive devices such as Laser printer.
- Use note books instead of desktop computers.

8. Conclusion

Ending on a Green Signal: Green signal for the Green Libraries in India should be given by the Government of India through its various agencies such as University Grants Commission, AICTE, Medical Council of India, Bar Council of India and also by private projects. Paucity of funds would stop the Green signal. Respective college should evolve their own fund generating system as well as seek the help of State Governments and Philanthropic Organisation.

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Implementation of Kaizen in Library and Information Services Activities

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Abstract: Library is backbone of any kind of institute. A librarian has to provide book, document or information as per the requirement of user or institute. There is an information explosion due to new technology and digitization. Institutes are providing limited resources to libraries i.e. men, material and money. It is prime duty of a librarian to provide required services or right information at the right time by using limited resources. A small improvement for big achievement is the need of hour. Kaizen philosophy is based on small change from root level for the maximum use of available resources. In this paper   a small effort is made for big achievements in the world of library and information services.

Keywords: Kaizen, LIS services, LIS activities.

1. Introduction

Due to the rapid growth in the number of learning institutions all over the country, the necessity and importance of libraries is also growing. Moreover, with the industrialization, economic and social growth role of traditional librarian has changed very fast from custodian of books to a facilitator who locates the right information and disseminates to the readers. A librarian hasto provide right information at the right time in the right way for the right use to fulfill the prime duty. The information explosion and information technology revolution has led to emergence of electronic information era. A rapid advance in information processing, storage and communication-technology hasrevolutionized the role of automated libraries in disseminating information services to their users.Today achieving of maximum knowledge of culture, evaluation and collection and even the information of purchase and sale is overflowing with a great speed. Digital computer and internet service is used today through new technique. On line collection is used in modern libraries. Digital Technology has enhanced the access to more and more information worldwide. The use of modern technology for services are affecting rapidly in the different areas of libraries such as circulation service, reference service, SDI services, bibliography and documentation service etc. The advent of computers has brought many benefits to library and information systems and services. The use of technological devices such computers, barcode scanners, smart card, etc. has become routine activities.

Good libraries are to be managed by minimum resources, minimum manpower and has to provide services quickly with accuracy and ease. The libraries resource sharing, interlibrary loan, union catalogue and document sharing etc. are the modern practices being adopted. User's demands are mainly focused on collection of printed resources,

storing of resources and their retrieval as and when required .Due to the information explosion and technological development the libraries has to be efficient through computerization, automation and digitization.

2. Objectives

- To study the organizational system of libraries.

- To reduce the problems and limitations that discourages the development of resources in modern era.

- To improve the organization and planning of efficient library services with available resources in Libraries.

- To evaluate the strengths and weaknesses of any kind of libraries.

3. What is Kaizen?

'Kaizen' is a Japanese term that means 'improvement'. 'Kai' means 'change' and 'Zen' means 'good' or 'for the better'. So Kaizen means "Change for the better". It also means 'continuing improvement in personal life, home life, social life and working life.(Imai 1986) This program establishes a culture focused on the continuous improvement of all processes and work places through the elimination of waste. Kaizen means "everyday improvement by every person, everywhere" (Imai 2010).

Kaizen is a small improvements and a change for better. It must be accompanied by change of method. The kaizen concept stimulates productivity improvement as an ongoing process in any organization. It is practice oriented strategy which leads to creation of culture of improvement. It is more a way of life or at least a cultural approach to quality improvement. The implementation of philosophy of Kaizen can be achieved through involvement of employees to effect improvement.

4. Why Kaizen in Library?

Kaizen can be implemented in the library by improving every aspects of activity process in a step by step approach, while gradually developing employee skill through training and increased involvement. The principles to be focused on are:

- Human resources,the most important asset.
- Process must evolve by gradual improvement rather than radical changes.
- Improvement must be based on evaluation of process performance.

By practicing Kaizen culture, librarians demonstrate commitment to quality services. Also, the professionals with adequate support from librarians become a major source of improvement.

Kaizen system is simple, but its application requiresconcentration. These can be in the area of Productivity, Quality services, Cost, Delivery (circulation), Safety & Moral of employees i.e.PQCDSM.

- Q for more accurate information.

- C forcheaper, lesser value.

- D for lesser cycle time or lead time, faster and more quantity.

- S for safer, easier and comfortable working.

- P is a derivative or a combination of any of the above QCDSM.

5. Advantages of implementing Kaizen

- All functions of library come under continuous introspection and improvement.

- The maximum use of resources i.e. men, material and money.

- Employees most familiar with a particular operation on a day-to-day basis are the ones evaluating it.

- It serves to increase employee morale and job satisfaction.

- Waste is eliminated throughout the library, reducing costs and increasing efficiency.

- Product or service quality is improved and is monitored on a continuous basis

- Customization of library services and resources.

- Feedback mechanism.

- Increase the level of satisfaction.

6. How Kaizen can be implemented in Libraries?

- **Develop an understanding of the processes**: According to Imai, there are three principal building-blocks, or keys to satisfying theuser, to be embraced under Kaizen:

  - A continually improving quality assurance system to meet user requirements.

  - A continually improving cost management system to provide the products or service at affordable price to users.

  - A continually improving delivery system to meet users timely requirements.

  These are known collectively as QCD- quality, cost and delivery.

Identify main objectives: The three most important elements to creating the spirit of Kaizen are 'top management commitment', 'top management commitment' and 'top management commitment'. "Without that, you had better forget the whole thing". (Imai). Kaizen is best introduced as a means of achieving targets. SWOT analysis has to be carried out. Existing systems and structures need to be assessed for their support for cross-functional goals and any necessary changes in terms of organization, planning and control and personnel practices should be planned. Targets should be set for the next five years and commitment should be agreed and shared.

7. **Plan the Kaizen programme**:

A well-planned programme of Kaizen has to be broken down into three segments i.e. management-oriented, group-oriented and individual-oriented.

- **Management-oriented Kaizen**:focuses upon the most important strategic issues, processes and systems.

- **Group-oriented Kaizen** is based upon small-group activities that use statistical tools to solve problems.

- **Individual-oriented Kaizen** is based upon the assumption that each individual can work smarter and can contribute towards the improvement process.

- **Allocate resources**: Senior management must be prepared to allocate resources. One person needs to be appointed a director as overall in-charge of project and a person to implement the programme. Training will need to be introduced for all employees, and funding, as well as other resources, must be allocated to support this.

- **Develop a training plan**: Identify the training requirements of employees as well as users . An understanding of the continuous improvement process of cross-functional working and of problem-solving techniques is a minimum requirement. Work with training department or consultant to draw up a training plan.

- **Communicate with library professionals and users:** Bring representatives from all functions and from all levels in the library into the planning process. Kaizen is about cultural change and employee participation, and user is an essential part of accepting the change process. Arrange meetings, briefing sessions and newsletters to promote the objectives of Kaizen.

- **Set up a suggestive scheme**: Involving employees is an integral part of individual-oriented Kaizen. Invite suggestions and feedback and difficulties being faced in continuous process. A suggestion scheme is a good way of encouraging employee contribution as well as users. Be prepared to listen to all suggestions. Give recognition to employees' efforts and awards based on predetermined criteria.

- Review: Plan to review the development of the Kaizen progrmme. Assess the extent to which a process-oriented cultural change has been achieved. Recognize champions and consider further training as required.

8. Conclusion

The new technology if exploited and implemented effectively can bring sea change in library and information resources. Many problems of libraries such as quality of services,product, wastage and stagnation, mass failure of users will be solved. It helps to fulfill the five Laws of library & Information Science. In present scenario, Library &Information Professional should cultivate their field of knowledge in professional way. They should contribute to the field by research; innovative work updates themselves with the new technology.It is small step toward the demand of present era of explosion of information and getting rid of "Muda". Muda is Japanese term roughly translated as "waste" or "something that does not add value to your life".

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What Children Expect from Tomorrow's Urban Libraries of Karnataka State: *A Case Study of City Central Library, Vijayapura*

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Abstract: Reports the results of a study conducted in different localities of Vijayapura city where branch libraries of City Central Library are located to know the expectations of children (actual visitors and non-visitors) about the services and facilities. Finds that there is a disconnection between the needs and expectations of the children and the facilities and services provided in the branch libraries and that children are enthusiastic but are unable to make it to the library premises. They know library as a place to read but many of them are in confusion about the role expected of public libraries. Provides suggestions to attract the children to the library premises.

Key words: Children library use, urban libraries, user study

1. Introduction

Public libraries have been considered over centuries as important entities for community development and empowerment process and trusted information resources at the heart of communities. However, in the beginning, many early public libraries had denied women and children right to use libraries. Children in some places were not allowed inside libraries at all. Currently, in the contemporary public library environment, the situation has changed. Today children have become the primary focus of any services, programs or activities and as such public libraries are designing programs to attract children. This is because children have always been enthusiastic and devoted users of public libraries.

A number of studies have been reported to identify the expectations of different user groups in different public library settings. Thanuskodi's assessment of the efficacy of library services of DCLs in Tamil Nadu has revealed weak user base among children. Kunhambu and Mudhol have noticed that rural libraries are becoming more visible as an essential institution for children. Parvathamma and Reddy' s survey of use of information resources and services in branch libraries Bidar district and Gulbarga district libraries revealed that a significant number of children above the age of 11 visit the libraries mainly to read newspapers and magazines. Sujatha's study of Bantwal public library Dakshina Kannada district also found that children mainly students visit the library. Children were a non-significant group as user population in the studies reported by Kala , Asundi and Heritzman , Tyagi and Chopra and Banerjee . No specific studies on children's use of public

libraries were reported. Hence an effort is made in this paper to map the expectations of children about next generation urban libraries based on a case study of children's expectations of City Central Library, Vijayapura. Vijayapura is the headquarters of Vijayapura district (Formerly Bijapur) located in the northern part of Karnataka. The City Central Library Vijayapura (Herein after referred as CCLV) established in 1981 has 14 branch libraries (Vivek nagar, Ashram, Zenda Katti, Shastri nagar, Maruti colony, Treasury colony, Kalyan nagar, Nehru Market, Adarsh nagar, Jorapur pet, KHB colony, Pawad Basaweshwar colony, Gandhi chowk and Central Jail) and 1 children library (Bal bhavan) located at different parts of the city. At present the main library has a collection of 192,706 books and has a registered membership of 4024. The branch libraries together have a membership of 11167. The Children's library was established in 2006 has 1025 books, few toys and facilities for indoor games like Carrom and Chess. The branch libraries work in shifts from 8.30 am to 12.30 pm and again from 4.30 pm to 8.00 pm. The branch libraries are basically print dominated and provide reading facilities and circulation services. They are managed by non-professionals. Interviews were conducted between 15th December 2014 and 31st January 2015 with 36 children who had actually visited the branch libraries on the particular day of visit to the concerned branch library. On the same occasion interviews were also conducted with 126 children of the localities purposely selected for the study who were outside the branch library premises (either playing with friends or simply moving on the street) to map the expectations of children.

2. Results and Discussion

2.1 Influencing Factors: From Table -1 it can be found that just more than one fifth of children actually visited the branch libraries while more than three fourth have not visited the branch libraries. It is also found that children aged below 9 years (32.72%), between 9 and 11 (33.95%) and aged 12 and above (33.33%) constitute the study population. A majority of children (44.45%) aged between 9 and 11 visit the branch libraries while 19.44% children aged below 9 have made visits to the branch libraries.

Table 1 - Age wise distribution of children

Age	Actual visitors	Non-visitors	Total
Below 9 years	7 (19.44%)	46 (36.51%)	53 (32.72%)
9-11 years	16 (44.45%)	39 (30.95%)	55 (33.95%)
12 and above	13 (36.11%)	41 (32.54%)	54 (33.33%)
Total	36 (22.22%)	126 (77.78%)	162 (100.%)

From Table 2 it can be found that boys account for 56.17% of the study population while girls account for 43.83% of the study population. Further it can also be analyzed that girls hardly make use of branch libraries as only 19.44% of them did visit. More than eighty percent of boys actually visited the branch libraries. Among the non-visitors, there are 50.79% of girls.

Table 2 - Gender wise distribution of children

Gender	Actual visitors	Non visitors	Total
Boys	29 (80.56%)	62 (49.21%)	91 (56.17%)
Girls	7 (19.44%)	67 (50.79%)	71 (43.83%)
Total	36 (22.22%)	126 (77.78%)	162 (100.%)

Table 3 reveals that only 8.64% of the study population comprises of children studying in Government schools while a greater majority of 91.36% of children study in private schools. One of the surprising results of the study is that none of the actual visitors among the children were studying in Government schools. Among the non-visitors only 11.11% of children were studying in private schools.

Table 3 - School wise distribution of children

School	Actual visitors	Non visitors	Total
Government	00 (00%)	14 (11.11%)	14 (8.64%)
Private	36 (100%)	112 (88.89%)	148 (91.36%)
Total	36 (22.22%)	126 (77.78%)	162 (100.%)

From Table 4 it can be found that either of the parent of more than two third of children is a graduate. While both of the parents of only 4.32% of children are non-graduates and both of them are graduates for 28.4% of children. Further it can also be interpreted that either of the parent is a graduate among more than three fourth of children who actually visited the branch libraries. Not a single child whose' both the parents are non-graduates visited the branch libraries. Either of the parent of nearly two third of children who are non-visitors is a graduate. It is also surprising to note that 30.15% of parents of children who are non-visitors were graduates.

Table 4 - Educational qualification of parents

Parents education	Actual visitors	Non visitors	Total
Both non-graduates	00	7 (5.56%)	7 (4.32%)
Either of them graduate	28(77.78%)	81 (64.29%)	109 (67.28%)
Both of them graduates	8 (22.22%)	38 (30.15%)	46 (28.40%)
Total	36 (22.22%)	126 (77.78%)	162 (100.%)

A question was asked to the children under study to explain what words or images appeared in their mind first when they heard the word "library". It is found from the table 5 that slightly more than one third of children (33.95%) felt it a place to read while 27.16% of children opined that library is a place for recreational reading while another 29.63% of children remarked that it is a place where books are kept. A small percentage of children

also have their own images. 4.32% have developed an image that library is a place for highly educated people for study while 3.09% treated it as a sacred place and another 1.85% were of firm opinion that library is a place not meant for children. More than one fourth of actual visitors considered library as place to read while one third consider it as a place for recreational reading. A majority of actual users considered it as a place where books were kept. A majority of non-visitors (35.71%) considered it as a place to read while a quarter of them felt that it is a place for recreational reading and 26.98% also felt it as a place where books are kept.

Table 5 - First feeling of children when they have heard the word Library

First feeling	Actual visitors	Non visitors	Total
Place to read	10 (27.78%)	45 (35.71%)	55 (33.95%)
Place for highly educated people for study	00 (00%)	7 (5.56%)	7 (4.32%)
Place for recreational reading	12 (33.33%)	32 (25.4%	44 (27.16%)
Place where books are kept	14 (38.89%)	34 (26.98%)	48 (29.63%)
Place not meant for children	00 (00%)	3 (2.38%)	3 (1.85%)
A sacred place	00 (00%)	5 (3.97%)	5 (3.09%)
Total	36 (22.22%)	126 (77.78%)	162 (100%)

Children under study were asked to indicate why they have visited the branch library. It is found from Table 6 that a majority (30.15%) had come to the library just like that. For some of them there was no purpose, for few mother will not say anything if they were in the library. One fourth of children had come to the library to read newspapers while 5.56% had visited to return the borrowed books. 8.33% had come to the library to read magazines while another 8.33% had entered the library with rather serious purpose – to prepare for their project work.

Table 6 - Reasons for Children's visit to library (N=36)

Reasons	Number	Percentage
To read newspapers	9	25.00%
To read magazine	3	8.33%
To read comics	8	22.22%
To return borrowed books	2	5.56%
To prepare for project work	3	8.33%
Just like that	11	30.56%
Total	**36**	**100.00%**

Children were asked how frequently they visit the branch libraries. It can be found from Table 7 that no child visits the library every day. A majority of children visits library once or twice a week while 41.67% do visit occasionally. It can be interpreted that library visit is considered as a hobby among children.

Table 7: Frequency of Children's visit to library

Reasons	Number	Percentage
Once or twice a week	21	58.33
Occasionally	15	41.67%
Total	36	100.00%

Children were asked to give their opinion on how friendly the library environment is. From the opinion elicited from them it can be interpreted that library environment is user friendly as 75% of the children have opined that the environment is friendly. On the other hand 25% felt that library environment is unfriendly as they felt that the staff is strict.

Table 8: User friendliness in the branch libraries

User friendliness	Number	Percentage
Friendly	27	75.00
Unfriendly	9	25.00
Total	36	

Children who actually visited the branch libraries at the time of survey were asked to rate their satisfaction on a 5-point Likert scale from highly unsatisfied (value 1) to highly satisfied (value 5) on fifteen various aspects of branch libraries. The calculated mean value ranges between 1.00 and 3.78. The mean value for staff helpfulness (mean: 3.78) and seating arrangement (mean: 3.69) indicates that the children are satisfied with helpfulness of staff and seating arrangement in the branch libraries. The mean value for cleaning (mean: 3.44), newspaper collection (mean: 3.25), collection of magazines (mean: 3.08), knowledge of staff (mean: 3.00), reading room (mean: 2.89), library services (mean: 2.83) and arrangement of books (mean: 2.64) indicate that children are not in a position to decide their satisfaction or non-satisfaction. This rating is due to the fact that very few had used newspaper and magazine collection and also availed library services and reading room facility and utilized the knowledge of library staff. The mean value for lighting (mean: 1.75), working hours of library (mean: 1.58) and ventilation (mean: 1.56) indicates that children are not satisfied with lighting, ventilation and working hours of the branch libraries. Children are highly unsatisfied with children's collection (mean: 1.25), drinking water (mean: 1.00) and toilet (mean: 1.00) facilities.

Table 9: Children's opinion on library facilities and services (N=36)

No	Opinion on	Highly satisfied	Satisfied	Can't say	Unsatisfied	Highly unsatisfied	Mean
1	Staff helpfulness	3	1	00	29	3	3.78
2	Staff knowledge	00	00	36	00	00	3.00
3	Working hours	15	21	00	00	00	1.58
4	Seating arrangement	3	1	00	32	00	3.69

5	Reading room	10	7	00	15	4	2.89
6	Lighting	13	21	00	2	00	1.75
7	Ventilation	18	16	2	00	00	1.56
8	Library services	7	3	15	11	00	2.83
9	Cleaning	00	10	00	26	00	3.44
10	Drinking water	36	00	00	00	00	1.00
11	Toilet	36	00	00	00	00	1.00
12	Newspaper	00	00	27	9	00	3.25
13	Magazines	00	00	33	3	00	3.08
14	Children's Collection	29	5	2	00	00	1.25
15	Arrangement of books	00	7	29	00	00	2.64

Children were asked whether there are any reasons for their disliking the branch library that they have visited on a 5-point Likert scale from strongly disagree (Value 1) to strongly agree (Value 5). Their opinion was tabulated in Table 10. It can be observed from the mean value that the children under study strongly with the statement "There aren't computers and Internet" (mean: 5.00). Children agree with the statements "Very shabby look" (Mean: 4.44) and "There are too many rules" (mean: 3.89). Children are undecided about the statements "I never find anything interesting there" (Mean: 2.5) and "I don't need public libraries" (mean: 2.67).

Table 10: Reasons for Children's disliking of libraries (N= 36)

Reasons	Strongly disagree	Disagree	Can't say	Agree	Strongly agree	Mean
I never find anything interesting there	6	9	18	3	00	2.5
There are too many rules	00	00	5	30	1	3.89
There aren't computers and Internet	00	00	00	00	36	5.00
Very shabby look	00	00	7	6	23	4.44
I don't need the public library	6	5	20	5	00	2.67

Table 11: Reasons for not visiting libraries (N=126)

Reasons	Number	Percentage
Do not have time	67	53.17
Library working hours are not convenient	29	23.03
Parents do not allow	12	9.52
Nothing is available	2	1.59
Newspapers and magazines are subscribed at home	8	6.34
No Internet facility	7	5.56
I don't need a library	1	0.79
Total	**126**	**100.00**

Children who were outside the library premises at the time of interview (non-visitors) were asked why they have not visited the public libraries. Their answers were tabulated (Table 11). From table 11 it is found that more than half of children have not visited libraries as they do not have time to visit (53.17%). Nearly one fourth of children have expressed their opinion to the effect that library working hours are not convenient (23.03%). Nearly one tenth of children have put the blame on their parents saying that their parents won't allow them to go to library (9.52%). 6.34% of children have said that they are not visiting libraries as the newspapers and magazines are being subscribed at home. Non-availability of Internet is a cause for 5.56% of children for not visiting public libraries. A very small percentage of children have said that nothing is available in the library and hence they are not visiting. One child under study said that " I don't need library".

Table 12: Importance of public libraries (N=162)

Reasons	Not at all convincing	Not very convincing	Can't say	Somewhat convincing	Very convincing	Mean
Librarians help all kinds of users find information, from all sources -printed and electronic	19	17	60	29	37	2.68
Libraries: Places for education, self-help, and offer free access to all.	3	6	00	145	8	3.92
Libraries: Place of lifelong learning.	00	00	162	00	00	3.00
Library technology: Information from around the world is available through the internet.	00	00	67	60	35	3.8
In a typical library, children can be listening to a storyteller, first-time computer users can be learning to navigate the internet, users can get a wide range of books and students get information to help their	00	00	75	65	22	3.67

studies.						
Librarians are trained experts in finding the right information, wherever it is – in books, or on the internet.	00	00	162	00	00	3.00
Libraries can help all kinds of people in many ways. You can get help with job applications, find delicious recipes, find government information or help with homework. The library does all these things.	00	00	162	00	00	3.00
Libraries play an essential role in our democracy and are needed more now than ever.	00	00	00	145	17	4.14
The library is a safe and welcoming community space where everyone feels welcome. People see their friends and neighbors there.	00	00	162	00	00	3.00

Children irrespective of whether they were using the library or they were outside the premises were asked to rate the importance of librarians and libraries for few statements (made in Kannada and English) on a 5-point Likert scale from not at all convincing (value 1) to very convincing (value 5). The calculated mean value ranges between 2.68 and 4.14. A mean value of 2.68 for the statement "Librarians help all kinds of users find information, from all sources -printed and electronic sources such as books including the internet" indicates that the children could not say anything and that they do not have any clear idea. The same analogy holds good for the following statements "Libraries are a place of lifelong learning" (mean: 3.00), "Librarians are trained experts in finding the right information, wherever it is – in books, or on the internet" (mean: 3.00), "Libraries can help all kinds of people in many ways. You can get help with job applications, find delicious recipes, find government information or help with homework. The library does all these things" (mean: 3.00), and "The library is a safe and welcoming community space where everyone feels welcome. People see their friends and neighbors there" (mean: 3.00). It indicates that children are not aware of what library is and how it can help them. A mean value of 4.14 for the statement "Libraries play an essential role in our democracy and are needed more now than ever" indicates that children understand the role of libraries in democracy.   Children are somewhat convincing with the statements "Libraries are places for education, for self-help, and offer free access to all" (mean: 3.92), "Today's library technology means that information from around the world is available through the internet (mean: 3.8) and "Libraries are changing and dynamic places. In a typical library, children can be listening to a storyteller, first-time computer users can be learning to navigate the internet, users can get a wide range of books and students get information to help their studies" (mean: 3.67).

Children under study irrespective of whether they were using the library or found outside the library, were asked to list five expectations from the library in the order of preference. The preferences were tabulated and mean was calculated by assigning values to the preferences (5 to I preference, 4 to II preference, 3 to III preference, 2 to IV preference and 1 to V preference). From table 13 it can be observed that Internet is first preferred expectation for 30.2% of children. For 23.5% of children having educational materials relevant to their courses in the library is a second preferred expectation and also fourth preferred expectation (20.4%), while books on general knowledge were preferred by 17.9% of children as third preferred expectation. Xerox facility was the fifth preferred one by 22.2% of children. From the table it can be interpreted that Internet with a mean value of 2.96 is the first preferred expectation of children, while developing educational materials relevant to their courses and also developing books on general knowledge are the second and third preferred expectations. Developing e-resources, building reference books like dictionaries and encyclopedia, developing comics and video games collection, and setting up of Xerox facility were fourth, fifth, sixth and seventh preferred expectations. Indoor game facilities were the eighth preferred expectation. It is surprising that no child preferred radio or TV in the library.

Table 13: Children's expectations of libraries (N=162)

Expectations	I preference	II preference	III preference	IV preference	V preference	Mean (Rank)
Internet	49 (30.2%)	29 (17.9%)	26 (16%)	20 (12.3%)	00	2.96 (I)
E-resources	16 (9.9%)	23 (14.2%)	26 (16%)	23 (14.2%)	19 (11.7%)	1.92 (IV)
Books on general knowledge	36 (22.2%)	20 (12.3%)	29 (17.9%)	17 (10.5%)	16 (9.9%)	2.2 (III)
Educational materials relevant to their courses	17 (10.5%)	38 (23.5%)	28 (17.3%)	33 (20.4%)	21 (13%)	2.58 (II)
Comics and video games	17 (10.5%)	19 (11.7%)	18 (11.1%)	19 (11.7%)	27 (16.7%)	1.73 (VI)
Reference books like dictionaries and encyclopedia	17 (10.5%)	17 (10.5%)	21 (13%)	28 (17.3%)	29 (17.9%)	1.86 (V)
Xerox	9 (5.6%)	13 (8.0%)	11 (6.8%)	11 (6.8%)	36 (22.2%)	1.16 (VII)
Radio	00	00	00	00	00	00
TV	00	00	00	00	00	00
Indoor game facilities	1 (0.6%)	3 (1.9%)	3 (1.9%)	11 (6.8%)	14 (8.6%)	0.38 (VIII)

3. Conclusion

The study has revealed many facts about children. Children's usage is distinct enough to warrant special attention from the authorities. The results help the authorities and

planners understand better what children expect and what strategic approaches help in this scenario. There is a disconnection between the needs and expectations of the children and the facilities and services provided in the branch libraries. Books on general knowledge, educational materials relevant to their courses, reference books like dictionaries and encyclopedia, collection of comics and video games can be made conveniently accessible to children.

A better reading environment for children be created by filling the gaps in the provision of book collection for children. To satisfy the information needs of children, the branch libraries of City Central Library, Vijayapura must be ready to provide various library services. It is expected that collection in different languages and formats should be provided to the children to help them in their academic activities. Internet the most demanding expectation by children needs to be introduced in the branch libraries. Xerox facility is another one expected by children. Personal visits to all the branch libraries and interaction with children shows that library services in the branch libraries are largely inadequate to meet the needs of children. The authorities should be more committed to developing effective library services in order to increase the visibility of the library among the user community and consequently attract the attention of the children. It is high time that children must be given a warm welcome in the library. Children irrespective of age, gender, type of schooling must be encouraged to explore the resources of public libraries.

The public library authorities must go for organizing mass awareness programs to attract the children. Children are enthusiastic but are unable to make it to the library premises. They know library as a place to read but many of them are in confusion about the role expected of public libraries. They are unaware of the latest developments taking place in libraries. They have specific expectations from the public libraries. They want Internet, e-resources, in the library premises. If public libraries are developed with relevant materials required by the children, children tomorrows citizens will use it.

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Evaluation of College Library Buildings in the Light of Five Laws of Library Science: *A Study of Medical College Libraries of Vijayapura, Karnataka*

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Abstract: The present work evaluates the buildings of medical college libraries in the light of Dr. S.R. Ranganathan's Five laws of library science using survey method of research to find out: to what extent these libraries satisfy the implications of five laws of library science with regard to library buildings. The study is based on a structured questionnaire distributed among the medical college students of Shri B. M. Patil Medical College Hospital & Research Centre and Al-Ameen Medical College, Vijayapura.

Key words: Medical libraries, Five laws of Library Science, Dr. S. R. Ranganathan, Library Building, Medical Council of India, User Survey.

1. Introduction

Dr. S.R. Ranganathan has contributed many new ideas to library and information science as a discipline. Dr. Ranganathan enunciated various laws, principles, canons, theories, etc., in Library and Information Science. His theories are based on scientific principles. They are accepted universally and are relevant even today. The five laws of library science enunciated by Ranganathan in the year 1928 and published in 1931 are the first fundamental laws in the field of library science. The Fives Laws of library science are:

1. Books are for use
2. Every reader his/her book
3. Every book its reader
4. Save the time of the reader
5. The library is a growing organism

The first law, "Books are for use" is a simple statement which is self evident. It has implications on library staff, library building, and location of a library, library hours, book selection, shelf arrangement, reference service and maintenance. The second law "Every reader his/her book" emphasises on the reader who is the primary factor. It has implications on library legislation, book selection, shelf arrangement cataloguing, maintenance, reference service, resource sharing, open access and responsibility of the users etc. The third law prescribes "Every book its reader" where the emphasis is on the book. It implies that there should be maximum use of books by their users. This law has implications on book selection, shelf arrangement, cataloguing, reference service, accessibility, open access and extension service. The fourth law says "save the time of the reader". Employing the best available technologies to provide quick access to materials or using an online catalogue also saves the time of the reader. This law has implications on shelf arrangement, cataloguing, centralized cataloguing and classification, library services, qualifications of librarian, accessibility, signage system, library guide, location of a library, special sequences of books, library publicity, use of information technology, and management of libraries. The fifth law "A library is a growing organism" recognises a library's growth in terms of documents, readers and staff. It has implications on extension of library building, storage and weeding, choice of a classification scheme, shelf arrangement, and physical form of a catalogue, choice of a catalogue code, reference service, user education, library orientation, and staff.

Thus five laws have many implications on libraries, library services, personnel, users and every other concept concerned with libraries. These five laws could be used very well to evaluate any category of libraries. The review of literature reveals that Venkatiah (1978) related the philosophy behind inter-library loans to each of five laws. Bhattacharyya (1979) discussed the relevance of networks of libraries and information centres in the light of five laws and stresses on its adoption by the libraries. Neelmeghan (Sept 1992) suggested that the design of library buildings should facilitate open access, browsing, quick reading and selection of documents, development of structure for absolute syntax in information processing and organization, providing analytical entries, and many other entries in catalogue, development of reference services, documentation service, information service, and computerbased information services, studies in librametrics, bibliometrics, informetrics are all the results of five laws. Cochrane (1992) interpreted that five laws can serve as useful guidelines and criteria for assessing the value of information technology. Viswanathan (1992) also examined the validity of fifth law in the context of advancements in modern technology and their impact on libraries. Itner (1995) opined that with very little revision, five laws retain their fundamental importance as building blocks of professional responsibility. Estes (1996) observed that applying five laws to technology can build a system to manage both externally and internally created information. Kuronen (1996) evaluated the potential of the electronic library (virtual library) to provide information for the public in light of five laws by rephrasing certain laws in the context of electronic information resources and points to opportunities to make additions to the laws in light of new services and the Internet. Kaur (2000) examined how five laws serve as guiding principles in assessing the usefulness of information technology in library and information services. Dasgupta (2007) discussed the implications of five laws on library staff's qualification and scholarship, professional training, status, their

responsibility, their attitude towards readers, staff and psychology, personal service, staff and social service. Shah (2007) in his editorial noted that these laws are still relevant today, they are to be applied suitably to meet the challenges and changing requirements by library and information profession. Ranganathan's five laws of library science are reconsidered by Nicholas (2010) in the context of the changing library environment and are used to demonstrate how libraries can remain relevant, by highlighting a benchmarking pilot project that is being considered by a group of librarians in the special libraries section of the Library and Information Association of Jamaica and how one special library has adopted appropriate measurement and evaluation techniques to define its value in the organization. Hence the present study has been undertaken.

2. Library Buildings

There are many standards available in the Indian context that have laid down standards and guidelines for the library buildings. Besides Dr Ranganathans five laws, the Bureu of Indian Standards, and apex bodies like ICMR and other such agencies have laid down guidelines.

- **Indian Standards:** The IS 1553-1960 Code of Practice Relating to Primary Elements in the Design of Library Buildings prescribes the average size of different types of libraries, the different kinds of rooms required; the basis and method of estimating the dimension of each kind of room, etc.

- **Medical Council of India (MCI):** The Medical Council of India (MCI) which is the apex body in India regulating medical education prescribes the following as the mandatory requirements for the library of a medical college as per Amendment Notification dated 8th July 2009 of Medical Council Act, 1956 (102 of 1956). There shall be an air-conditioned Central Library (2,400 Sq.m) with seating arrangement for at least 300 students for reading and having good lighting and ventilation and space for stacking and display of books and journals. There shall be minimum one room for 150 students inside and one room for 150 students outside.

There shall be provision for

a) Staff reading room for 30 persons; b) Rooms for librarian and other staff; c) Room for daftaries and book binders; d) Microfilm reading room; e) Journal room; f) Room for copying facilities; g) Video and Cassette room (desirable); and h) Air-conditioned Computer room with Medlar and Internet facility with minimum of 40 nodes. There shall be provision for e-library also. Further, MCI insists that there shall be a Departmental library-cum-seminar room (30sq.m. area) with at least 80-100 books. (Rathinasabapathy).

In the planning of library buildings, Ranganathan's five Laws of library science with their possible implicationsis used as basic principles. On the other hand Kaula has summarized the principles enunciated by different specialists as follows (Singh):
- Building should be designed on the functional basis;

- Physical design should be governed by the functions of the library;

- Interior details should be planned anterior to the exterior;

- Building should provide economy in administration and Operation;

- Main study areas should be close to the book shelves and stacks;

- Building should represent simplicity in character;

- Consideration should be given for expansion and anticipated development in the future;

- Physical conveniences should be in proportion to the number and nature of Clientele and library staff;

- Details of the library should be worked out, based on the existing data and the proportional future growth; and

- Plan of the building should be adaptable to the future growth and development.

3. Research Design

The primary objective of the study was to evaluate the medical college libraries of Vijayapura in the light of Dr.S.R.Ranganathan's Five Laws of Library Science. A survey method of research using structured questionnaires is been employed for the collection of data, to evaluate the medical libraries in the light of five laws of library science. The designed questionnaire was distributed to the users of two libraries of medical colleges in Vijayapura district namely Al-Ameen Medical College and Shri B M Patil Medical College Hospital & Research Centre. In total 130 questionnaires have been distributed among which 96 questionnaires have been replied with a response rate of 73.8%.

4. Data Analysis

Table 1-Location of Medical Library

Colleges	Frequency	Percentage
Beyond the zone of accessibility	2	2.1
Central place	44	45.8
Distance of few minutes' walk	50	52.1
Total	**96**	**100**

From Table 1 it is found that, 52.1% (N=50) of the respondents feel the location of a medical library is at a distance of few minutes' walk, 45.8% (N=44) of the respondents felt that the library is at the central place and only 2 (2.1%) respondents said the library is beyond the zone of accessibility. By this we can say that the medical libraries go with the implications of First Law of Library Science of situating the library building at a distance of few minutes of walk.

Table 2 - Status of Library Buildings

Library Building	Frequency	Percentage
Independent	96	100
Part of the main buildings	0	0
Total	**96**	**100**

When referred to the status of Library buildings all the respondents agree that they have an independent building of their library.

Table 3 - Suitability of library buildings

Suitability	Frequency	Percentage
Yes	96	100
No	0	0
Total	**96**	**100**

Also with reference to the suitability of their library building 100% of the respondents believe that their library building is suitable for their use, which satisfies the first law of library science.

Table 4 - Convenience of library buildings for use

Convenient to use	Frequency	Percentage
Yes	96	100
No	0	0
Total	**96**	**100**

After analysing the convenience of the library building for use, it is found from the above table that 100% (N=96) of the respondents feel that their library building is convenient for them to use.

Table 5 - Planned library buildings

Well planned	Frequency	Percentage
Yes	83	86.5
No	13	13.5
Total	**96**	**100**

With reference to the planned library buildings it is found that 86.5% (N=83) of the respondents feel that their library building is well planned and the remaining 13.5% (N=13) of them feel that the library buildings are not planned properly.

Table 6 -Description of library buildings

Description	Frequency	Percentage
Office staff room is convenient	16	16.7
Unfit room	0	0
Small rooms	0	0
Big hall	36	37.5
Quite spacious	44	45.8

Table 6 describes the different rooms of library buildings and it is found that 45.8% (N=44) of the respondents feel their library buildings to be quite spacious, 37.5% (N=36) of the respondents say that there are big halls in their library buildings, 16.7% (N=16) of them feel their office staff rooms to be convenient. None of the respondents say that they have small or unfit rooms, and this satisfies the implications of the Fifth Law of Library Science.

Table 7 - Internal Furniture's used in the Medical Libraries

Internal Furniture	Frequency	Percentage
Book shelves	70	72.9
Book display cases	42	43.8
Catalogue cabinet	42	43.8
Circulation desk	36	37.5
Pamphlet boxes	8	8.3
Cartographic boxes	2	2.1
Vertical files	2	2.1
Reading table	64	66.7
Notice board	58	60.4
Chairs	68	70.8
Dictionary stands	18	18.8
Book trolley	12	12.5

The internal furniture's used in Medical libraries are discussed in table 7. It is found that 72.9% (N=70) of the respondents use book shelves, 70.8% (N=68) of them use chairs available in the library, 66.7% (N=64) of them use reading tables, 60.4% (N=58) of them use the notice boards available, 43.8% (N=42) of them use book display cases and catalogue cabinets, 37.5% (N=36) of them use circulation desks, dictionary stands are used by 18.8% (N=18) of them, book trolleys are used by 12.5% (N=12), pamphlet boxes are used by 8.3% (N=8) of them and only 2.1% (N=2) of the respondents use cartographic boxes and vertical files for their reference.

Table-8: Good lighting facilities in medical libraries

Good lighting	Frequency	Percentage
Yes	96	100
No	0	0
Total	**96**	**100**

When analysed table 8 to know good lighting facilities in medical libraries it is found that 100% (N=96) of the respondents say that they have good lighting facilities in their libraries.

Table-9: Good ventilation facilities in medical libraries

Good ventilation	Frequency	Percentage
Yes	96	100
No	0	0
Total	**96**	**100**

Regarding good ventilation facilities in the medical libraries, it is found from table 9 that 100% (N=96) of them feel that their libraries possess good ventilation facilities.

Table-10: Availability of fans in medical libraries

Fans	Frequency	Percentage
Yes	96	100
No	0	0
Total	**96**	**100**

When investigated about availability of fans in medical libraries it is found that all 100% (N=96) of the respondents agree that they have fans available in their libraries.

Table 11 - Types of furniture's used in medical libraries

Type of Furniture	Frequency	Percentage
Wooden	82	85.4
Steel	4	4.2
Fiber	10	10.4
Total	**96**	**100**

Table 11 describes the types of furniture's used in medical libraries, it is found that 85.4% (N=82) of the libraries have wooden furniture's, 10.4% (N=10) of them say that their libraries have fibre furniture's and only 4.2% (N=4) of them say that they use steel furniture's in their libraries.

Table 12 - Comfortableness of Furniture's for long reading

Comfortableness	Frequency	Percentage
Yes	92	95.8
No	4	4.2
Total	**96**	**100**

When asked regarding comfortableness of the library furniture's for long reading it is found from table 12, that 95.8% (N=92) of them feel their library furniture's to be comfortable rest 4.2% (N=4) of them do not find the furniture's comfortable for long reading purpose.

5. Conclusion

The results indicate positive results. The Medical college libraries have their buildings which satisfy the implications of five laws of library science. These libraries are well established and both are around 30 years old. The buildings have been properly designed keeping in view the IMA guidelines Shri. B. M. Patil Medical College Hospital & Research Centre library being a university library has better facilities than the other library. The college authorities ensure a healthy working environment for its staff and extend career promotion. The authorities also ensure that the college library should get an independent and well planned library, which is attractive and easily accessible, suitable for library purposes, suffice for a longer duration and the buildings are functional for future expansion, with good lighting and ventilation, and comfortable furniture. The librarians follow the proper preservation methods to keep the books in good condition. User studies are conducted regularly and their implications have to be incorporated in CDP and other policies. The other libraries must also find alternative ways to meet space problems. The libraries must implement all such practice that is prescribed under the five laws of library science.

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Libraries and Space Management : an overview

Dr. Dharam Kumar
Dr. Pardeep Rai

Abstract: The Change is eternal. The libraries since their inception have witnessed the change. From Clay tablets to digital documents the journey of change has passed through many dimensions. The Growth in library collection and changing role of libraries in society from learning centres to the place of contemplation and comfort has created the problem of space as challenge to the library community to relook into the internal planning of the library building so as to fulfil the pressing expectations of the users from a modern library building. The paper highlights the problem of shrinking library space and its possible solutions given by Library Scientists.

"When everything is online why do come to library at all?". It is an important question being asked by the people. The question also raises the doubts on the existence of libraries in the future. To answer the questions it is said that the library that is sustained by the community will be the library that sustain the community.

The academic and special libraries are always attached to an institution except the public libraries. Therefore the location of the public libraries is the busiest place of the town or city because of its accessibility to the public. In case of academic libraries they are the central point of any university or college. The academic libraries are considered to the most important learning centre of the institution – both symbolically and in terms of its physical placement. The present era is the Information Age, the information is the key ingredient for the development and prosperity of any nation. The Information turns into knowledge and evaluated and assimilated knowledge turns into wisdom. This transformation from information to wisdom takes place in the library. From very ancient times systems and space for conservation and dissemination knowledge exist though they were not named as library or archive. The Men used to illustrate his experiences on the walls and other safe places to be utilised by future generations. Media for recording knowledge witnessed change from cave wall to stone, clay tablets, metal sheet, palm leaf, paper to digital media and real to virtual. Similarly, the library space also evolved with facilities and systems to manage these changes from prehistoric to the modern age digital collection. The Earliest civilizations started in Mesopotamia and Indus thus the libraries of that time were managed by the scholars. The Medieval period witnessed the learning and scholarly work and the documents collection thus well designed and impressive library buildings were built at Nalanda, Taxila and other seats of learning in India.

The renaissance led to the invention of printing and the wide distribution of knowledge and ideas. The spread of education led to the establishment of numerous educational institutions like Oxford University and Cambridge University etc. and libraries were developed as their central hub to acquire and manage documents that support their activities as well as to manage and conserve the knowledge generated there. The magnificent beautifully designed buildings, best in their campuses, housed those libraries. The invention of printing press also led to the explosion of printed material which flooded

in the libraries, causing the problem of storage space. During the last century libraries, regardless of size have to double their stack at least in every decade. In addition to the printed books and documents the other formats like audio – video tapes, gramophone records, microfilms, CDs and digital documents also got their presence in the libraries. The developments in ICT have now brought in new digital media. These documents in the other media format also need space if the facility is to be provided to the users. All these have reduced the working space in the libraries and the diminishing exercise is going on uninterrupted because of rapid growth of digital or non book material in addition to the printed documents. The libraries are neither purely having traditional printed documents nor they are fully digital or paperless. Thus in the hybrid libraries the problem of space management is emerging rapidly and the top priority to be given for its solution.

In earlier days the libraries were expected to provide the library services to the users. In this context the library Services means the traditional services of Reference, Circulation, Reading Room and Reprographic services to the users. The advent of ICT in libraries has changed the concept of services provided to the users. Instead of manual traditional services of Circulation, Reference and reading room the users expect many more services in the libraries. Though these services may not be called as library services but the matter of the fact is that they are the need of every library to hold its importance in the academic world. These services are: - General computer lab(s); Snack bar or cafe; Conference/meeting rooms; Auditorium; Tutoring centre; Archives; Bookstore; Photocopy/Xerox; Art gallery or museum space ; Exhibition area; Video watching room; Audio room; CD/DVD library; multimedia centre; News watching facility; Writer's cabin; Incubator (Thinking Cell); meditation/assimilation room. In other words it may said that the library should have Space for Discussion among friends, Open Space for Refreshing after long deep study, Room for Presentation through IT for students, Seminar Room for librarian, Multimedia Room for screening films and presentations by library staff, Cafteria, Toilets, Drinking Water and cozy interior with natural light and proper Ventilation of air, Silence Zone for Reading with air conditioning and IT resource centre.

Thus on the basis of the above stated facilities the library is considered to be place for many activities. It is a meeting place with the friends. The library also serves as a significant social role. It is a place where people come together on levels and in ways they might not in the hostles, class room or off campus location. The students on entering in the library want to be the part of the richness of tradition of scholarship as well as its expectation to the future. Thus library is a place for community and contemplation. In addition to it, the library also serves as a place of reading and relaxing in safety and in quite. It is also used for day dreaming, thinking experiences of intimate moments in students life.

The problem of space in the libraries has been addressed by many library scientists and even Dr. S R Ranganathan in his basic five laws of Library Science visualised this problem. His Fifth Law of Library Science " Library is a Growing Organism" is primarily addressing the problem of space management in the libraries. While interpreting the above law, the growth of the library have manifold dimensions – i.e. growth in the collection, in the technologies, in the form of services, in the needed skills to the librarian etc.. The growth in the collection directly affects the needed physical space of the library. As stated above, even

in the digital era the book publishing is on healthy trend and the libraries will continue to struggle with space problem, the statistics of information generation and acquisition of information resources in the libraries reflects this phenomena, through- out the world. Even the presence of e-resources does not stop or reduce the acquisition of new printed material and the rapid pace of acquisition of printed material is being still maintained in the libraries. The fifth law has got a specific implication to see into the library space planning to accommodate all new documents, technologies, services etc., keeping in view the user's future needs, dealing with un-certainty and new environment to come. Growth or expansion is natural and it needs more space to accommodate those changes, the effective planning and proper utilisation of space is the only solution. Ranganathan's Fifth law is a call for the proper planning of the library space so as to fit into changing needs of the users.

The Indian Standards Institute now known as Bureau of Indian Standards, appointed Dr. S. R. Ranganatahan as the chairman of its first Documentation Sectional Committee, which fixed accorded priority to the areas of Library buildings, furniture and fittings. The committee finalised its draft for standards regarding Buildings, Furniture's and Fittings and as a result IS: 1553 – 1960 Code of practice relating to Primary elements in the design of library building came into existence that gives information on the following things:-

I   The average size of different types of libraries in terms of the number of books bound volumes of periodicals, number of current periodicals for display, the number of seats for readers and strength of staff;
II   The different kinds of rooms required for different libraries; and
III   The basis and method of estimating the dimension of each kind of room etc.

Ranganathan has touched and envisaged minute details of all the areas to be adhered to while constructing the libraries. If the guidelines given by Dr. S R Ranganathan, are followed, the library would be capable of accommodating all the future needs.

Since 1960 the following more Standards have been developed by the Indian Standards Institution for interior planning of the libraries. They are as follows:

1. IS: 2672 – 1966- Code of Practice for Library Lighting
2. IS: 1892 (Part I) – 1978- Specifications for Library Furniture's Fittings, Part I Timber (1st Revision).
3. IS: 1892 (Part2) – 1977 – specifications for Library Furniture's Fittings, Part 2: Steel.
4. IS: 1233 – 1969 – Recommendation of Modular Coordination of Dimensions in the Building Industry (1st Revision).
5. IS: 1172 – 1971 – Code of Basic requirements for Water Supply, Drainage and Sanitation (2nd Revision).
6. IS: 1883 – 1975 – Metal Shelving Racks (Adjustable Type) (2nd Revision)
7. IS: 8338- 1976 – Recommendations relating to Primary Elements in Design of School Library Buildings.

8. IS: 3312 – 1974 – Steel Shelving Cabinets (Adjustable Type)(1st Revision).
9. IS: 4116 – 1976 – Wooden Shelving Cabinets (Adjustable Type) (1st Revision).

The above stated specifications are indicative only, otherwise the architecture may plan better design of the library buildings.

In Japan, the solution of space problem is believed to under the philosophy of **KAIZEN.** The formula of **5S** i.e. **sort, straighten, shine, standardize** and **sustain**. **KAI** means change and **ZEN** means good. It means that change to good. 5S is the abbreviation of Japanese terms with five initials of S. These are 1.**Seiri**, 2. **Seiton**, 3. **Seiso**, 4. **Seiketsu**, and 5, **Shitsuke**. 5S and KAIZEN are two basic methods of the Total Quality Management. 5S engages people through the use of standards and discipline to manage the organisation. The 5S methodology is a very good philosophy that goes beyond just making the workplace clean. According to 5S Sort (Seiri) means **sort** out the needed and not needed in the area. Anything that is not needed at the work place is removed to be stored, disposed or destroyed. **Straighten** (Seiton) means arrange items in order that area needed so that they are ready and easy to use. Clearly identify the location for all items so that anyone find them and return them once the task is over. **Shine** (Seiso) means Clean the workplace and equipment on regular basis in order to maintain standards and identify defects. It also sets the standards that should be there in the *Gemba* daily. **Standardise** (Seiketsu) means repeat the first three steps of 5 S on a frequent basis and conform the condition of the *Gemba* using standard procedures. **Sustain** (Shitsuke) means rules have to be maintained and continue to improve every day. Audits are done by the employee with standard rules. 5S is a simple way of installing discipline in the workforce at the same time motivating employees to creatively solve the problems at the workplace. Kaizen is recognised worldwide as an important pillar if an organisation long term competitive strategy.

The practice of KAIZEN is based on the following principles:-

1. Good processes bring good results.
2. Manage by facts and collect data.
3. Analyse the current situation and grasp matter.
4. Action should be taken to correct the root causes of problems.
5. Work as team.
6. Kaizen is everyday business.

The central feature of Kaizen is that the big results are achieved by making small accumulated changes over a period of time. The 5S procedure is followed in the library context to solve the space problem. This is in this way that **Sort** out the needed and not needed in the library, mainly the withdrawn and weed out books are removed away to create a space in the library to keep other things. Straightening the item like file and registers made us to provide place for each and every thing by giving numbers to each one. The main gain that is achieved during the exercise is help to get things from the general work place. It makes cost benefit and also arranges for some more space for the particular section of the library. Training should be given to all the workers to drive 5S initiative can be done within a short time. Inter personal relationship and communication developed

rapidly due to the frequent training programs. Team spirit is achieved when workers are involved in any joint activity. The Librarian should select and prepare a small team for 5S program before it can start. 5S programme in totality makes the environment of organisation neat and tidy along with customer satisfaction.

According to Harry Faulkner – Brown, although internal arrangements and user services vary from place to place and from one type of library building to another, modern buildings of all sizes have several common factors, which have been crystallised into the following desirable qualities, otherwise known as 10 commandments. It is like this. A library should be:-

Flexible - with a layout, structure and services which are easy to adapt;

Compact – For ease of movement of readers, staff and books;

Accessible – from the exterior into the building and from the entrance to all parts of the building, with an easy comprehensible plan needed minimum supplementary directions.

Extendible – to permit future growth with minimum disruption.

Varied – in its provision of book accommodation and of reader services to give wide freedom of choice.

Organised – to impose appropriate confrontation between books and readers;

Comfortable – to promote efficiency of use;

Constant in environment – for the preservation of library materials;

Secure – to control user behaviour and loss of books;

Economic – to be built and maintained with minimum resources both in finance and staff.

Libraries remain amongst the most socially – inclusive, enduring and well used places in modern society and creating good buildings is critical not only to the future of our universities, but also to the intellectual capital of our countries. The society is witnessing unprecedented and dynamic change in higher education, technologies and management. These trends, and the considerable challenges they present to planners are likely to continue at an ever – increasing pace. Tomorrow's libraries will look and feel very different places from yesterday's buildings. Even though demonstrating the impact of good library design on learning, teaching and research remains an elusive challenge. It is reassuring for all those involved in the planning process that successful new libraries continue to encourage even greater use of both traditional and virtual services, often stimulating a two or three fold increase in demand.

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Theme V: Technologies and Content Development

Application of Technology in to Library Services in changing Scenario: *Issues and Challenges*

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Abstract: The difficulties and ramifications of technological change are many. The technology innovation and worldwide expansion in enterprises, especially in information technology has gradually triggered a rapid growth of emerging and cutting technologies in the digital age. The rise and use of social media tools, the ubiquitous nature of global search using Google, search engines make access to global news, business and decision influencing content easily available. The rise application of technology systems, understanding of the changes brought by technologies help us understand these trends and develop strategies to use to advance our role within our organizations.

Keywords: Technology, ICT, Emerging technology, Technological factors, Issues

1. Introduction

The technological innovation system is a concept developed within the scientific field of innovation studies which serves to explain the nature and rate of technological change. Rapid advances in ICT and its applications are dramatically affecting economic and social activities, as well as the acquisition, dissemination and use of knowledge. The use of ICT is reducing transaction costs and lowering the barriers of time and space, allowing the mass production of customized goods and services. With ICT use becoming all-pervasive and its impacts transformational, it has become an essential backbone of the knowledge society. The information infrastructure in a country consists of telecommunication networks and strategic information systems. Recent advances in information technology have provided new ways of dealing with information in academic libraries. Such systems may be designed by providing information seekers with alternative interface mechanisms for displaying and manipulating multiple levels of representation for information objects.

2. Acquiring New Technology and Capabilities

Significant amounts of our time and energy are devoted to creating, managing, and avoiding information. Computers and telecommunications technology have extended our regard for information and are driving changes in how we learn, work, and play. One result of these developments is that skills and strategies for storing and retrieving information have become more essential and more pervasive in our culture. Information seeker to choose what strategy to apply according to their immediate needs. Such systems may be designed by providing information seekers with alternative interface mechanisms for

displaying and manipulating multiple levels of representation for information objects The system components of a Technological Innovation System are called structures. These represent the static aspect of the system, as they are relatively stable over time. Three basic categories are distinguished:

- **Actors:** Actors involve organizations contributing to a technology, as a developer or adopter, or indirectly as a regulator, financier, etc. It is the actors of a Technological Innovation System that, through choices and actions, actually generate, diffuse and utilize technologies. The potential variety of relevant actors is enormous, ranging from private actors to public actors, and from technology developers to technology adopters. The development of a Technological Innovation System will depend on the interrelations between all these actors.

- **Institutions:** Institutional structures are at the core of the innovation system concept It is common to consider institutions as 'the rules of the game in a society, or, more formally, the humanly devised constraints that shape human interaction'. A distinction can be made between formal institutions and informal institutions, with formal institutions being the rules that are codified and enforced by some authority, and informal institutions being more tacit and organically shaped by the collective interaction of actors. Informal institutions can be normative or cognitive. The normative rules are social norms and values with moral significance, whereas cognitive rules can be regarded as collective mind frames, or social paradigms. Examples of formal institutions are government laws and policy decisions; firm directives or contracts also belong to this category. An example of a normative rule is the responsibility felt by a company to prevent or clean up waste. Examples of cognitive rules are search heuristics or problem-solving routines. They also involve dominant visions and expectations held by the actors.

- **Technological factors:** Technological structures consist of artifacts and the technological infrastructures in which they are integrated. They also involve the techno-economic workings of such artifacts, including costs, safety, reliability. These features are crucial for understanding the feedback mechanisms between technological change and institutional change. For example, if R&D subsidy schemes supporting technology development should result in improvements with regard to the safety and reliability of applications, this would pave the way for more elaborate support schemes, including practical demonstrations. These may, in turn, benefit technological improvements even more.

2. The Role of the World Wide Web in Changing Culture

The World Wide Web and electronic mail before it have changed the way that academics communicate, access, and disseminate information. Electronic mail started out primarily in the scientific community as a means to keep scientists in touch with each other. Humanists were much slower to make use of e-mail (they are not collaborators), and have been equally slow to use the WWW for their research and teaching (information is often not old

enough or not available online). Humanities materials have not easily lent themselves to electronic dissemination. Humanists like to see the original document or artifact, the original artwork or musical score, and have not trusted electronic media to do an adequate job of making information available. As electronic information access technologies improve it is possible that humanists will slowly become more willing to learn these technologies and disseminate their work in digital formats. Until that time there will remain a large informational and cultural gap between scientists and humanists.

3. Five Things Are Changing in Emerging Technologies

The new paradigm thinking in science reaffirms the constant change occurring in our view of nature and our understanding of the process of the acquisition of knowledge in man. The ways and the speed with which the components of the environment change and are interrelated are tremendous. Considered at the national and global levels, groups and individuals will communicated directly and do business with each other in a decentralized and wired society, transcending national borders. These changes will be reflected in the anatomy of organization. They are:

- Books

- Behavior

- Search

- Access

- Mobile

4. Changes in the technological Infrastructure

As computers become more affordable and more and more users their own, what impact does this have on library use? What impact do wireless access and the growing number of student-owned laptops have on library use? Students clearly prefer desktop delivery of information and if they have a personal networked computer, in their eyes they may have no need to come to the library - hence the decline in gate counts and reduced circulation of traditional library materials.

- **Environmental Factors:** In the absence of environmental contextual data, traditional measures are difficult to interpret and explanations of why library use is changing are destined to be speculative. The larger context surrounding libraries must be examined to identify environmental factors that may be influencing the changes occurring in libraries and confounding interpretation of library trend data.

- **Mobile:** New advances in hardware and software are making mobile "smart phones" indispensible tools. Just as cell phones have leapfrogged fixed line technology in the telecommunications industry, it is likely that mobile devices with internet access and computing capabilities will soon overtake personal computers as the information appliance of choice in the classroom.

- **Ubiquitous learning:** With the emergence of increasingly robust connectivity infrastructure and cheaper computers, school systems around the world are developing the ability to provide learning opportunities to students "anytime, anywhere". This trend requires a rethinking of the traditional 40 minute lesson. In addition to hardware and Internet access, it requires the availability of virtual mentors or teachers, and/or opportunities for peer to peer and self-paced, deeper learning.

- **Behavior: Theories of Information Seeking and Use:** An excellent example of academic cultural differences is in the field of information seeking and use. Information-seeking research looks at how individuals go about finding the materials that they need in order to satisfy informational needs both professional and recreational. In the ethnographic experience of an unfamiliar worship service, an individual might gather clues about standing-sitting-kneeling through watching others, through listening for directions from an authority, or through written materials available somewhere in the place of worship. In the university, academics usually follow the patterns established by their peers, relying upon mentors in their fields to guide them in graduate school and early professional development. Differences of style come from both the individual—his or her own personal traits, predispositions, and biases, and from the training that he or she has received in a particular discipline. Thus, culture, including the ways individuals seek information, is passed on through apprenticeship and practice.

- **Search:** Many users of online and other automated information systems want to take advantage of the speed and power of automated retrieval, while still controlling and directing the steps of the search themselves. They do not want the system to take over and carry out the search entirely for them. Yet the objective of much of current theory and experimentation in information retrieval systems and interfaces is to design systems in which the user has either no or only reactive involvement with the search process. It is argued here that the advanced information retrieval research community is missing an opportunity to design systems that are in better harmony with the actual preferences of many users—sophisticated systems that provide an optimal combination of searcher control and system retrieval power. In today's information society, the internet and the WWW have become the most important in which to access and located information. If you need information, many people will recommend you to Google, it. If you search for information regarding 'information society' on the web, for example, a list of 11, 50,000 related search results will be generated by the Google web search engine within 0.29 seconds. If you try the same search on yahoo.com, list of 7, 10.000 search results will be available within 0.26 seconds, and if your apply the same search on MSN.com, a list of 2, 40,000 search results will be available. Moreover I believe these lists of search results will become longer and longer as more and more emerging technologies are developed in the coming years.

- **Information Search in an Electronic Environment:** Cognitive research into information need focuses both on recognition of need by individuals and on how differences in individual style can affect patterns of information need, seeking, and

use.   Taylor suggests, nonetheless, that there are four more or less distinct steps in the cognitive process concerned with information need and seeking that are common to most information-gathering situations. At first, need for information is at a visceral, almost subconscious level. Individuals move from a visceral sense to a conscious need for information in the second step.   Third, information seekers formalize their need for information, verbalizing the specific sorts of information products that would ideally answer their need.   Finally, the individual seeking information finds himself in a state of compromise between the ideal information product and actual information products available to him. This compromise can be necessitated because of informational constraints (the information does not exist), because of the nature of the information need (non perfect information is sufficient to answer the need), or because of time constraints (the information exists but the searcher is unwilling to expend more resources—time and/or money—in locating it).   In this last case the penalty for non-use of potential information is not great enough to warrant further expenditure of resources. This compromise position, otherwise termed "satisfying" pits potential availability against potential accessibility and the transaction costs necessary to create access. A humanist might stop collecting resources when there are enough to satisfy a particular information need, even if there might be more diaries, or military records available if one only searched long or hard enough. Information-seeking and use patterns vary between the sciences and the humanities. It is worth noting for the discussion that follows that the bulk of research done into these differences was conducted pre World Wide Web.   This paper ends with a discussion of how the web might change future patterns of cross-disciplinary communication.

5. Library Information Provider in the Developing Countries

Librarians in these countries must be involved in the collection of baseline data, their processing and eventual storage as authentic information about their countries. In research institutions, librarians should not wait to receive the end product of the researchers in form of books, periodicals or conference proceedings. They should be part of the research process. They must adopt an integrated approach to identifying, evaluating, retrieving storing and sharing institutional and national knowledge assets in the forms of intellectual databases, policies, documents and statistical databases.

Developing countries information resources are predominantly in gray form. Conventional publishers do not publish them formally. The first problem therefore is becoming aware of their existence; the second is on how to collect them. National information resource husbandry is a major role for developing countries' librarians. An information resource that is not known to exist cannot in any way become part of a nation's knowledge heritage. Librarians in critical subject areas and institutions such as health, agriculture, the judiciary, education, science and technology owe their organizations the professional duty of ensuring a comprehensive documentation of all information resources emanating from their institutions.

6.   Trends and Issues in Information in an Electronic Environment

The issues and trends in information in an electronic environment can be grouped into technological, economic, human (user and staff), socio-political, organizational, and legal as well as relating to the structure of the information environment itself.

- **Socio-political and Legal Issues:** There are a number of socio-political issues that affect information- seeking behavior. Some governments limit Web access to specific groups within the population. Other governments filter out unwanted sites because of ethical issues. Individuals have personal preferences about the contents and interfaces of sites. Some use only one search engine. Because of the ease of downloading and copying, Intellectual Property Rights of authors are sometimes disregarded. The laws of copyright and the Fair Use Principle apply not only to print resources but also to digital resources.

- **Library Service and Organizational Changes:** Library services have been greatly affected by the shift from print to digital resources. The acquisitions section had to develop new policies about acquiring materials. The reference service had to purchase and make available electronic databases of abstracts and indexes as well as full- text journals, encyclopedias and other reference materials. Even the delivery of information to the user has changed. Digital information can be sent directly to the user's desktop. Librarians have to learn how to use ICT to be able to provide adequate service. Digitization of information materials and their indexes is also being done in-house.

- **Controlled vs. Natural language Indexing:** Controlled indexing makes use of descriptors that have been assigned by human indexers. These descriptors are listed in a thesaurus or in a subject headings list. In producing the concept map for the document, the thesaurus and the subject headings list are consulted for possible descriptors. The controlled vocabulary is advantageous to use because all documents fall into a predefined set of descriptors. Synonyms can be replaced by just one term that will always be used to describe a particular concept. Retrieval is fast and the index is not cluttered with unwanted terms. It is disadvantageous in that sometimes new terms are already in use but the thesaurus or subject headings list have not been updated. It is also expensive to index documents using a list of controlled terms and it can be difficult in practice to do this challenging task accurately and consistently from document to document, and indexer to indexer. In natural language indexing, keywords found in the document are used to describe the document. This kind of indexing can be done by a computer. It is fast but it produces a lot of unwanted, meaningless terms. It is advantageous because it uses words naturally occurring in the document and currently in use. It also provides many more search terms than a small number of controlled indexing terms.

7. Conclusion

Change is inevitable in every field and library is not exception from other. In library new techniques was apprehensive in the beginning of the 20th century. Now we are living the age of Information explosion. In recent years the importance of librarian has been considerably strengthened both at national and international level. Today, Librarian is functioning in a dynamic and changing complex environment. The challenges for the Librarian are to continuously upgrade their knowledge and are to capture the new services time to time. In modern era the Librarian have to change them as the information profession is being changed. It is, therefore, necessary to develop professional skills as well as basic IT operating skills. IT skills are obtained mainly through prolonged experience in use. Therefore, it is part of the social science institutions and associations make a strategy that the social science educational system be so arranged that researchers and students become accustomed to regarding Internet as a tool to be used in the learning process.

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Abstract: Cloud computing technology came up as a boon for libraries and is offering various opportunities for libraries to connect their services with clouds. Cloud computing is a new breed of service offered over the internet, which has completely changed the way one can use the power of computers irrespective of geographic location. This paper attempts to address a short historic view of cloud computing, the advantages for using cloud computing with libraries, cloud computing activities in the libraries in particular in Digital library in particular. The libraries can deploy this technology for providing services to the end users.

Keywords: cloud computing, library services

1. Introduction

This scenario is slowly changing owing to the emergence of new breed of Internet services popularly known as Web 2.0, through which now one can use the power of computers at a completely different location, what it is popularly called as 'in the cloud' or 'cloud computing'. There are many synonyms for cloud computing such as, 'on-demand computing', 'software as a service', 'information utilities', 'the internet as a platform', and others1. Cloud computing refers to use of web for computing needs which could include using software applications, storing data, accessing computing power, or using a platform to build applications. From e-mail, to word processing or photo sharing or video sharing one can use products that live in the cloud, which are secure, backed-up and accessible from any Internet connection. The best live example of this is Gmail, which is increasingly used by organizations and individuals to run their e-mail services. Google Apps being free for educational institutions is widely used for running different applications, especially the email services, which was earlier run using their own computer servers. This has saved cost for the organizations as they pay peruse for applications and services and time for the computer staff, which they can invest on running other services and need not worry about upgrading, backup, compatibility, and maintenance of servers, which is taken care of by Google. Now cloud computing has become a new buzzword in the field of libraries, which is blessing in disguise to run different ICT services without much of a problem as third-party services will manage servers and undertake upgrades and take backup of data. Even though there are some concerns in using cloud services such as privacy, security, etc., some of the libraries have already embraced this new technology to run some of their services. (Nagalingam,2014)

2. Cloud Computing Advantages

Some of the advantages are;

- Openness: The services and data are made available to support greater interoperability, not only within and between cloud services, but also with library developed and third –party applications.

- Extensibility: The platform can easily accommodate the addition of new services and applications, developed either by service provider or by members of the community.

- Data richness: Library can interact with and expose a wide variety of information about purchased, licensed, and digital content through this platform.

- Collaboration: Libraries can harness the collective power of the community of libraries to innovate and share solutions like SMS, e-mail, chat.

- Knowledge and integration: Deeper knowledge of cloud computing is essential as working of the service is totally dependent on the service provider. Similarly, integration is an issue as it will be difficult to integrate equipment used in data centers to host data with that of peripheral equipments in the organization such as printers, USB drives, etc.

- Network connectivity and bandwidth: Since the cloud computing is offered over the Internet, if the connection goes down due to any reason then the organisations suffer from loss of data connectivity till the time it is set. Also the service requires more bandwidth, as it may not work on low-speed Internet connections(Nagalingam,2014)

3. Characteristics of Cloud Computing

The Characteristics of Cloud computing are self-healing, multi-tenancy, scalable, virtualized, flexible, etc., as state below;

- **Self-Healing:** Any application or any service running in a cloud computing environment has the property of self-healing. In case of failure of the application, there is always a hot backup of the application ready to take over without disruption.

- **Multi-tenancy:** With cloud computing, any application supports multi-tenancy - that is multiple tenants at the same instant of time. The system allows several customers to share the infrastructure allotted to them without any of them being aware of the sharing. This is done by vitalizing the servers on the available machine pool and then allotting the servers to multiple users.

- **Scalable:** Cloud computing services are linearly scalable. The system is able to break down the workloads into pieces and service it across the infrastructure.

- **Service-oriented:** Cloud computing systems are all service oriented - i.e. the systems are such that they are created out of other discrete services.

- **Virtualized:** The applications in cloud computing are fully decoupled from the underlying hardware. The cloud computing environment is a fully virtualized environment.

- **Flexible:** Another feature of the cloud computing services is that they are flexible. They can be used to serve a large variety of workload types - varying from small loads of a small consumer application to very heavy loads of a commercial application.

- **Cost-effectiveness**, User-friendly Resource Optimization and Infrastructure and service-level agreements (SLAs) (Singh, 2012)

4. Development Models

4.1. **Private Cloud:** This kind of deployment model solely developed and managed by a single organization or a third party regardless whether it is located in premise or off premise. There are several reasons behind the development of private cloud for an organization some key reasons include optimize utilization of existing in-house resources, security concerns including data privacy and trust also make private cloud an option for many firms, data transfer cost from local IT infrastructure to a Public Cloud is still rather considerable organizations always require full control over mission critical activities that reside behind their firewalls and for research and teaching purposes.

4.2. **Community Cloud:** It is a joint venture of several organizations come together to build a cloud infrastructure as well as policies through which cloud services will be rendered. This type of cloud deploy model helpful in developing of economic scalability and democratic equilibrium. In the community cloud model, cloud infrastructure may be hosted by a third party vendor or within one of the organizations in the community.

4.3. **Public Cloud:** Public cloud is meant for general public use and open to all. This kind of deployment model of cloud computing is developed by any cloud computing agency and having own policy, value, and profit, costing, and charging model. Some popular public cloud services include Amazon EC2, S3,Google App Engine and Force.com.

4.4. **Hybrid Cloud:** This type of cloud made from more than one cloud deployment models that may be public, private, community and other models also, bound together with by standardized or proprietary technology that enables data and application portability (e.g., cloud bursting for load-balancing between clouds). The Hybrid cloud model is widely used by institutions and organizations because this model provides more facilities and flexibilities in making optimum use of their resources and accomplishing the tasks.(Kaushik,2013)

5. Cloud Computing Initiatives

The followings are the Cloud Computing initiatives;

5.1. **Amazon Web Services (AWS):** Amazon is perceived as one of the major players in the business, offering a wide range of prominent cloud computing services such as elastic compute cloud (EC2), simple storage service (S3), simple DB and simple queuing service (SQS). It provides a reliable, scalable,low-cost infrastructure platform in the cloud that powers hundreds of thousands of businesses in countries around the world7. Some of the solutions offered by Amazon through cloud computing include application hosting, web hosting, backup and storage, enterprise IT, content delivery, and databases

5.2. **Google Apps:** Google Apps cloud services, a multi-tenant, internet scale infrastructure, offers faster access to innovation, superior reliability, and security, and maximum economies of scale as compared to on-premises, hosted and software plus services technologies8. Google Apps is available free for individuals and organisations (limited up to 10 user accounts), educational institutions and US non-profitable organisations and for a price to businesses and organisations. Google apps offer Gmail, Google Docs, Google Sites, Google video and other services on the cloud. Google Apps helps organisations to move their e-mail services, web services and office applications on the cloud. (Bansode,2012)

5.3. **Microsoft Windows Azure:** Windows Azure is a cloud platform from Microsoft Corporation that empowers organisations to develop and run applications with unbounded scalability and ease-ofuse. With this flexible platform one can easily scale up or down to meet the demands of business. With the pay-foruse business model, i.e., one is paying for the services which are actually used while one is not paying for the services which are not used. Windows Azure allows developers to develop and run applications quickly, while leveraging current skills to develop applications with .NET, PHP, or Java9.

5.4. **Rackspace Cloud:** The Rackspace cloud is a cloud computing platform that offers three types of services for organisations and businesses viz. cloud servers, cloud files and load balancers. Cloud servers are available to organisations in different sizes and are measured by the amount of physical memory reserved for an instance and range from 256 MB up to 30 GB on Operating system of their choice to run various web services. (Bansode,2012)

6. Role of Cloud Computing in Libraries

- Cloud computing is a completely new in technology and it is known as 3rd revolution after PC and Internet. Cloud computing is an enhancement of distributed computing, parallel computing, grid computing and distributed

databases. Among these, grid and utility computing are known as predecessors of cloud computing.

- Cloud computing has large potential for libraries. Libraries may put more and more content into the loud. Using cloud computing user would be able to browse a physical shelf of books, CDs or DVDs or choose to take out an item or scan a bar code into his mobile device. All historical and rare documents would be scanned into a comprehensive, easily searchable database and would be accessible to any researcher. Many libraries already have online catalogues and share bibliographic data with OCLC. More frequent online catalogues are linked to consortium that share resources.

Data storage cloud be a main function of libraries, particularly those with digital collections storing large digital files can stress local server infrastructures. The files need to be backed up, maintained, and reproduced for patrons. This can strain the data integrity as well as hog bandwidth. Moving data to the cloud may be a leap of faith for some library professionals. It's a new technology and on the surface it is believed that library would have some control over this data or collections. However, with faster retrieval times for patern requests and local server space it could improve storage solutions for libraries. Cloud computing or IT infrastructure that exists remotely , often gives users increased capacity and less need for updates and maintenance , and has gained wider acceptance among librarians (Gosavi,2012)

7. Advantages of Cloud computing in libraries:

- Cost saving
- Flexibility and innovation
- User centric
- Openness
- Transparency
- interoperability
- Representation
- Availability anytime anywhere
- Connect and Converse
- Create and collaborate

8. Application of cloud computing in Libraries

Libraries are using cloud computing in number of areas starting from federated search, website hosting, digital libraries, library Automation, Digital Library Services, Office Applications, Storage, Search Services and Website Hosting etc. Some of the libraries had initiatives of Cloud Computing undertaken by giants, there is sizable number of initiatives relevant to libraries initiated by organizations and business houses, which are in the business of integrated library software, digital libraries, search engines, etc. Few major ones are;

- **OCLC's Web scale :**OCLC has set an example for making use of cloud computing for libraries. Years together OCLC has been functioning as a cloud computing vendor because they provide cataloguing tools over the internet and allow member institutions to draw on their centralized data store.

- **Ex-Libris Cloud:** Ex-Libris a leading library software vendor from USA, who initially developed most of the current products as locally implemented solutions and at a later stage, adapted them to a hosted environment.

- **Dura space's DuraCloud:** Dura space provides open source repository solutions by undertaking turnkey projects for organizations and libraries to enable them to share scholarly literature using D Space and Fedora Commons.

- **OSS Labs:** OSS labs from India is using Amazon's elastic cloud computing platform owing to the various capabilities of Amazon such as high durability of data, strong information security based on ISO standards, capability, and flexibility. (Nagalingam,2014)

- **Library Automation:** For library automation purpose, Polaris provides variant cloud based services such as acquisitions, cataloguing, process system, digital contents and provision for inclusion of cutting edge technologies used in libraries and also supports various standards such as MARC21, XML, Z39.50,Unicode and so on which directly related to library and information science area.

- **Sharing of E-resources using Clouds:** Cloud computing offers information retrieval systems, particularly digital libraries and search engines, a wide variety of options for growth and reduction of maintenance needs and encourages efficient resource use. These features are particularly attractive for digital libraries, repositories, and search engines. The dynamic and elastic provisioning features of a cloud infrastructure allow rapid growth in collection size and support a larger user base, while reducing management issues.

The three typical kinds of cloud computing services are processing clouds, storage clouds and application clouds. Processing Clouds that provide scalable and mostly affordable computing resources that run enterprise programs, which is also sometimes known as Infrastructure as a service (IaaS), Storage Clouds that offer an alternative to local file systems also known as a Platform as a Service (PaaS), and Application Clouds also called Software as a Service (SaaS), that allow a thin client to interact with services that are completely hosted on an external infrastructure. The libraries can use cloud computing applications to create personalized portals for users, the Library could use cloud computing as their back up methodology. Libraries have already begun to adopt cloud services to alleviate their IT departments and increase efficiency.

9. Conclusion

Cloud computing is a new baby in the computer systems technology emerged owing to the developments in internet and associated technologies. It is in the evolving stage, requires some amount of careful considerations before organizations think about hosting some of

their services. However, this technology has certain advantages, which definitely help organizations such as libraries in managing their services, which will relieve library staff from managing the servers. The cloud computing may help libraries to undertake modern ICT activities without worrying about technical side of it, except adding content of resources.

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Applications of Cloud Computing Libraries and Information Centers

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Abstract: Information and communication technology is used widely in libraries and information centers due to its benefits and new ways of approach it is up-coming of in the area of LIC. The libraries have been automated, networked and now moving towards paperless and virtual libraries. To meet the challenges in the profession librarians also apply different platforms in LIC's for attaining economy in information and haw cloud computing. The use of cloud computing in libraries and how cloud computing actually works.

Keywords: Cloud computing, Library and information center

1. Introduction

Libraries and Information Centers are facing many challenges in the profession due to applications of ICT. New concepts are being added to make practices easy in the society, and libraries and information centers also accepting many new technologies in the profession as they suit the users instantly the libraries have become automated. The emergence of e-resources e-publication, digital libraries, internet usage, Web tools applications for libraries, consortium practices lead to the further developments in LIS profession. The latest technology trend in LIC is use of cloud computing for various purposes and for achieving economy in library function.

2. Cloud computing

Cloud computing is the technology of computing, which is based on internet media. Using internet technology many servers share resources in terms of offering common platform for use of software applications. Different resources including information network computer and devices which are attached on request with the control of electricity grid. It can also be called as service architecture complete cloud computing system is service oriented and costumer focused. The main concept behind cloud computing is based on the cloud that is specifically designed for the processing each related device located in cloud of network. Cloud computing is invisible to the user. The users of the service provider using clouds needs to pay for their resources and rendered used in cloud computing environment.

Finally cloud computing means-

- Customers do not own network resources like hardware software systems etc.
- Network resources are provided through remote data centers on a commercial and subscription bases.
- Network resources are delivered as service over the web.

It has many advantages and recently proved as a resource sharing faculty in the information society.

3. Cloud Networking

Cloud networking is one of the networking based technology that is responsible for facilitating the computer networks with the required resources. Cloud networking provides the resource when computer networks ask for the resource. They work exactly in the same way as other service providers company by the cloud networking to its users is in the simplest form so that its reader can understand them easily. The service providers facilitating its users with the abstract internet services is known as cloud.

4. Advantages of cloud computing

- Cloud computing enables user to frequently use the technological resource at inexpensive price.

- it is accessible and reliable interface for its user API technology make it more interesting for the users to interact with the human being.

- These computing techniques greatly reduce the total cost and capital expenses that come in arranging the infrastructure. Integrated resources are valuable at almost no cost to the third party users.

- Cloud computing is completely geographically independent. It is users can access the web browsers anywhere in the world at any time.

- Multi and large application pool is available for users.

- Reliability improved design versions of many redundant website have efficiently increase the performance and suitability of cloud computing more useful.

- Security: Security is at one level above as compared to the other network because of the centralization of data and increased security feature of every individual component.

- Cloud computing systems are flexible and easy to maintain because components can be added of deleted from the infrastructure.

4.1. Characteristics of cloud computing

Genes (2008) while defining cloud computing and computing and cloud services pointed out some characteristics of cloud computing which states, agility, application program interface, cost, device, reliability, scalability, performance, security, maintenance and sustainability etc. These characteristics are useful for the service provision through cloud.

5. Cloud computing in Libraries and information centers

Cloud computing offers many interesting possibilities for libraries that may help to reduce technology costs and increase capacity rehabilitee, and performance for some type of automation activities. Cloud computing has made strong inroads in to other commercial

sectors and is now beginning to find more applications in LIC. The cloud computing pushes hardware to more abstract levels. Most of us are acquainted with fast computing power being delivered from systems that we can see and touch.

6. Role of cloud computing in libraries

Cloud computing is a completely new ICT based technology and is known as 3rd Revolution after PC and internet. Cloud computing is an enhancement of distributed databases. Computing, parallel computing, grid computing and distributed databases. Among these, grid and utility computing are known as a predecessor of cloud computing. Cloud computing has large potential for libraries. Libraries may put more and more content in to the cloud. Using cloud computing user would be able to browse a physical shelf of books. CDs of DVDs or choose to take out an item or scan a bar code in to his mobile device. All historical and rare documents would be scanned into a comprehensive, easily searchable database and would be accessible to any researcher. Many libraries already have online catalogue and share bibliographic data with OCLC. More frequent online catalogues are linked to consortium that share resources.

7. Advantages of cloud computing in libraries

Cost saving: In an era of shrinking budgets, it gets harder with each passing year to justify the purchase and maintenance of servers that aren't in use almost all the time. Cloud computing offers price saving due to economics of scale and the fact that you are only paying for the resources you actually use.

Flexibility and innovation: Libraries don't have to decide between devoting their limited server resources to POAC overflow traffic and a new mobile web application that one of your colleagues wants to develop. If they are both hosted in cloud the resources devoted to each will shrink and expand as traffic rises and drops.

Broad, General IT Skills: Cloud computing increases the pressure on IT professional to become well rounded employees with highly –developed managerial skills. Knowing how the configure and network a server isn't enough. Systems librarians have to manage complex projects and evaluate competing vendors on a variety of criteria. Holding vendors accountable is especially important a significant when they manage a significant chunk of your online data and IT infrastructure.

8. Conclusion

Cloud computing is the next big wave in computing. It stands to change information Technology services for many environments. IT has many benefits one of which is betterment of hardware management, since all the computers are the same and run the same hardware. It also provides better and easier management of data security. Since all the data is located on a central server. Today cloud computing is the bingeing of **network based computing** over internet in force. It is the technology of the decade. There are innumerable benefits of cloud computing in library and other organization. Libraries in the future may have the objectives to transfer manual effort in to valuable activity. For this

purpose, use of web as primary technology would be a better option and professionals should be trained for all.

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Resource Sharing through Cloud Computing in the Libraries

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Abstract: In this digital age the services are also being given electronically with the help of the software, hardware, network and electronic or digital resources. The management of shared services of huge data, software, hardware, and network is also a challenging task. Therefore, the concept of cloud computing come into existence for the management and use of the resources offered quickly and easily on internet. The concept of cloud computing can be helpful in the efforts of libraries by providing their infrastructure based services to the member libraries. The concept of resource sharing is already exist in the libraries and for redefining and refreshing this service according to the modern concept is very much essential. In this term cloud provides opportunity to fulfil the objectives of resource sharing in true sense.

Keywords: Resource Sharing, Cloud computing, library co operation, virtualization, programming techniques.

1. Introduction

Resource sharing may be defined as mode of operation, functions which are shared in common by a number of participants having the same objective or goal in mind [1]. In this modern era, the resource sharing term may be used for sharing of the services of software, hardware, network and electronic or digital resources, etc. among the participants or member institutions or organizations. This concept only can be possible by adopting the concept of cloud computing.

Cloud Computing, also known as "The Cloud", is a highly scalable platform promising quick access to hardware and software over the internet, in addition to easy management and access by non-expert users. There are various types of "clouds".

- Cloud Computing may be public, in the event that the owner is a provider maintaining the cloud for the entities that own the data: In this case, entities pay for the use and enjoyment of the resource on the internet.

- It may also be private in the event that the platform is maintained by the institution itself, within its facilities. However, the term Cloud Computing is most commonly associated with the public cloud.

- Cloud Computing relies on technologies such as virtualization, programming techniques such as multi-tenancy and/or scalability, load balancing and optimal performance, to ensure that resources are offered quickly and easily. Furthermore, in the case of public clouds, these techniques generate economies of scale arising from the efficient use of hardware and human resources. These economies of scale, in turn, have an effect on the price the customer pays, which is of great interest to any institution in current times[2].

Cloud Computing can be divided into various divisions on the basis of the services being offered by the various companies. The divisions are as follows:

- IaaS or infrastructure as a service
- PaaS or platform as a service
- SaaS or software as a service.
- STaaS or Storage as a service
- SECaaS or Security as a service
- DaaS or Data as a service
- TEaaS or Test environment as a service
- Desktop virtualization
- APIaaS API as a service
- BaaS or Backend as a service

2. Resource sharing

Resource sharing term is commonly used in the Library and Information Science field which is essential to adopt by the libraries for providing better and expanded services to their users in the limited resources of the institutions. The objective of the resource sharing is as follows:

- Assist member libraries in selection of materials.

- Assist in acquiring, and processing of library materials.

- Cooperative collection development

- Cooperative preservation and sharing of materials

- Achieving economies in the use of resources [3].

The objectives of the resource sharing can be fulfilled by adopting the concept of cloud computing. Cloud gives opportunity to collaborate the member libraries with each other in terms of pooling the data for cooperative collection building, cooperative preservation or digitization and cooperative sharing of e-resources, etc.

3. Services of Cloud Computing

The Cloud Service Providers basically provides their services according to the following three fundamental models:

3.1. IaaS or Infrastructure as a service

In this service, provider offer the services of virtual machines and file based storage, firewalls, load balancers, IP addresses, virtual local area networks (VLANs), and software bundles. The cost of this service will be based on the amount of resources allocated and consumed. The Storage as a service will also come under the IaaS which manages all the storage services in cloud computing. The providers have to take care of security issues also such as data integrity, confidentiality, reliability, etc. The example of the IaaS are Amazon

Cloud Formation and underlying services such as Amason EC2, Rackspace Cloud, Terremark, Windows Azure Virtual machines, Google Compute Engine and Joyent.

3.2. PaaS or Platform as a service

In this service model providers deliver the operating system, programming language execution environment, database, and web server. The Application developers can develop and run their software solutions on cloud platform without the cost and complexity of buying and managing the hardware and software layers. The examples of PaaS are Amazon Elastic Beanstalk, Cloud Foundry, Heroku, Force.com, Engine Yard, Mendix, Google App Engine, Windows Azure Compute and OrangeScape.

3.3. SaaS or Software as a service

Cloud providers install and operate application software in the cloud and cloud users access the software from cloud clients. The cloud users do not manage the cloud infrastructure and platform on which the application is running. Here, users need not to install and run the application on the cloud users' own computers and it simplify the process of maintenance and support which makes a cloud application different from other applications. This service can also accommodate more than one cloud user organizations. The examples of SaaS include Google Apps, Microsoft Office 365, and Onlive [4].

4. Resource sharing and cloud computing

The libraries can make collaborative efforts in order to reduce the risk of budget crisis or improper availability of resources in terms of computers, networks, data, and softwares by adopting the technology of cloud computing. The cloud computing service providers can assist in the efforts of libraries by providing their infrastructure based services to the member libraries. The cloud computing services are of three types: Public cloud, Private cloud, and Hybrid cloud. The public clouds services are more prominent in order to imply the concept of resource sharing because in this service, the third party is owning and operating the clouds and infrastructure costs are spread among users. It provides an attractive low-cost **"Pay–as-you-go"** model. Here all customers share the same infrastructure pool and they work on the basis of the limited configuration, security protections because these things are managed by the cloud service providers.

5. Role of Cloud computing services in Resource Sharing

The benefits of cloud computing technology help in resource sharing in a true manner which can be understood in the following points.

- Any library may share their computing resources, among all the member libraries with the help of cloud service providers.

- The services of the cloud computing can be purchased jointly and used simultaneously in the cloud technology.

- Infrastructure as a service model provides the services of data storage also and thus sharing of data for creating union catalogues and preparing the list of current issues or publications, etc. is possible in this virtual environment.

- Cooperative digitization and preservation is also possible in this technology.

- Cloud applications can be multi tenant for accommodating a large number of cloud users.

- The cloud computing services are divided in three layers where sharing start with a single company via a private cloud service which further include the trusted number of companies and then move to the unlimited and anonymous public crowd.

- Memory sharing technology is forthcoming which will be deployed in the cloud.

6. Conclusion

The cloud computing technology is a modern technology and it is different from the traditional computing methods and helps in consuming the information technology resources in an economical manner. It has a feature of increased storage and flexibility also. The libraries may think to adopt this technology after reviewing the limitations of this technology such as data protection, data recovery and availability, management capabilities, regulatory and compliance restrictions.

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Promoting Open Access Movement with Special Reference to Institutional Repositories in University Libraries of Karnataka: *An Update*

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Abstract: Institutional repository being an integral component of open access occupies significant role in collecting, organizing and preserving the intellectual output of a university to encompass scientific, technological, cultural, artistic, and historical materials. The study highlights the significance of Institutional repository and its status in Universities of Karnataka. The challenges for creating such repositories and a case study of Gulbarga University has been showcased and shows how this can be done with ease, but caution of maintenance to reveal the hidden treasure to the academic and research community providing its conceptual development and elucidates the various Open Source Software's used for capturing the hidden knowledge of research value.

Keywords: Open Source Software, Scientific Productivity, Institutional Repository

1. Introduction

It was Dr S R Ranganathan, Father of Library and Information Science, who proclaimed the concept of open access movement, when he found that the books are kept under locking system and were chained and felt privilege of a few. This has led to the first law `Books are for use'. In the digital environment, efforts to provide access to the digital content to the user community under network environment and even through remote access serves the philosophy of open access. Satija and Singh (2007) enumerated the implications of the five Laws with respect to the ubiquitous Internet, Electronic publishing, Information Literacy, Virtual Reference Desks, Open Access Archives, Information Transfer, Knowledge Management, Information Marketing, OPACs and Hypermedia and reiterated that all the new concepts and processes facilitate the implications of the five Laws which square well with the IT enabled services and information society. It would be needless to mention that the ideas of Dr S.R. Ranganathan's transformed to reality to form the Budapest Open Access initiative during 2001 to make the academic and research literature of all disciplines made available freely on the Internet. National Assessment and Accreditation Council indicates that for better recognition of librarians from the perspective of university libraries, it is not what others have done, but what an individual university library has contributed or developed a mechanism to reveal its scientific temper of its own university productivity to the students, research scholars and teaching faculty, which is termed as Institutional repository - one of the significant component that forms open access. The study attempts to highlight the perspectives of Institutional repositories in Universities of Karnataka and its challenges.
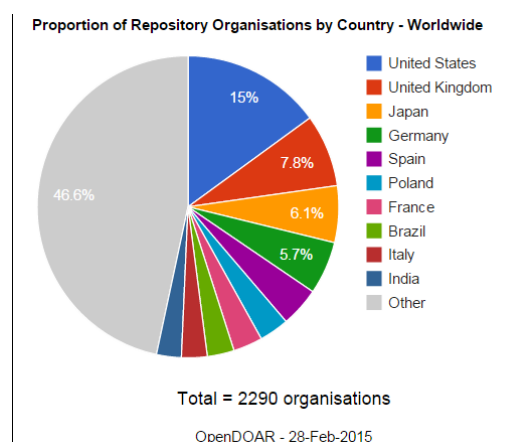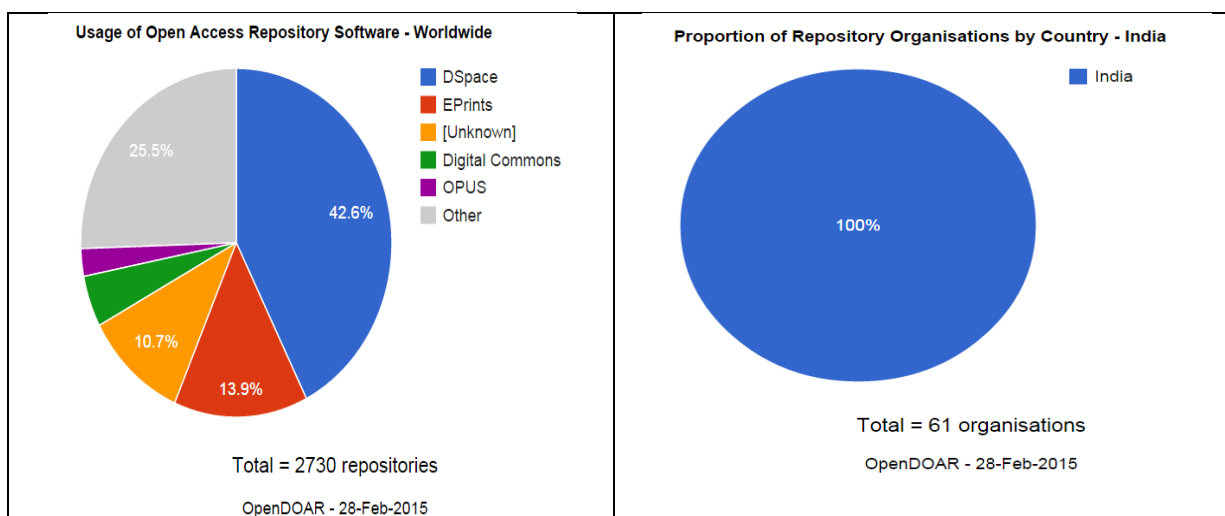
2. Literature Review

In the stiff competitive world, where scientific information is becoming a costly affair and at the same time, budget cuts are common phenomena in university or college libraries. Institutional repository being the intellectual out of institution but unfortunate thing is very few academicians are willing to contribute to the treasure of institutional repository being developed. Research studies on Institutional repositories particularly in the university environment are reported.

Manjunatha K (2014) in his doctoral study reported academic scholar's attitude towards Institutional repositories in Karnataka and found that Researchers deposits research material for a various reasons. 969 (56.80%) respondents motivated to contribute to the IRs. All the 1736 researchers responded to both the awareness and perception questions. Majority of the researchers were found be aware of the Institutional Repository concept the perception to make publicly access to result through the Institutional Repository have been found strong and positive. 56.80% (n=969) of the academic scholars agreed that it was very important to publish in IRs in order to disseminate their research findings. Similarly **Sambhu Nath Halder and Suvra Chandra (2012)** also examined the user-awareness of institutional repositories in Jadavpur University. **Krishnamurthy** and **Kemparaju, (2011)** studied 20 repositories covered collections of diverse types in various institutions in India with respect to institutional repository software and data based on the content type, metadata and characteristics. **Bansode (2012)** highlighted the project undertaken for creation of Institutional repository at University of Pune sharing experiences and challenges faced in creating its institutional repository.

3. Institutional Repository in India: Status Quo

Directory of Open Access Repositories (OpenDOAR) is an authoritative directory of academic open access repositories in the world and the Indian output showing the proportion of repository by country-wise is depicted in the following chart. It is observed that United States of America dominates in the proportion of repository contributions with 16.7% and India shares very less 10th position in the world and 61 organizations have registered institutional repository.

Proportion of Repository Organisations by Country - Worldwide

United States 15%
United Kingdom 7.8%
Japan 6.1%
Germany 5.7%
Spain
Poland
France
Brazil
Italy
India
Other 46.6%

Total = 2290 organisations

OpenDOAR - 28-Feb-2015

Developing an institutional repository has become sometimes a fashion or because somebody is carrying out or hosted, but rather it should encompass as a value added service and one should feel its significance in an academic setup to foster the research tempo. Sometimes, it becomes ridiculous to carryout Institutional repository without having library automation. It is a serious note to the librarians particularly colleges and universities (state) to have library automation as the first priority then one can go for Institutional repository.

To fetch better accreditation from the **National Assessment and Accreditation Council (NAAC)**, developing Institutional repository by the colleges or Universities would be an added value services and for which library has to take initiative in developing its own institutional repository revealing scientific publications.

The major institutional repositories in Karnataka particularly Universities in Karnataka are

University	URL	Software	Accessibility
University of Mysore	http://eprints.uni-mysore.ac.in/	ePrints	Internet
Bangalore University, Bangalore	T.D. Kemparaju and Ramesha, Bangalore University have undertaken major research project, UGC and developing Institutional Repositories for Scholarly Communication of Karnataka State Universities particularly Library and Information Science professionals.		Campus Intranet
Kuvempu University, Shimoga	B.S. Biradar (2010-2012) carried out major research project supported by UGC on Design and development of Institutional repositories in Kuvempu University.		Campus Intranet
Karnataka State Women's University, Bijapur.	Primitive stage & planning for establishing IR		-
Karnataka University, Dharwad	Primitive stage & planning for establishing IR	-	-
Mangalore University, Mangalore	Primitive stage & planning for establishing IR	-	-

Tumkur University, Tumkur	Primitive stage & planning for establishing IR	-	-
Gulbarga University, Gulbarga	http://172.27.102.246:8080/jspui	dspace	Campus Intranet
Vijayanagara Sri Krishnadevaraya University, Bellary	Primitive stage planning for establishing	-	-
Institutional Repositories in Research Institutes, Karnataka			
Digital Library at Indian Statistical Institute, Bangalore	http://library.isibang.ac.in:8080/dspace/	Dspace	Internet
DSpace at Vidyanidhi	http://dspace.vidyanidhi.org.in:8080/dspace/	Dspace	Internet
Electronic Theses and Dissertations at Indian Institute of Science	http://etd.ncsi.iisc.ernet.in/	ePrints	Internet
National Aerospace Laboratories Institutional Repository	http://nal-ir.nal.res.in/	ePrints	Internet
Indian Institute of Astrophysics (IIA)	http://prints.iiap.res.in/	ePrints	Internet
Indian Institute of Science, (IISc) Bangalore	http://eprints.iisc.ernet.in/	ePrints	Internet
Raman Research Institute (RRI)	http://dspace.rri.res.in/	Dspace	Internet

It can be noted from the table that it is only the University of Mysore that has really taken a step forward in creating and hosting its Institutional repositories (IRs) on the Internet from the perspectives of Universities in Karnataka.

Bangalore University is concentrating on development of IRs confined to scientific productivity of library and information science covering the state universities in Karnataka. Similarly Kuvempu University has developed IR and should be noted that both universities i.e. Kuvempu University and Bangalore University has initiated by esteemed faculty sponsored by major research projects, UGC and they are accessible under campus intranet.

Gulbarga University's institutional repository can be accessed @ http://172.27.102.246:8080/jspui within campus intranet and online through remote access. However, the other universities particularly Karnataka University, Dharwad; Mangalore University, Mangalore; Tumkur University, Tumkur and Karnataka State Women's University, Bijapur are planning to establish such institutional repositories and is in process for such establishment.

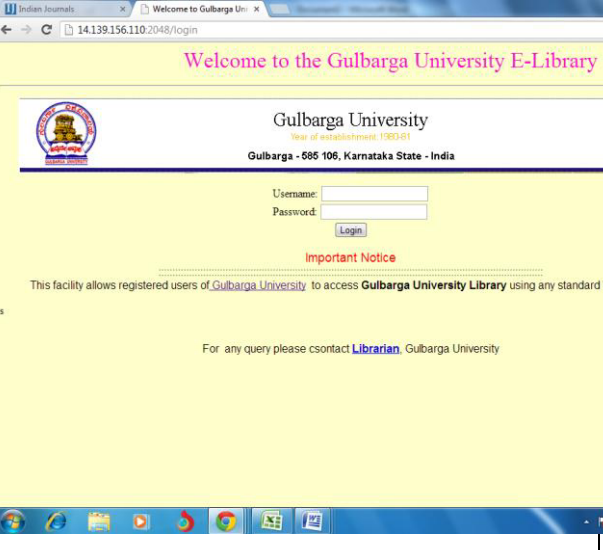Institutional Repository @ Gulbarga University, Gulbarga

The Gulbarga University Library is at the core of research and learning at the University. Virtual Learning Resource Center and Digital Library (VLRC & DL), with 150 computer systems and three main servers, a giant leap into information age is at the heart of the

University Learning experience supporting e-LTR (e-Learning Teaching and Research), provides access to UGC INFONET e-resources (10,000 e-journals+ & databases), Internet and e-learning, course materials and e-books. Remote access facility, Virtual Reference through Question Point Service, OCLC-USA, Institutional Repository, Career Planning and User Sensitization Programs are a few unique services rendered to promote the optimum use of library resources.

Gulbarga University Library has initiated the process of establishing Institutional Repository with Greenstone, then tried with eprints and finally hanged on with dspace. For the practicing librarians within the limited manpower and technical competencies, development of livecd would be a great boon to install the software at one stretch and that has stimulated for dspace.

Institutional Repository covers research publications of the Faculty, e-Thesis and Dissertations, rare manuscripts, question banks, syllabus, university publications, Hyderabad Karnataka e-resources, statistical/ government reports (free) and e-books (free & WPL) using LibLiveCD using Ubuntu 10.10 and DSpace 1.7.0 and is made accessibly campus intranet @ 172.27.102.246:8080/jspui. The screenshots shows the modalities of IR @ Gulbarga University as under.

IR @ http://172.27.102.246:8080/jspui	IR through Remote Access for Registered Users

| Faculty Publications | Hyderabad Karnataka Resources |

4. Challenges Ahead

Prospects and challenges are two sides of a same coin. Creating an institutional repository of a college or university will have better visibility of library and appreciation, which would be prospects and growth of a librarian and on the other hand, maintaining, providing access, user orientation, usage and updating will be a great challenges ahead for the librarians. There is always a criticism and chances of creating confusion about the type of content being deposited on the Institutional Repository and for which one can always refer SHERPA guidelines (http://www.sherpa.ac.uk/guidance/).

Universities in Karnataka particularly state universities have to create institutional repository of its own institution either within campus intranet or Internet. This would be a great value added services particularly in organizing and providing access to Faculty publications, on-going and completed research projects, learning course materials and instructional courseware's including presentations/ lesson plans, Question-banks and administrative reports like annual reports, newsletters, Convocation addresses, proceedings etc. Due to the Live-CD's, most of the technicalities involved in installing and configuring the software's have reduced considerably and become more user friendly and requires little IT skills to the librarians. This sort of creativity will definitely show the existence and better visibility about the strength of library professionals to the academicians and administrative machinery. It is up-to the library to concentrate on automation of library as a first priority and then creation of institutional repository in the interest of our users and tools like Team-viewer can be utilized to trouble shoot any problem through remote access by seeking help from experts in the field of information science.

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Digital Archival: *Principals and Management*

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Abstract: The archiving in digital environment may be wrongly projected or attributed, due to the technological morphing, which attract the criminal breach of trust, and affect the intellectual property rights, based on three important factors. i.e. **Firstly:** In the digital preservation, and to access archival materials, rises legal concerns like 'loss of integrity and protection to digital content' and sometimes deliberate tampering of the digital content and material. **Secondly**, the digital archives focus and help on retaining of evidence (through archives) in time and over a time, through digital presentations. **Thirdly**, the libraries engaged in the creation of information and its ultimate disposition to the user. In this context, the researcher thoroughly discussed the need and importance of basic principles of Arching, which are important for the digital libraries in general, as well for the Digital archiving. The basic principles of Archival and knowledge management, which attract the Digital Environment, under the: i) The Sanctity of Evidence; ii) Respect des Fonds and iii) the Life Cycle of Records was discussed briefly.

1. Introduction

The basic factors influences the Archival and knowledge management in the Digital information Environment are briefly explained in this paper. The principles of archival perspectives, viz., i) The Sanctity of Evidence; ii) Respect des Fonds – Provenance and Original Order; and iii) The Library Cycle of Records was discussed, how to organize the Archives under the Digital Environment is the main theme of this presentation.

The Technological advancements in the knowledge management, influences the Archival, age-old practices and procedures, into digital environment to ease out the old practices, for the management of the current and active Archival materials, land weeding techniques applied on in-active and on obsolete records.

In this context, the impact of Information and Communication Technologies on the principles of **'Sanctity of Evidence'**, **'Respect des Fonds** – Provenance and Original order; and **'Life Cycle of Records',**and how these principles are translated into digital environment was discussed briefly to know about the techniques and process of Digital Archival Management Systems.

2. Objectives of the study

- Whether the Digital Archival System protects and provides the logical, historical and Archeological evidence?

- To study the strength and weakness of the archiving and in comparing to the Digital Archival System

- Whether the implementation of **Respect des Fonds** and the **Life Cycle of Records** support the Knowledge Management under Digital Environment

3. Methodology

The topic of this paper completely based on the descriptive analysis and the review of related literature of Archival Systems in general and Digital Archiving its nature and scope of its changes occurred in Digital Environment subject which attributed in the review of the literature. The facts and principles exhibited under the Digital Archiving was studied and analyzed the relationship and importance of these perspectives under the three basic principles, i.e. **Sanctity of Evidence, Respect des Fonds and the Life Cycles of Records** on the basis of reviews. The researcher reviewed number of articles and textual materials both from primary and secondary sources to present this paper on the descriptive form. The scope of the quantitative and statistical analysis was limited in this subject area.

4. Analysis

As stated above, the descriptive analysis of basic principles of Digital Archiving was present under three components, to meet the requirements, to initiate the Digital Archiving to move forward in the information age.

4.1. The Sanctity of Evidence

The archives sense of evidence can be attributed the ability of document and objects to provide insight into the processes and an event that gives clue to create the authority of logical, legitimate, historical and archaeological events of past. The concerns for evidence demands high bench marks for information systems and services, with reference to archival description and presentation. The evidential value of archival materials have been re-emphasized on two counts; i.e. A) Due to the challenges posed by Electronic Records but also, b) the practices of information preservation of archives by the library professionals. The integrity of the evidential value of archival materials is ensured by documentary with un-broken chain of custody after the receipt of the materials from the creator. The primary values of archival records are related to the creation of legal base, fiscal and administrative needs. But the secondary value mostly in the contest of subsequent research or researchers. The archival concern of evidence involves a rich understanding of the "Implicit and Explicit" values of materials at the time of creation and over a time.

Particularly in the context of evidential values of digital archrivals, the question of: i) Reformatting and ii) Preservation should be considered as two key areas to maintain the integrity and sanctity of the materials. While digital reformatting by the information professionals they need to protect the intrinsic characteristics of the document. At the same time, they should take necessary technological precautions to protect the originality of the content from the problems of tampering or morphing of the material or the pictures. Such digitized copies may have high or low resolution, color or black and white, and to use these materials, it may be provided with appropriate infrastructure to handle the material with care and to have maintainability. The information professional must be decided what type of materials that requires digitalization and the kind of metadata will be used to

enable the user to utilize the information objects. Digital preservation is the second important aspect to protect the evidential value. The preservation technologies are meant for the longevity of digital media storage and preservation and the current digital technologies integrated to next generation or new software and followed by the supporting latest hardware. In the process the intrinsic characteristics of the information objects can be disappeared, and data structures can be modified and preservation of the information object on a computer screen can be altered.

4.2. Respected des Fonds

During 1839 the French Minister of public instruction enunciated the principle of **Respect des Fonds** insists, that the records should according to the type and nature of institution; while and the principles did not included the practice of, strictly to maintain original order. But in 1881 the provisions of state archives announced more preserve regulations on the arrangement and regulation of materials i.e. the principle of providence.

The principle of providence has two components i.e. 1) Records of the similar provisions should not be mixed with other provisions and 2) the architect should strictly maintain the original sources and order in which the need were and kept by meet connecting the classification and cataloguing assigning of access points etc. According to these principles and practices and adhering to less source interval way in maintaining the archives.
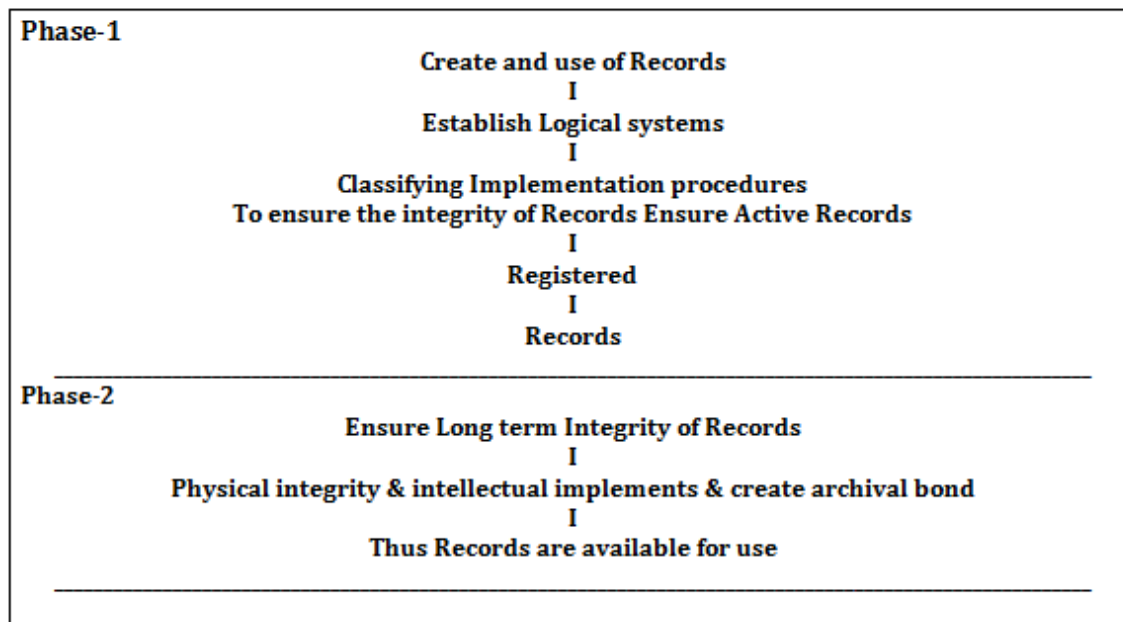
In recent years more complex and bureaucratic structures have evolved and digital systems have been under for record keeping. The archivists have had difficulty in establish through the principle of pounce, where multi-institutional collections with multifunctional data laws distributed information system. In an archival approach more respected conception of province have been digitalized as 'Functional producer and 'Multi province for Electronic laws' today we can observe and accepting the digital approaches according to type and coverage elements that have been integrated into Dublin Core for use in resource discover of national Electronic resources in Archiving.

The multi pronounces commends that a record must be similarly invalid through the internet of multiple offices. The in completed of digitalized and electronic resources and its requiring may be depended upon the latest techniques of Meta Data and by following the Dublin core study to mange the archival materials in 21st century

4.3. Life Cycle of Records Model

The concept of "Record Life Cycle Model" was developed by the U.S. National Archives and Records Administration studied the functions of Archives, i.e. 'Use of' records, and Responsibility for records change as Records Age', and move from the control of their creator to the physical custody of the Archives, is the basic function and process to reach archives.

Phase-1

Create and use of Records
I
Establish Logical systems
I
Classifying Implementation procedures
To ensure the integrity of Records Ensure Active Records
I
Registered
I
Records
_____

Phase-2

Ensure Long term Integrity of Records
I
Physical integrity & intellectual implements & create archival bond
I
Thus Records are available for use
_____

Figure 1 - Functioning of Life cycle of Records

These above said functions of Archives are **in two phases**: i.e.

- **Phase one:** under this model, administrators create and use records. And the records creator develop a certain logical systems, for classification of the records and implement the procedures of logical systems to bring the integrity of records. Records managers or archivists ensure the status of active records, and identify the records for systematic elimination of the records, or permanent retention, due to age and obsolescence, gradually lessen the reference value, and thus become inactive.

- **Phase two:** In this phase the archives form stands as third party responsibility, for long term integrity. In the second phase, where the records entered into the archives, thus physically and intellectually, integrated with other archival materials of the same province, area, subject establish the archival bond. And the physical integrity ensures the preservation management through the intellectual integrity and archival description. Archival records are thus available for secondary use.

4.4. Digital Environment and 'Life Cycle of Records Model':

As the Changes in record creation methods and the perceptions about the value of archives led archivists to consider how to apply the Life Cycle Model in a Digital Environment.

The archival researchers of University of British Columbia, initiated a (UBC Project), to study the principles underlying the Life Cycle of Records, through Preservation and the Integrity of Electronic Records conducted during 1994-1996. The UBC Project has developed two models, i.e. i) Generic Model to identify and define by-products of

electronic information systems, which constitute the evidence of action; and ii) The Records Continuum model: reiterates the need in the digital environment for completed records placed under the jurisdiction of the archives. The UBC Project has developed i) Generic Model and II) Records Continue model.

- **The Generic Model**: identify and define the byproducts of elective information system and methods for integrity and protection of the by products, which constitute the evidence of action using the deductive methods to ensure control over reliable   records creation during the first and second phase of the records life cycle.   The project observed that in the digital environment the completed records should be placed under the Jurisdiction of the archives.

- **The Record Continuum Model:** begins the record keeping according to the designed lines. Appropriate maintenance of the records monitor compliance by records creators. The intellectual inter-relationship of active archival records are   established by integrating metadata for active records into the archival authors information system.   In this custodial model, the archives at should participate actively in the production and use of the records. Thus the model of "Life Cycle of Records extended the benefits in general by:

    - The responsibility of integrity the community for creating developing of and preserving information reasons focusing on the organization and use of information.

    - The process of creating and consumption of knowledge and thus to create new knowledge.

    - This process helps to meet different used needs and;

    - Production of levels of use and management of information storage dissemination etc.

5. Conclusion

The archival sense can be defines as his positive ability of the documents to provide insight into the processes, events that led to create logical, historical and archaeological purposes of evidence. Archival systems established high benchmarks, for information systems, services and preservation. The importance of Evidence value has been (under Sanctity of Evidence) value has been re-emphasized due to the challenges proved by "Electronic Records" with multimedia practices.

The integrity of the evidential value of materials is ensured by demonstrating the unbroken chain of custody of sequence of events. The aggregation of archrivals precisely and integrated with the rest of the associated archrivals materials of the same provinces. The authenticity and primary value of archrival records, related to the legal and fiscal depends upon the records creators. But the secondary values of public records can be ascertained in relation to i.e. (a) the evidence they contain, wherein the concerned government body held responsible and (b) the information contain on persons, corporate bodies, things and problems etc. with which the govt./departments concerned will be responsible. Thus the digital environments for the archives will

certainly maintain the Evidence value and manage the conditions for the Achieves in Digital form and the people of respected des fonds facilities physical and intellectual access to records generated and received regardless of their form, medium or value. The principle of provinces enhanced and ensuring that the records remained as much as possible they were originally created should not be mixed with that of other provinces and maintain the original order which the records were created and kept.

The French conception of respected des Fonds" referred to as principle of original order did not include by the French Archives. Fresh Archivists have been using what was known as the Principle of Pertinence and rearranging the records according to their subject content. Under this principle of Respected des Fonds followed by the Principle of Pertinence integrate the originally created materials protect the intellectual content and access, further enhanced by the Management Principles of Digital Archives. The application of the "Life Cycle Records" described in two phases viz. First Phase it expressed the "Creation & Use of Records" and the record creators must develop a logical system like Classify/Registering of records, implement procedures to ensure integrity of records and eliminate and present relation. In the Second phase: the archives responsible for ensuring the log-term integrity of the records. And the records under archives are physically, intellectually integrated with other archives materials of the same provinces, thus establish the archival bond. Finally the archivists have considered how to apply the 'Life Cycle of Records' model in a digital environment. The principle under "Life Cycle of Records" was verified by initiating the UBC project by the University of British Columbia. This study gave birth to two models to integrate this life cycle of records principles under viz 1. Generic model and 2. Records Continuum model, the digital Archives principles and management techniques help to enhance the Digital Environment. The basic principles of archives support the introduction of digital content, thoroughly to archive this Digital Archives Management.

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Electronic Theses and Dissertations (ETDs) Repositories initiatives in India: *A study*

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Abstract: Theses and dissertations are one of the important information sources in any academic and research library. The libraries have now changed the theses production of theses and dissertations in electronic format. This paper covers the ETDs initiatives in India and presented under Universities and institutional level. Some of the ETDs repositories are taken initiatives in India they are Vidyanidhi, shodhganga, CSIR exploration, Indian National Theses databases and DELNET studied in this paper. The study observed that the shodhganga has implemented 198 universities of ETDs repositories and can be accessible full text theses on 2010 onwards. The paper aims to take an overview of the contents of these repositories and to highlight the problems in self archiving approach of researchers in India.

Keywords: Electronic Thesis and Dissertations, Digital Library software, Indian digital repositories, institutional repositories

1. Introduction

Theses and dissertations from all Universities level become part of the university's library collection. Once approved the theses from the Universities departments, researchers should be submit the theses to the university libraries and Ph. D section. In olden days, theses and dissertations are the written documents formatted and bound like a book. It is known to be the rich and unique Primary source of information useful to the researchers. In the recent technology, digital library technologies are changed the routine works in the libraries. Today, access to scholarly research is improving as a result of the growth of institutional repositories and associated with IT developments using open source platforms such as EPrints, DSpace, Fedora, Greenstone and other programs have been released now a days. These allow digital resources to be organized, described, and most importantly shared through metadata harvesting projects such as the Open Archives Initiative (OAI). An increasing number of academic institutions are encouraging the students to submit theses in electronic format which as a result become increasingly visible within the competitive research environment. Theses and dissertations represent a global source of research information.

The digital libraries of electronic theses and dissertations (ETDs) are promising to be extremely advantageous to scholars, especially in developing countries. The ETDs initiatives started in India during the year 1990s and popularity of this concept is growing rapidly in higher education and research institutions to disseminate newly emerged knowledge and expertise. The aim of this study to known the status of Indian Electronic

theses and dissertations repositories in India using digital library software. It may also be serve as a baseline study that to assess the development, impact, and viability of Indian ETDs repositories.

2. Benefits of ETDs:

There are numerous advantages of ETDs on different type of group such as libraries, institutions and students community. Bandra (2002) cited by Hirwade (2011) identifies the following benefits of ETDs:

- To empower students to convey a richer message through the use of multimedia and hypermedia technologies;
- To improve graduate education by allowing students to produce electronic documents, use digital libraries and understand issues in publishing;
- To increase the availability of student research for scholars and preserve it electronically;
- To lower the cost of submitting and handling theses and dissertations;
- To empower universities to unlock their information resources and
- To advance digital library technology.

3. ETDs Initiatives in India

Indian National Theses Database @INFLIBNET: Online Union Catalogue of Indian Universities is integrated with Online Library Catalogues of books, theses and journals available in major university libraries all over in India. This database contains bibliographic description, location and holdings of information for books, journals and theses in all subject areas available in more than 160 university libraries across the country. The Indicat consists of three components available in open access to users and librarians having number of books - 1,28,36,579 records in 160 universities, theses - 2,65,351 records in 309 universities and Serials - 33,184 records in 213 universities are uploaded.

Union database of Theses covers the bibliographic Metadata of Doctoral Theses submitted to **287** Universities/Institutes in India. It has over **2,53,073** unique records can be accessible bibliographical records from all subject areas. This Data is contributed by participating Universities (as on January 2015).

Vidyanidhi: Vidyanidhi began as a pilot project to demonstrate the feasibility of Electronic Theses and Dissertations in the Indian Context. This project got in the year 2000 at the Department of Library and Information Science, University of Mysore, Manasagangotri, Mysore, sponsored by the National Information System for science and Technology, Department of Scientific and Industrial Research, Ministry of Science and Technology, Government of India. Currently Vidyanidhi is evolving into an information infrastructure

and portal for strengthening and augmenting the doctoral research capacities of Indian Universities. It is also has the strategic support from the University Grants Commission.

Vidyanidhi digital Library of Indian doctoral dissertations setup in the year 2013 using the open source software of e-prints archive. This database providing to access 9,536 only full text articles in different subject areas are Agriculture Biological Sciences (2304), Humanities and Fine Arts (106), Information, Computer and Applied Sciences (707), Management Sciences (136), Physical Sciences (5875), Social Sciences (601) and other subjects (2). This database covers journal articles, conference papers, books, books review during 1919 to 2015 available the theses in University of Mysore.

Table 1- shows the digitized journal articles of doctoral dissertations in University of Mysore

Sl. No.	University of Mysore	Digitized journal articles of doctoral dissertation in UoM
1.	**Constituent Colleges (706)**	
•	Maharajas College Mysore	43
•	Prior to UoM Bifurcation	193
•	University College of Physical Education	1
•	Yuvaraja's College Mysore	469
2.	Institutes/Centres Mysore	150
3.	Departments in University of Mysore	8,816
4.	PG Centre, Hassan	63
5.	PG Centre, Mandya	209
6.	Satellite Centre, Chamarajanagar	6
	Total	**9950**

Shodhganga: The University Grants Commission (UGC) is a statutory organization established by an act of parliament. This is a national body for the coordination, determination and maintenance of standards of University education. The UGC serves as a vital link between the Union and State Governments and the institutions of higher training. The UGC Notification (Minimum Standards & Procedure for Award of M.Phil. / Ph.D Degree, Regulation, 2009) dated 1st June 2009 mandates submission of electronic version of theses and dissertations by the researchers in universities with an aim to facilitate open access to Indian theses and dissertations to the academic community throughout the world.

"Shodhganga" is the digital repository of Indian Electronic Theses and Dissertations setup by the INFLIBNET Centre. The Shodhganga@INFLIBNET is setup using an open source digital repository software called DSpace developed by MIT (Massachusetts Institute of Technology) in collaboration with HP. The submission of full text e-theses (as on 24th February 2015) as shown in Table No. 2

Table 2 -Shows the list of digitized e-theses in state wise universities

Sl. No.	State	Universities	ETD repositories
1.	Andhra Pradesh	15	**4779**
2.	Arunachal pradesh	2	2
3.	Assam	4	375
4.	Bhiar	4	8
5.	Chattisgarh	3	885
6.	Goa	1	516
7.	Gujarat	14	1387
8.	Haryana	6	505
9.	Himachal pradesh	2	59
10.	Jammu and Kashmir	4	308
11.	Jharkhand	3	47
12.	karnataka	14	920
13.	Kerala	6	4160
14.	Kolkata	2	8
15.	Madhya Pradesh	10	866
16.	Maharashtra	23	1909
17.	Manipura	1	57
18.	Meghalaya	1	41
19.	Mizoram	1	20
20.	New delhi	7	5230
21.	Orissa	3	8
22.	Punjab	7	927
23.	Rajasthan	16	650
24.	rajkot	1	339
25.	Tamil Nadu	30	3898
26.	Tripura	1	16
27.	Uttar pradesh	22	4201
28.	uttarakhand	4	469
29.	West bengal	7	186

"Shodhganga" provides a platform for research scholars to deposit their Ph.D. theses and make it available to the entire scholarly communication in open access. The repository has the ability to search by chapterwise, bibliography, index in PDF format submitted by the researchers in reputed universities. In this database 198 Universities have signed the Memorandum of Understanding (MoU) in Shodhganga. This repository can be accessible of 32,832 full text theses in form of theses format and it is also uploaded synopsis of different Universities in shodhgangothri about 1,884. The search techniques is used to search the ETDs records in different fields are universities and departments, submit date, Research guide, title, keyword and universities.

CSIR Explorations

CSIR has been development of human resource for research and development. It pursuing the research fellowship to young post-graduates, doctoral, post doctoral research at national laboratories and universities in all over India. CSIR exploration in a digital library of electronic theses and dissertations and research reports of the fellowship and projected by CSIR. In this database e-theses digitized about 970 in different subject of institutional level during the year 1938 to 2015 and serves as a valuable source of information about doctoral theses submitted to Indian universities.

In this website, listed out all institutions in categories wise available in India and some of the universities regulations in UGC also included in this list. The searching tools are possible to search e-theses by different keywords viz title, author, guide, institute, universities and synopsis. Table No. 3 shows the list of institutions was digitized doctoral dissertations.

Table 3 -The list of institutions/universities digitized e-theses

Sl. No.	Institutions/ Universities	Total no. institutions added within the subject	Total no. of institutions digitized e-theses	Records of ETDs
1.	Council of Scientific and Industrial Research(CSIR)	37	20	779
2.	Department of Biotechnology	20	5	9
3.	Department of Science & Technology (DST)	17	6	7
4.	Indian Council of Agricultural Research (ICAR)	95	5	8
5.	Indian Council of Medical Research (ICMR)	30	1	1
6.	Indian Universities	327	66	166
			Total	**970**

6. Major Findings and Observations

The study evaluate the status of the ETDs repositories under taken initiatives in India they are Vidyanidhi, Indian National Theses Database, Shodhganga, CSIR exploration and DELNET.

- The study found that the shodhganga@INFLIBNET has been implemented the ETDs repositories of all the universities in India. 198 universities under signed MoU for digitization of e-theses in shodhganga project. Out of 198 Universities, 20 universities are not uploaded the e-theses even single document. Shodhaganga repositories also uploaded the synopsis and full text theses can be accessible 32,000+ in the chapter wise on 2010 onwards.

- It is observed from the Vidyanidhi ETDs repositories has been implemented the Journal articles submitted the doctoral dissertations in University of Mysore. It covers digitizations of journals articles from theses of all the departments in university, constituent colleges, institution within the Mysore, PG centres in mysore. It is also found that the only journals article of doctoral dissertations and some the synopsis are also uploaded for the year 1919 to 2015.

- CSIR exploration website has listed out 197 institutional level in india and 327 universities are covered in this doctoral dissertation database. Out of 526 institutions/universities, only 103 institutions/universities of theses were digitized totally about 970+.

- The study shown that the Indian National theses databases@INFLIBNET have unique records of bibliographic details about **2,53,073** theses of all subject areas in 287 universities in India.

7. Conclusion

There are a growing number of institutions at international and national level which are initiating new programs and policy in digitizing ETDs. ETD repositories are becoming a major source of information. It is a journey that is rigorous and also fraught with many a challenges from selecting a topic to writing the thesis.

Many ETDs repositories have very limited access to e-theses databases under taken in India. Only shodhganga has implemented the full text theses of about 198 universities, but it covers the e-theses 2010 onwards. Shodhganga@INFBLINET take the decision to covers e-theses of all the universities in India and also to suggest that the ongoing ph.d work should be implement in the website for avoiding the duplicate topic for the ph.d work.

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Successful Implimentation of Open Source Software In Libraries

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Abstract: As the costs of frequently emerging technologies go up day by day, minimizing the disparity of resources between well-off and less wealthy libraries is a real challenge. With the free source code, simple customization, and growing user community, OSS is a viable tool that can help the libraries for the fundamental alteration. By utilizing open source solution as a part of the library, cost that generally would be spent on proprietary solutions can be utilized for other resources or services or can be diverted to hire educated, technical support that provides patrons with the know how to better use already existing resources. This paper aims to point out the benefits of the open source software and the signifying end of the proprietary driven model that has prevailed for more than 20 years or more.This also includes the successful implementation 0f open source solutions to the parent library.

Key Words: Open source software,Digital Library, Library Automation,Dspace

1. Introduction

In the present digital era of information dissemination and most of the library services are based on information technology as well as resources available in electronic formats. For many libraries, organizing information sources like books and other media can be a challenging task, especially as the library grows with more resources. Now just because the world has been blessed with wonderful software solutions that make everything easier to do, **doesn't mean that every library is using these solutions .**However, the high price of such software prevents most of the libraries from using them. So as to deal with this issue, and for the benefit user communities of libraries, organizations and individuals have developed software, which are distributed free of cost. Known as free/open source software, these are extensively available on the internet and can be downloaded, installed, modified and distributed.

2. Implementation of OSS in libraries

- **Requirements:** The selection of open source software for library activities is driven by the nature of collection, availability of skilled staff, budget, and management support. Thus while considering the OSS for libraries, they have to focus on the following factors.

- **Implementation costs**: For some software, implementation is quite easy, and will take a staff person 10-30 minutes to install. More complex applications take days of staff and/or consultant time to implement, and convert information from an old system. When evaluating the options for a particular solution, be aware that in some cases open source projects can be more difficult to install than their proprietary counterparts, especially if the folks doing the installing are new to Open Source Software.

- **Software Acquisition Cost**: Some proprietary products have very low software acquisition costs. Other products can have high acquisition costs. In some cases, non profit organizations can get many software packages or web-hosted applications donated or at reduced costs, which may reduce or eliminate the acquisition cost for the software. Sometimes, however, organizations are limited in how many copies of a product will be reduced-price or donated. Virtually all open source software is available for no acquisition cost whatsoever, and no multiple licenses are needed.

3. Tips for successful Implementation

- If you are adapting the OSS first time then maintain both for few months so that your library can run smoothly. But if you are switching from proprietary software to OSS, then take the back-up regularly, work with the OSS in back-end. After successful testing for every aspect, you can quit the last one and make the OSS full-functional.

- If you're interested for completely switching operating systems, you can start by simply using open source applications that work for Windows.

- See how the new solution impact on the user community.

- Re-check frequently to see if more open source applications have been adapted for Windows (if you haven't yet switched to Linux).

- Educate your staff! Select a few programs your library wishes to host or promote and familiarize the library staff with them, so that they will be able to answer user queries.

- Be mindful that you're downloading the latest version of a product. Older versions are likely to have bugs in them or might not work properly. Older versions are kept around to monitor the changes that have been made to the open source software, but often have old errors that cause problems, which have been fixed in newer

- Be aware of OSS limitations. "There are three major issues in using or re-using open-source software; quality, documentation, and licensing terms." Read more on this here.

- Check activity level: When was this software last released? Do developers keep a current forum about changes?

- Teach patrons Do patrons bother asking how to use it? Do patrons seem interested? Look out for opportunities! Listen to what patrons want, not what brand names they use.

- Advertise within the library! Hold events like lectures or hands-on tutorials to teach patrons about various software options.

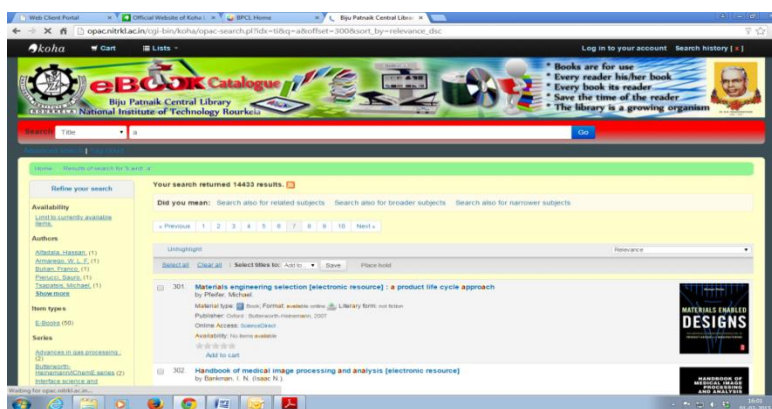## 4. More about the different types of OSS related to Library

In the culture of of open source software, few are listed in the table shows in which way library can be benifited from those OSS.

List of OSS for Libraries

Sl. No	Category	Name of the OSS	URL	Desctiption
1	Library Automation	CDS/ISIS, Winisis Koha • LibLime • Koha Support Evergreen New Gen Lib	http://portal.unesco.org/ www.koha.org www.liblime.com http://koha.org/support www.open-ils.org http://www.newgenlib.com/	Intigrated Library Software
2	Digital Library Software	D-Space E-Print Green Stone Fedora	www.dspace.org www.eprint.org www.greenstone.org	Institutional Repository Software
3	Content Management	Drupal Joomla Word Press Weebly	www.drupal.org www.Joomla.org	Web portal/website design
4	Lib 2.0	Blogger Facebook Google Sites Skype	www.blogger.com Facebook www.facebook.com www.google.com/ www.skype.com	Extending Library Services

5. More about the OSS running successfuly at Central Library, NIT-Rourkela

5.1. Koha integrated library management software: There are so many open source library software are available such as CDS/ISISE,vergreen, Koha and NewGenLib for different operating systems. KOHA open source software for library management is now adopted by most of the libraries and also at BPCL,NITR for management of e-books and Periodical due to its unique architecture, features like Simple, clear interface for librarians and members, Circulation and borrower management and Cataloging module with integrated Z39.50 client of the software and support of the open movement community developer. In use worldwide, its development is steered by a growing community of libraries collaborating to achieve their technology goals. Koha's impressive feature set continues to evolve and expand to meet the needs of its user base. The current version of KOHA is 3.18 as on Feb-2015. This screen shot is the e- book catalogue of NIT, Rourkela

5.5. Facebook as a social media for information dessimination at BPCL, NITR

Basically we can use Facebook to make direct person to person direct contact with people who work in other libraries or organisations thrugh interaction – that whole process of communication. For built a good communication withthe users and the same clients, we have to set up a Facebook page for the library. The below screen shot is the Facebook page for BP central Library , NITR.

6. Conclusion

The open source Culture likewise gives a chance to library staff to be effectively included being developed ventures, to improve their abilities and to utilize an extensive variety of technological application for library functions. On the other hand, the implementation of OSS on a wide scale will generally rely on long-term commitments by the associations. Libraries and library experts need to empower themselves with required innovative aptitudes, andaddress conceptual, social, monetary, specialized, human issues in a collective way for more prominent productivity and expense funds. Librarians need to understand open source license for promotion the use of Open Source Software. This is the best way to face the difficulties postured by business programming in the market. It will likewise expand the self-governance and control of the expert over programming arrangements. The advent of open source library software has change towards a revolution in the field of library and information resources management, and has become popular choice for most library and information professionals because of their numerous benefits and valuable gimmicks.

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Role of UGC – Infonet Digital Library Consortium in the Study of Life Sciences

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Abstract: Presents the role of UGC – Infonet Digital Library Consortium in the Study of Life Sciences. It deals with INFLIBNET Centre, UGC-INFONET Digital Library Consortium, Objectives of UGC-INFONET Digital Library Consortium and the number and name of journals in discipline of life sciences of various publishers/aggregator made available through UGC – Infonet Digital Library Consortium. Biological Sciences, Botany and Zoology together are the major subjects (80 %) under Life Science discipline to which UGC-Infonet Digital Library Consortium is providing access. JSTOR, Science Direct, Springer and Wiley Blackwell Publishing are major publishers/aggregators who are providing access of approximately 90 % of the journals in Life Sciences discipline.

Keywords: E-Journals, E-Resources, UGC – Infonet Digital Library Consortium, Biological Sciences, Microbiology, Biology, Botany, Zoology, INFLIBNET, etc.

1. Introduction

The field of study which involves the scientific study of living organisms such as microorganisms, plants, animals, human beings and their relation with environment is called Life Science. This discipline is composed of biological science and environmental science. Biological Sciences is an exciting and rapidly developing subject area in which the study of living things has undergone tremendous expansion in recent years, and topics such as cell biology, neuroscience, evolutionary biology, etc are rapidly developing. The Biological Sciences is composed of biology, biochemistry, microbiology, botany and zoology. The environmental science is a multidisciplinary academic field in which environment and solution of environmental problems are studied. It includes aquatic science, ecology, oceanography, atmospheric science, etc. The other related subjects to biological sciences are forest and forestry, fish and fisheries (Wikipedia, 2015). There is considerable overlap between many of the topics of study in the Life Sciences.

Biology is a natural science concerned with the study of life and living organisms, including their structure, function, growth, evolution, distribution, and taxonomy. In general, biology recognizes the cell as the basic unit of life, genes as the basic unit of heredity, and evolution as the engine that propels the synthesis and creation of new species (Wikipedia, 2015). Biochemistry examines the rudimentary chemistry of life. It is the study of chemical processes within and relating to living organisms (Wikipedia, 2015). Ecology is the scientific analysis and study of interactions among organisms and with their abiotic environment. Ecosystems are composed of dynamically interacting parts including organisms, the communities they make up, and the non-living components of their environment (Wikipedia, 2015). Forestry is the science of creating, managing, using, conserving, and repairing forests and associated resources, in a sustainable manner, to meet desired goals, needs, and values for human benefits. The forest science has elements that belong to the biological, physical, social, political and managerial sciences (Wikipedia,

2015). Aquatic Science is the multidisciplinary study of aquatic systems, encompassing both freshwater and marine systems. Scientific investigations within this field often examine the human impact on and interaction with aquatic systems and range in scale from the molecular level of contaminants to the stresses on entire ecosystems (Wikipedia, 2015). Microbiology is the study of microscopic organisms-unicellular, multicellular or acellular (lacking cells). It encompasses virology, mycology, parasitology, and bacteriology (Wikipedia, 2015). Botany is the science of plant life and a branch of biology. It is also called as plant science or plant biology (Wikipedia, 2015). Zoology or animal biology is the branch of biology which deals with the animal kingdom, including the structure, embryology, evolution, classification, habits, and distribution of all animals, both living and extinct, and how they interact with their ecosystems (Wikipedia, 2015). Fisheries Science is science of managing and understanding fisheries. It is a multidisciplinary science encompassing limnology, oceanography, freshwater biology, marine biology, conservation, ecology, population dynamics, economics and management. A fishery may involve the capture of wild fish or raising fish through fish farming or aquaculture (Wikipedia, 2015).

2. UGC-INFONET Digital Library Consortium

With globalization of education and competitive research, the demand for the journals has increased over the years. Due to scarcity of funds, libraries have been forced to discontinue the scholarly journals, which have great impact on the users. In order to provide the current literature to academician, UGC initiated the UGC-INFONET E-journal consortium. Now this consortium is named as UGC-INFONET Digital Library Consortium. Timely initiative of UGC is a great boon to academician in the country, which enables them to access large number of scholarly journals from reputed publishers, aggregators and society publications. At present, the Consortium provides current as well as archival access to more than 9000+ core and peer-reviewed journals and 10 bibliographic databases from 26 publishers and aggregators in different disciplines across the globe. The whole programme has been implemented in different phases based on the establishment of network facility to access these resources. So far 421 members comprising 196 Universities, 204 Associate members, 6 IUCs and other Institutions and 14 National Law Scools/Universities coming under the purview of UGC, have been provided access to these journals and databases. This facility is also extended to affiliated colleges through a separate initiative called N-List programme (Inflibnet, 2015).

3. Subject Coverage under UGC-INFONET Digital Library Consortium

The UGC-INFONET Digital Library Consortium covers all areas of learning. It further aims at covering all fields relevance to various Universities including Arts & Humanities, Social Sciences, Physical and Chemical Sciences, Life Sciences, Computer Science, Mathematics, Statistics, etc.

The overall picture shows that there has been equal distribution of journals and databases subscribed in the project having 48% collections in Science and Technology, 46% collections in Social Sciences and 6% collections in the area of Humanities (Cholin, et al., 2006).

4. Presentation of Data

This consortium is providing access to 1199 journals in the discipline of Life Sciences comprising 649 in Biological Sciences, 148 in Botany, 147 in Zoology, 77 in Ecology, 71 in Microbiology, 57 in Biochemistry and rest 50 in Fish & Fisheries, Forest & Forestry and Aquatic Science as it is evident from Table 1.

Table 1: Subject wise No. of Journals Accessible via UGC-Infonet Digital Library Consortium

Sl. No.	Name of Subjects	Number of Journals
1.	Aquatic Science	13
2.	Biochemistry	57
3.	Biological Sciences	649
4.	Botany	148
5.	Ecology	77
6.	Fish & Fisheries	19
7.	Forest & Forestry	18
8.	Microbiology	71
9.	Zoology	147
	Total	1199

The publisher-wise number of journals accessible in discipline of Life Sciences through UGC-Infonet Digital Library Consortium is presented in Table 2. This consortium is providing access of 351 journals from JSTOR, 293 from Science Direct, 232 from Springer Link, 153 from Wiley Blackwell and rest from other publishers/aggregators.

Table 2: Publisher wise No. of Journals Accessible via UGC-Infonet Digital Library Consortium

Sl. No.	Name of Publishers	Number of Journals
1.	American Chemical Society	09
2.	Annual Reviews	12
3.	Cambridge University Press	20
4.	JSTOR	351

	5.	Open Journal Systems@Inflibnet	01
	6.	OUP Archive	10
	7.	Oxford University Press	08
	8.	Portland Press	10
	9.	Project Muse	01
	10.	Royal Society of Chemistry	02
	11.	ScienceDirect (10 Subject Collection)	293
	12.	ScienceDirect Archive (Basic Sc Collection)	13
	13.	Springer Link	232
	14.	Taylor and Francis	84
	15.	Wiley Blackwell Publishing	153
		Total	1199

The publisher-subject-wise number of journals available in Life Sciences through UGC-Infonet Digital Library Consortium is shown in Table 3.

Table 3: Publisher-Subject-wise No. of Journals Accessible through UGC-Infonet Digital Library Consortium

Sl. No.	Name of Publishers	Number of Journals									Total
		Aquatic science	Biochemistry	Biological science	Botany	Ecology	Fish & Fisheries	Forest & Forestry	Microbiology	Zoology	
1.	American Chemical Society	-	-	09	-	-	-	-	-	-	09
2.	Annual Reviews	-	-	06	03	-	-	-	01	02	12
3.	Cambridge University Press	05	-	13	02	-	-	-	-	-	20
4.	JSTOR	-	-	228	47	04	-	01	-	71	351
5.	Open Journal Systems@Inflibnet	-	-	01	-	-	-	-	-	-	01
6.	OUP Archive	-	01	05	03	-	-	01	-	-	10
7.	Oxford University Press	-	-	04	03	-	-	01	-	-	08
8.	Portland Press	-	01	09	-	-	-	-	-	-	10
9.	Project Muse	-	-	01	-	-	-	-	-	-	01

10.	Royal Society of Chemistry	-	-	02	-	-	-	-	-	-	02
11.	ScienceDirect (10 Subject Collection)	-	47	187	17	-	03	04	29	06	293
12.	ScienceDirect Archive (Basic Sc Collection)	-	03	09	01	-	-	-	-	-	13
13.	Springer Link	02	01	78	32	43	03	11	29	33	232
14.	Taylor and Francis	06	-	48	18	-	05	-	-	07	84
15.	Wiley Blackwell Publishing	-	04	49	22	30	08	-	12	28	153
	Total	13	57	649	148	77	19	18	71	147	1199

5. Analysis and Interpretation

The UGC-Infonet Digital Library Consortium is providing access of 649 journals in subject area of Biological Sciences which is more than 54 % of total journals in Life Science discipline. The Botany and Zoology is the 2nd and 3rd subject in which consortium is providing access of 148 (12.34 %) and 147 (12.26 %) journals. This is evident from the figure 1. The UGC-Infonet Digital Library Consortium is providing access of 351 journals from JSTOR which is approximately 30 % of the total journals in Life Science discipline. Science Direct which is the product of Elsevier Science is covering approximately 25 % of total journals while Springer Link is covering approximately 20 % of total journals in Life Sciences. This can be seen in figure 2.

From the above analysis and discussion it can be interpreted that Biological Sciences, Botany and Zoology together are the major subjects (80 %) under Life Science discipline to which UGC-Infonet Digital Library Consortium is providing access. JSTOR, Science Direct, Springer and Wiley Blackwell Publishing are major publishers/aggregators who are providing access of approximately 90 % of the journals in Life Sciences discipline.
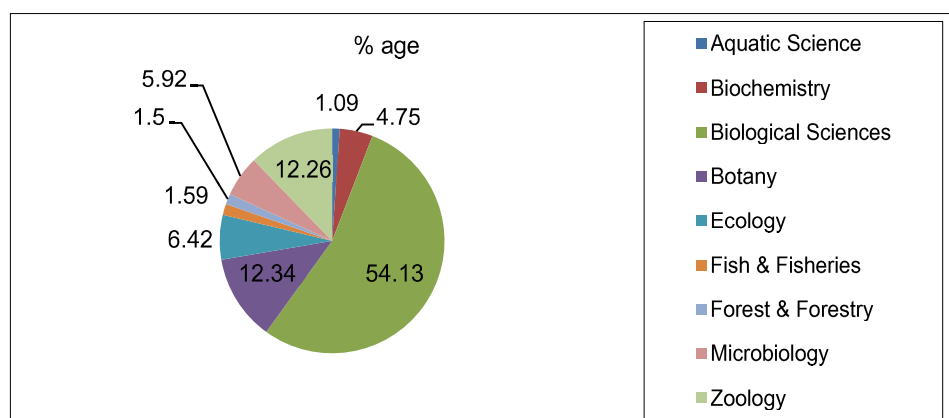
Figure 1: Subject-wise number of journals accessible through UGC-Infonet Digital Library Consortium

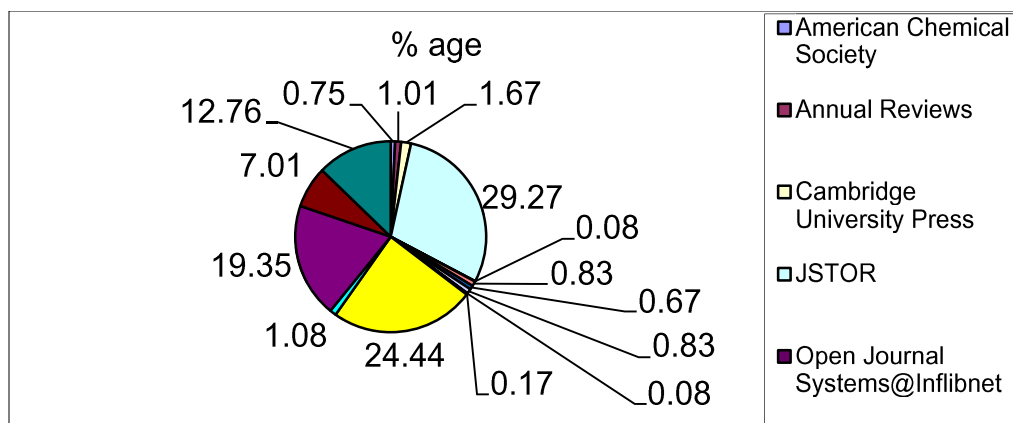**Figure 2: Publisher-wise Number of Journals Accessible through UGC Infonet Digital Library Consortium**

6. Conclusion

The initiative taken up by University Grants Commission to provide electronic access to scholarly journals and databases through Inflibnet Centre has started making a very good impact on the research and academic community. The UGC is providing good number of journals to the scientist and academician working in the field of Life Sciences.

The Biological Sciences along with Botany and Zoology are the major subjects in Life Science discipline covered in UGC-Infonet Digital Library Consortium. The JTSOR, Science Direct, Springer and Wiley Blackwell Publishing are major publishers/aggregators who are providing access of maximum number of journals in discipline of Life Sciences through UGC-Infonet Digital Library Consortium. However, there is great need to further improve the access in terms of network infrastructure within the universities and the bandwidth support will further enhance over the usage over the years. The results strongly indicate that in the consortia arena the levels of information use has raised through desktop electronic access. At this early stage, the users have probably not yet fully absorbed what the UGC-INFONET Digital Library Consortium can do for them, but INFLIBNET is on its mission to reach out to them and provide necessary guidance time to time in improving the access base.

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Author Profile

Jawahar Lal at present working as Assistant Librarian at Sayaji Rao Gaekwad Library, Central Library, Banaras Hindu University, Varanasi since Feb 12, 2005 and supervising Periodical, Newspaper and Magazines and Thesis Sections of the library. Before to this, he served as Semi-Professional Assistant (Contractual) from Feb 1993 to June 1993 at Deptt of Metallurgical Engineering, Institute of Technology, Banaras Hindu University, Varanasi. From July 07, 1993 to Feb 11, 2005, he served as Assistant Librarian at Kashi Naresh Government Post Graduate College, Gyanpur, Sant Ravidas Nagar Bhadohi under Directorate of Higher Education, Uttar Pradesh, Allahabad.

Digital Library Consortia for MoEFCC Institutions: *A concept note*

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Abstract: In the present scenario of technological advancement, information needs of the users have increased considerably and no library can meet all information requirements of the users individually. Consortia are also needed for efficient association and collaboration between Libraries and Information Centres for sharing their available resources and information through networking. In the recent past many successful initiatives have been taken in India for the formation of Library consortia. This concept note also discusses the requirements, types, advantages, methodology and activities involved to formulate a digital library consortium for Ministry of Environment, Forest and Climate Change (MoEFCC).

1. Introduction

Cooperation amongst institutions for sharing their library resources is being practiced for decades. Traditionally, the primary purpose of establishing a library consortium is to share physical resources including books and periodicals amongst members. However, the mode of cooperation has gone under a transformation with infusion of new information technology from print-based environment to digital environment. The emergence of Internet, particularly, the World Wide Web (WWW) as a new media of information delivery triggered the proliferation of Web-based full-text online resources. In the era of information technology, web-based electronic databases have become important resources for education and research. Such databases provide functionality and ease of use as compared to print products. There has been a gradual trend towards an increase in use of electronic resources in general and electronic journals in particular. So, libraries are retaining limited print based resources, and are migrating to electronic media so that they can survive in the new digital information environment. E-journals are becoming increasingly in demand as these offers a variety of benefits to libraries and end users such as easy 24x7 access; can be used simultaneously by more than one user and minimize physical storage space.

2. Need For Digital Libraries Consortia Initiative

Libraries are facing the challenges of shrinking budgets, literature explosion; increasing user demands, cost of collection, storage space and trained manpower; and advances in the field of information technology. As per the Association of Research Libraries (ARL) surveys, the bundling of scholarly journals and the marketing practices of the largest commercial publishers have inherent problems that limits the use of such bundles by the users for a variety of reasons. One of the major drawbacks is that when library budgets are locked into large bundles, purchase of non relevant journals becomes a compulsion. Cancellation of bundles often also deprives the benefit of archived journals. Another constraint is that once bundles are purchased, funds for any addition/specific journals are

not available. Moreover, the size of the larger bundles has been growing. In the recent years, merger of the several large publishers have resulted in escalated cost of merged bundles, posing major implications for growth of library. Most of the largest commercial publishers have been offering bundles for many years which are forced to continue. The ARL surveys have shown that consortia play a significant role in journal bundle acquisition. In majority of research libraries e-bundles are acquired through such consortia. A very small percentage of bundles are defined by single institution's historic holding. The above challenges have forced librarians to work together for alternate strategies towards collection, enrichment and sharing of resources. Consortium based library subscription to e-journals has been picking up good momentum in India.

Consortia Activities in India: Many consortia are being run successfully by different organizations in India. Some of them are UGC-INFONET, FORSA (Forum for Resource Sharing in Astronomy), NKRC (National Knowledge Resource Centre) - CSIR e-journal consortia, IIM Library Consortia, ICICI Knowledge Park, DAE Library Consortium, INDEST (Indian National Digital Library in Science and Technology) Consortia. ICMR Library Consortia, HELINET (Rajiv Gandhi University of Health Sciences, Karnataka), DRDO (Defence Research and Development Organization), DeLCON (DBTs Electronic Library Consortium), CERA Consortia etc., ISRO etc.

Types of Consortia and Models: The types of consortia models identified are generally based on various models evolved in India in a variety of forms depending on participants' affiliations and main funding sources (Satyanarayana 2004; Patil 2004).The important types of consortia are:

- Open consortia: FORSA, SNDT's LISA and INDEST,

- Closed group consortia: CSIR, DAE and IIMs,

- Institutional headquarters funded consortia: TIFR and its branch libraries,

- Centrally funded consortia: CSIR, INDEST, UGC-INFONET, ICMR,

- Shared budget models: FORSA, IIMs and HELINET and

- National level consortia: INDEST, UGC-INFONET

3. Ministry of Environment, Forests and Climate Change (MoEFCC)

The Ministry of Environment, Forests and Climate Change (MoEFCC) is the nodal agency in the administrative structure of the Central Government for the planning, promotion, co-ordination and overseeing the implementation of India's environmental and forestry and climate change policies & programmes. The primary concerns of the Ministry are implementation of policies and programmes relating to conservation of the country's natural resources including its lakes and rivers, its biodiversity, forests and wildlife, ensuring the welfare of animals, and the prevention and abatement of pollution. While implementing these policies and programmes, the Ministry is guided by the principle of sustainable development and enhancement of human well-being. The Ministry also serves as the nodal agency in the country for the United Nations Environment Programme (UNEP), South Asia Co-operative Environment Programme (SACEP), International Centre

for Integrated Mountain Development (ICIMOD) and for the follow-up of the United Nations Conference on Environment and Development (UNCED). The Ministry is also entrusted with issues relating to multilateral bodies such as the Commission on Sustainable Development (CSD), Global Environment Facility (GEF) and of regional bodies like Economic and Social Council for Asia and Pacific (ESCAP) and South Asian Association for Regional Co-operation (SAARC) on matters pertaining to the environment. The broad objectives of the Ministry are:

- Conservation and survey of flora, fauna, forests and wildlife
- Prevention and control of pollution
- Afforestation and regeneration of degraded areas
- Protection of the environment and
- Ensuring the welfare of animals

Requirement of MoEFCC Consortium: These objectives are well supported by 8 important offices, 5 autonomous institutes and 10 centre of excellence (Table 1) and several collaborative Science and Technology institutes. The consortium is needed by these institutes for a variety of reasons viz :
- to avoid duplication of e-resources
- to cope up with the information explosion
- to meet the diversity of user needs and
- to overcome financial crunch resulting from increasing cost of e-resources.

4. Objectives

The broad objectives of the MoEFCC Digital Library Initiative would be to –
- To provide access to scholarly e-resources with high impact factor to all participating institutions and centres at substantially lower rate of subscription with suitable terms and conditions.
- To promote inter-institutional cooperation by sharing online information resources
- To develop comprehensive information base on environmental conservation and other related subject areas.
- To bring qualitative change in training, learning and research with an aim to meet the ever growing challenges of globalization of higher education.
- To increase the research productivity of the institutions both in terms of quality and quantity of publications.
- To impart training to the users, librarian, research scholars and faculty members of the institutions in use of electronic resources with an aim to optimize their usage.
- To evaluate the usage of the subscribed resources and to identify new resources that is required to be subscribed.

5. Methodology

The following methodology may be adopted to develop consortium of institutes under MOEFCC-

- The consortium may be initiated by conducting a workshop of librarians and users from member institutes. The workshop will help to assess the feasibility of consortium in terms of existing information resources and required infrastructure like – PC population, Campus-wide connectivity and bandwidth availability in the member institutes. A union catalogue of holdings of participating members is essential. In this context a brief questionnaire should be prepared to elicit information from participatory members of proposed consortium. Based on the areas of specialisation and prioritization of requirements for each of the participating institutions a policy for union catalogue would be formulated to facilitate the function of consortium.

- The workshop will also help in identifying a team of members who will prepare a comprehensive proposal including proper nomenclature of consortia, coverage of subject areas, infrastructure requirements, and memorandum of understanding and funding strategies for sustainability.

- In a consortia-based subscription to e-resources, the selection of e-resources requires careful planning and professional approach. Thus, the representative of target users from each institute would be involved in the selection process for e-resources.

- For making optimal use of e-resources by the users, a real time document delivery process may be developed to achieve maximum benefits from the consortia-based subscription.

- Finally, a well-design feedback online mechanism may be helpful in measuring the effectiveness of consortia.

6. Activities

The following are the scope of activities of the proposed consortium –

- It will act as nodal agency for increasing the cooperation among participating institutes.

- It will integrate and coordinate all activities related to subscription of e-resources.

- It will identify the information needs of users through user surveys.

- It will compile a union catalogue of information resources about the holding of various libraries.

- It will organize the meetings/seminars of stakeholders to improve the functioning of consortium; to identify new resources; and to evaluate the existing resources.

- It will act as a national repository of all e-resources on the subject.

7. Benefits

The proposed MoEFCC-DLI would provide huge benefits to the member institutions in terms of accessibility of the number of e-resources and development of inter-organizational cooperation by sharing information resources. Some of the benefits of the proposed consortium are as follows:

- Subscription to electronic resources through consortium would increase access to a large number of electronic resources across institutions at discounted rates of subscription with favourable terms and condition.

- Access to international and national database/e-journals would enhance the research productivity and quality in education and training.

- On-line culture would reduce the pressure of space requirement for storing and managing the print based library.

8. Conclusion

The initiatives to formulate the consortia for MoEFCC libraries in India will transform the information landscape in future. The present endeavours are no doubt a step forward for future needs and expectations of the MoEFCC. This consortia-based approach would be an apt solution to provide access to e-resources, which probably is the only way to satisfy increasing requirements of the users. The consortium, with its collective strength of participating institutions, may be able to attract highly discounted rates of subscription with most favourable terms of agreement.

Table 1

Name of Autonomous Institutions	Centre of Excellence	Offices
Wildlife Institute of India, Dehradun	Centre for Environment Education (CEE), Ahmadabad	Zoological Survey of India, Kolkata
Indian Council of Forest Reasearch and Education, Dehradun	CPR Environment Education Centre (CPREEC), Chennai	Forest Survey of India, Dehradun
Indian Institute of Forest Management, Bhopal	Centre for Ecological Sciences (CES), Bangalore	Indira Gandhi National Forest Academy, Dehradun
GB Pant Institute of Himalayan Environment and Development, Almora	Salim Ali Centre for Ornithology and Natural History (SACON), Coimbatore	Botanical Survey of India, Kolkata
Indian Plywood Industries Research and Training Institute, Bangalore	Centre for Environmental Management of Degraded Ecosystem (CEMDE), Delhi	Directorate of Forest Education, Dehradun
	Foundation for Revitalization of local health Traditions (FRLHT), Bangalore	National Institute of Animal Welfare, Faridabad
	Centre for Mining Enviroment (CME), Dhanbad	National Zoological Park, New Delhi
	Madras School of Economics (MSE), Chennai	National Museum of Natural History, New Delhi
	Tropical Botanic Garden and Research Institute (TBGRI), Thiruvananthapuram	
	Center for Animals and Environment, Banglore	

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ETD Repositories in India: *Some Major Initiatives*

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Abstract: The digital libraries of electronic theses and dissertations (ETDs) are promising to be extremely advantageous to scholars especially in developing countries. The ETD initiatives started in India during late nineties and popularity of this concept is growing rapidly in the higher educational and research institutions to disseminate newly emerged knowledge and expertise. Presently ETDs submitted in Indian universities is mainly in text format, and many libraries have no open access policy. Perhaps the greatest challenge for librarians today, is to develop and maintain sustainable model of open access ETD repositories for users. This article discussed about the current developments of ETD repositories in India.

Keywords: Electronic Theses and Dissertations, ETD consortia, ETD digital libraries, ETD repositories.

1. Introduction

The Indian libraries have witnessed a great impact of Information and Communication Technology (ICT) in last three decades. The development can be traced in three phases 1stPhase 1980s: Automation of House-keeping operations; 2nd Phase 1990s: Networking of Libraries and 3rd Phase: 2001 onwards: Digitization initiatives; E-content creation; Digital Repositories and Library 2.0. Electronic Thesis and Dissertation (ETD) increases the availability of research to the academic community worldwide, increase the exposure to potential employers, improve student understanding of electronic publishing issues and reduce the need for library space. Technical innovations are changing the way we communicate and share information around the globe. ETD offers a new generation of theses and dissertations that can include colour diagrams, colour images, hypertext links, audio, video, animations, spread sheets, databases, simulations, and virtual reality worlds. ETD helps in accelerating workflow within the university and library systems and makes theses and dissertations more quickly available to outside audiences. The greatest advantages of ETDs are avoiding duplication in research work, ensuring quick retrieval of information, promoting resource sharing, and providing a permanent solution to the problem of space.[1]

2. Theses and Dissertations in India

Indian universities/institutes plays a major role in generation and dissemination of knowledge by conducting research works and producing Ph.D. theses as a unique genre of information sources. Every year nearly 8000-10000 Ph.D. are awarding in India. The purpose of the thesis is to provide an experience in scholarship, which will be of enduring

value to the student in understanding how new knowledge is acquired and communicated within the chosen field. These works contain valuable content, including focused literature reviews and details on research, which are not generally made available elsewhere. At the moment, most unpublished theses are hard to get hold of, as they are field only in the university library where the students has worked. The Indian theses literature is beset with many problems like lack of systematic acquisition, Lack of access, uncertain publication practice, enormous growth in the number of theses etc. [2]

3. ETD in India

Electronic Thesis and Dissertation (ETD) initiatives in India are at an embryonic stage. At present, access to theses and dissertations is limited, as availability of comprehensive theses bibliography database or ease of availability of full–text theses is not available. Since the beginning of this decade, few national institutes started ETD initiatives with focus on Open Archives Initiative (OAI) complaint repositories, thus allowing metadata harvesting. It may not be surprising that some of these institutes received funding or collaborative support from other organizations to start their digital library initiatives. Information Library Network (INFLIBNET) consortium, Vidyanidhi Library of Theses and Dissertations etc. are actively involved in the development of bibliographic ETDs and digital ETDs.[3] In 2007, the National Knowledge Commission (NKC) in India recommended development of web based common open resources and encouraged open access for all material research papers, books, periodicals etc. It also recommended that all academic institutions must set up institutional repositories of ETD. This should be made mandatory for accreditation and such repositories should offer open access.

The UGC Notification (Minimum Standards & Procedure for Award of M.Phil./Ph.D Degree, Regulation, 2009) dated 1st June 2009 provides for submission of electronic version of theses and dissertations with an aim to facilitate open access to Indian theses and dissertation to the academic community world-wide. Online availability of electronic theses through centrally-maintained digital repositories will not only ensure easy access and archiving of Indian doctoral theses but will also help in raising the standard and quality of research. All these events have significantly contributed for establishment of E-theses repositories and OA movement in India.[4]

4. Current scenario

As per the OpenDOAR directory, there are 35 E-theses repositories in India on 26-Mar-2014. The oldest E-theses repository registered in ROAR is ETD@IISc in 2005.The list of Indian E-theses repositories is presented in tabular form.[5]
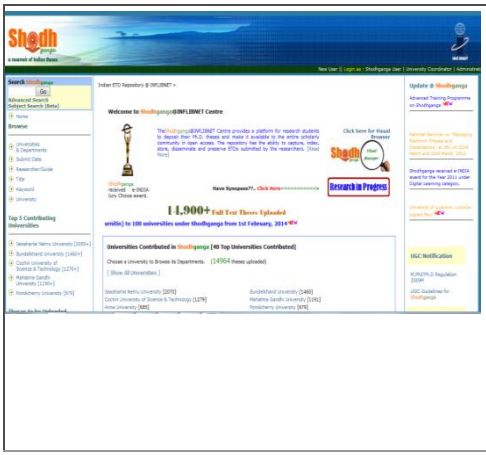
Repository name	Country	Num. Recs.	Pubs	Confs	Theses	Unpub	Other	Base URL	Software
ARIES, Digital Repository	India	805		+	+	+			DSpace
Catalysis Database	India	2327		+	+			OAI	EPrints
CMFRI Digital Repository	India	9661	+	+	+	+	+		EPrints
Digital repository of Cochin University of Science &	India	2525			+		+	OAI	DSpace

Technology									
DigitalLibrary@CUSAT	India	6199	+	+	+		+		DSpace
DIR@IMTECH	India	1330			+		+		EPrints
DRS at National Institute of Oceanography	India	4452		+	+			OAI	DSpace
DSpace @ GGSIPU	India	135			+		+	OAI	DSpace
dspace @ sdmcet	India	60	+		+	+	+	OAI	DSpace
DSpace at Indian Institute of Management Kozhikode	India	530		+	+	+		OAI	DSpace
DSpace at M S University	India	246			+				DSpace
DSpace at NCRA	India	84			+	+	+		DSpace
DSpace at Vidyanidhi	India	5482			+			OAI	DSpace
Dspace@NITR	India	1985	+	+	+			OAI	DSpace
DSpace@TU	India	2561		+	+				DSpace
DU Eprint Archive	India	170	+	+	+		+	OAI	EPrints
ETD at Indian Institute of Science	India	2215			+			OAI	DSpace
Eprint@NML	India	5692	+	+	+		+		EPrints
Eprints @MDRF	India	676	+		+			OAI	EPrints
Eprints@IARI	India	230		+	+	+			EPrints
EPrints@IITD	India	2144			+			OAI	DSpace
EPrints@NIRT	India	830	+	+	+		+	OAI	EPrints
Etheses - A Saurashtra University Library Service	India	1016			+		+	OAI	EPrints
IACS Institutional Repository	India	220			+	+			DSpace
Indian Institute of Astrophysics Repository	India	6307			+		+	OAI	DSpace
Institutional Repository of Intectual Contributions of Delhi Technological University	India	841			+		+	OAI	DSpace
Institutional Repository@CSIO	India	311		+	+	+	+	OAI	EPrints
Institutional repository@VSL	India	11037		+	+	+	+		DSpace
Kautilya Digital Repository at IGIDR	India	247		+	+	+		OAI	DSpace
Knowledge Repository Open Network	India	886		+	+			OAI	DSpace
Librarians' Digital Library	India	490		+	+		+	OAI	DSpace
Mahatma Gandhi University Theses Online	India	1814			+				Nitya

National Aerospace Laboratories Institutional Repository	India	5667		+	+	+	+	OAI	EPrints
ShodhGanga: A reservoir of Indian theses	India	14993			+				DSpace
Social Science Cyber Library	India	14782	+		+				CALIBER

5. Major ETD initiatives in India

Some major ETD initiatives in India are Shodhganga: a reservoir of Indian Theses, Mahatma Gandhi University Open Access Online Theses Digital Library, IndCat: Online Union Catalogue of Indian Universities, Vidyanidhi, etd@IISc, Etheses - A Saurashtra University Library Service, Dyuthi- Digital Repository of Cochin University of Science and Technology, Library of the Indian Institute of Science (JRD Tata Memorial Library), North-Eastern Hill University Digital Library and DELNET Databases of Theses and Dissertations.These are discussing below:

	Shodhganga: a Reservoir of Indian Theses **Description**: The Shodhgangais the digital repository of Indian Electronic Theses and Dissertations set-up by the INFLIBNET Centre provides a platform for research students to deposit their Ph.D. theses and make it available to the entire scholarly community in open access. The repository has the ability to capture, index, store, disseminate and preserve ETDs submitted by the researchers. Number of Theses: 33106.[6] **URL** http://shodhganga.inflibnet.ac.in/
	Mahatma Gandhi University: Online Theses Library **Description**: Mahatma Gandhi University Open Access Online Theses Digital Library is an important step towards democratization of knowledge and it is the model of digital archives created by MG University will be emulated by other Indian universities leading to transpancy in education research. Number of Theses: 2012.[7] **URL http://www.mgutheses.org/**
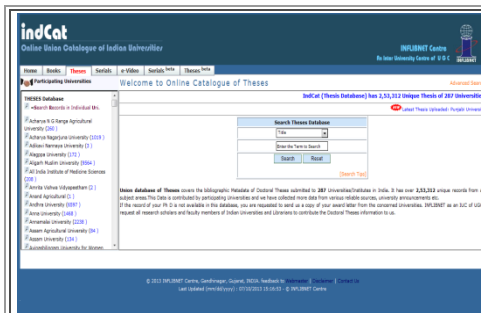
	IndCat: Online Union Catalogue of Indian Universities **Description:**IndCat is unified Online Library Catalogues of books, theses and journals available in major university libraries in India. Union database of Theses covers the bibliographic Metadata of Doctoral Theses submitted to 287 Universities/Institutes in India. Number of records: 2,53,312 (Bibliographic).[8] **URL**http://indcat.inflibnet.ac.in/
	|**Vidyanidhi** **Description:**Vidyanidhi is India's premier Digital library initiative to facilitate the creation, archiving and accessing of doctoral theses. Vidyanidhi is an information infrastructure, a digital library, a portal of resources, tools and facilities for doctoral research in India. Vidyanidhi is envisioned to evolve as a national repository and a consortium for e-theses through participation and partnership with universities, academic institutions and other stake holders. Number of Thesis: 5000.[9] **URL** http://www.vidyanidhi.org.in/
	Indian Institute of Science **Description:**This is the digital repository of Theses and Dissertations of Indian Institute of Science, Bangalore, India. You can search, browse and access theses and dissertations from this collection. This repository has been developed to capture, disseminate and preserve research theses of Indian Institute of Science. It complements ePrints@IISc, the research publications repository of IISc. Number of theses: 2370.[10] **URL** http://etd.ncsi.iisc.ernet.in/
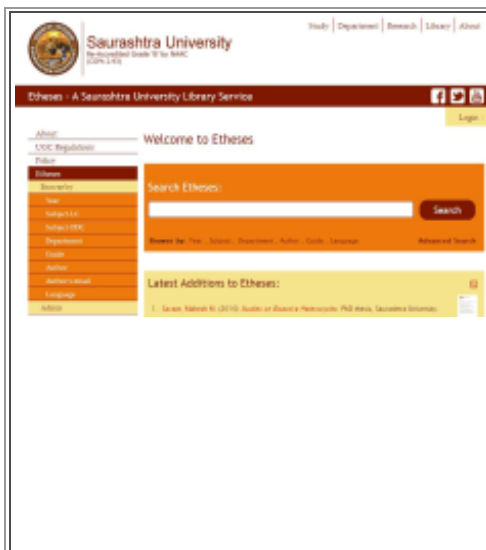
	Etheses - A Saurashtra University Library Service **Description:**Saurashtra University Research Archive [SURA] is a project of the Central Library of Saurashtra University. The repository acts as a focus for the University's research output and helps to manage the research process in future. It is for full-text electronic copies of theses produced by PhD students from the University. It is an Open Access repository, aiming to make the material available to the widest possible audience, and it supports the national project Shodhganga developed and maintained by Inflibnet.Number of theses: 1164.[11] **URL http://etheses.saurashtrauniversity.edu/**
	Dyuthi - Digital Repository of Cochin University of Science and Technology **Description:**Dyuthi is a Digital Repository of Cochin University of Science and Technology. Dyuthi is a digital service that collects, preserves, and distributes digital material. Repositories are important tools for preserving an organization's legacy; they facilitate digital preservation and scholarly communication. Number of thesis: 2281.[12] **URL http://dyuthi.cusat.ac.in/xmlui/**
	DELNET Database of Theses and Dissertations **Description:**DELNET has been actively engaged with the compilation of various Union Catalogues of the resources available in member-libraries. A database of Theses and Dissertations submitted to Indian Universities has been started, which covers various subjects. The database has 70,293 records.[13] **URL http://delnet.nic.in/**
	North-Eastern Hill University Digital Library **Description:**The NEHU Central Library at Shillong and the NEHU Campus Library at Tura cater to the needs of the students, research scholars, faculty, administrators and staff of the university.The library building, funded by DoNER, was inaugurated on 20th September, 2006 by Shri P. R. Kyndiah, Hon'ble Union Minister of Tribal Affairs &DoNER, Govt. URL **http://dspace.nehu.ac.in/**
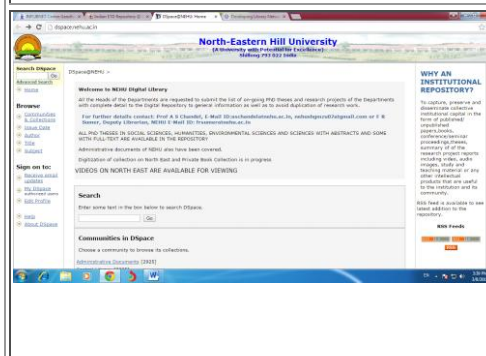
6. Conclusion

In spite of great interest for e-thesis development and majority of doctoral students in India get their theses produced electronically, no wide scale activity is initiated by government in terms of the storage and dissemination of these materials. Furthermore, adoption of national-level policies on institutional repository development is lacking in India. Till date very few institutes request students to submit electronically their theses and dissertations. This article proposes the construction of a reservoir of extensive doctoral research and an Indian portal, to enable preserving of scientific and technological research materials in the country and a global view of Indian institutional research assets. Few national level institutes like Indian Institute of Science and Indian Institute of Technologies have established ETD repositories and few are at the planning stage. The survey has revealed that digital preservation of Theses and dissertation are already in progress, though some of them are still in a novelty stage. The major problems and concerned reported by respondents are summarized and findings are discussed.

The greatest advantages of ETDs are avoiding duplication in research work, ensuring quick retrieval of information, promoting resource sharing, and providing a permanent solution to the problem of space. There is need for concerted effort by all ETD stakeholders to integrate theses and dissertations produced in India in a unified database to be coordinated by a central agency of Government of India. INFLIBNET is now taking steps in this direction. It has started developing a complete national union catalogue of ETDs in India.

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ICT Applications and E-resources in Technical College Libraries in Punjab: *A Survey*

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Abstract: This study was conducted to inspect the application of information and communication technologies (ICT) in technical college libraries in Punjab, India. Questionnaire survey of librarians and library users, semi-structured interviews with librarians, and observational visits in the libraries. This study was confined only to the computerized and automated technical college libraries. The analysis revealed that though the libraries had hardware, software, and communication facilities to some extent, ICT-based resources and services were not reaching the users to the expected extent. Library automation in technical college libraries was largely commenced during the period 1980-2000. The study provides recommendations to give priority to digital library initiatives, consortia based subscription and to enhance effective and efficient application of ICT.

Keywords: Information communication technology, Library automation, Research oriented, technical libraries.

1. Introduction

Information is a dynamic and everlasting resource that affects all disciplines and all works of life. The availability of the right information at the right time in the right form is of utmost importance to users for their knowledge and development activities. Application of ICT in academic and research libraries has become inevitable in the present era of information explosion and wide spread use of digital information resources. Research and Development is the back bone of any research institution which helps in the advancement of research and development activities. All the researchers require latest and relevant information to keep themselves abreast of new developments in their respective areas of interest.

The technical college libraries are switching over to ICT based resources and services at an accelerated pace. E – Journals, e- Books, CD-ROM databases, online databases, web based resources and a variety of other electronic resources are fast replacing the traditional resources of these libraries. It is a right time to evaluate the existing application of ICT facilities in the libraries in a region, particularly in developing countries like India. Punjab is characterized as the hub of the ICT activities and developments in India. The present analytical study is expected to provide fundamental understanding on the current status of

ICT applications in technical college libraries and it would also prove that it is quite useful for suitable modification or improvements of the existing research and development libraries in Punjab.

2. Objectives of the Study

The main objective of the study is to explore the use and application of ICT in engineering, pharmacy, bio-technology, architecture, Polytechnics and MBA college libraries in Punjab. In order to fulfil this aim, the following specific objectives were identified.

- To understand the use of modern information communication technologies in technical college libraries.

- To assess the current state-of-the-art Information and Communication Technology Infrastructure in technical college libraries in Punjab.

- To assess to what extent users are satisfied with information and communication technology resources and services in technical college libraries in Punjab.

- To know the various areas of applications of ICTs in technical college libraries.

- To know the practical opinion of the users and librarians about the application of ICTs in technical college libraries.

3. Methodology

Three main methods were used in data collection: questionnaire method, semi-structured interviews with library users, and observational visits in the libraries. Structured questionnaires were prepared and administered to the chief librarians. The purpose of the questionnaires was to obtain data regarding the current application. A total of 220 questionnaires were distributed to the library users. A total of 180 filled in questionnaires were received back. From these, 150 questionnaires were found to be usable, which comes to an overall response rate of 68.18 per cent. A total of 70 questionnaires were rejected, as they were incomplete and not properly filled.

4. Use of Library

Information is the essential element for progress of higher education and plays vital role in national progress. Proper use of information is directly related to the growth of study, research and teaching facilities and its multidirectional growth of higher education. The use of library could be measured in various ways.

One such way, which may give an idea of the use of the library, is that of finding the frequency of the visits of users to the library. For the present study, the use pattern of library includes frequency of visit to library, time spent on information gathering, purpose of visit to library and sources of information used.

Table 1: Distribution of frequency of visits to the Library by respondents

S.No	Category	Frequency of Library Visit					
		Daily	Twice a Week	Once a Week	Once a Fortnight	Once a Month	Occasionally
1.	Teachers	32 %	19%	12%	14%	16%	75%
2.	Students	18%	26%	11%	5%	19%	21%
3.	Researchers	14%	27%	20%	26%	5%	8%
4.	Guest Readers	2%	10%	12%	18%	35%	23%
5.	Others	3%	17%	21%	19%	9%	31%

- Chi-square value = 8.991
- Degrees of freedom = 20
- Level of significance = 5%
- Figures in parenthesis indicate percentage

4.1   Hypothesis: Respondents differs in their frequency of visit to the library on the basis of category.

It is inferred from the **Table 1** that 32% of the teachers visit the library daily, 19% of them visit twice a week, 12% of them visit once in a week, 14% of them visit once a fortnight. But in the case of students, only 18% of them visit daily, 26% of them visit twice a week, 11% of them once in a week, 5% of them visit once in a fortnight and 19% of them once in a month 21% of them visit library occasionally. In the case of researchers, 14% of them visit daily, 27% of them visit twice a week, 20% of them visit once in a week, 26% of them visits once a fortnight, 5% of them visit once a month and only 8% occasionally. 2% of the Guest readers visit daily, 10% of them visit twice a week, and 12% of them once in a week, 18% of them visit once a week, 35% once in a fortnight and 23% of them occasionally. Others, 3% of them visit daily, 17% of them visit twice a week, 21% of them once in a week, 19% of them visit once in a fortnight. So, more number of teachers visits daily than the other groups.

Table 2: Purpose of visit to the Library on the basis of category

S.No	Purpose of Library visit	Large Extent				Total (A)	Less Extent				Total (B)	Total (A+B)
		P	R	S.L	L		P	R	S.L	L		
1.	To Use/ To Borrow Books	7	15	41	53	116 (77.33)	2	6	7	19	34 (22.67)	150
2.	To Consult Periodical	5	14	42	46	107 (71.33)	4	7	6	26	43 (28.67)	150
3.	To Consult Reference material	6	12	39	48	105 (70.00)	3	9	9	24	45 (30.00)	150

4.	To get current information	4	14	41	45	104 (69.33)	5	7	7	27	46 (30.67)	150
5.	To get bibliographic information	3	7	35	41	86 (57.33)	6	14	13	31	64 (42.67)	150
6.	To get statistical information	2	4	17	23	46 (30.67)	7	17	31	49	104 (69.33)	150
7.	To get recreation purpose	-	1	2	12	15 (10.00)	9	20	46	60	135 (90.00)	150
	Total	27	67	217	268	579 (55.14)	36	80	119	236	471 (44.86)	1050 (100.00)

- *Figures in parenthesis indicate percentage*

The **Table 2** shows the purpose of these visits to the library. Among the various cadres irrespective of the designation, 77.33% of them visit the library to use and to borrow books as large extent. 71.33% of them visit to consult periodical, 70% of them visit to consult reference materials, 69.33% of them visit to get current information, 57.33% of them visit to get bibliographic information, 30.67% of them visit to get statistical information and 10% of them to get recreation purpose as large extent. But In the case of less extent, 90% of them visit to get recreation purpose followed by the statistical information 69.33%, 42.67% for bibliographic information, 3.67% to get current information, 30% to consult reference material and approximately 25% to use to borrow books, and to consult periodical as less extent.

Table 3: Distribution score for amount of time spend in computer and online service per week by the respondent

S.No	Category	Time spend by the respondents					Total
		More than 15 hrs.	12-15 hrs.	8-11 hrs.	4-7 hrs.	Less than 4 hrs	
1.	Principal Investigator	5 (50)	3 (30)	2 (20)	0	0	10
2.	Scientist's	13 (52)	7 (28)	3 (12)	2 (8)	0	25
3.	Technical Officer's	15 (42.86)	13 (37.14)	3 (12)	2 (5.71)	1 (2.86)	35
4.	Researchers	45 (75)	10 (16.67)	3 (5)	2 (3.33)	0	60
5.	Others	10 (50)	5 (25)	2 (10)	2 (10)	1 (5)	20
	Total	88 (58.67)	38 (25.33)	13 (86.67)	8 (5.33)	2 (1.33)	150 (100.00)

- Chi-square value = 7.648
- Degrees of freedom = 9
- Level of significant = NS (Non Significant)

Note: Figures in parentheses indicate percentage.

4.2   Hypothesis: Staffs Differ in their Spending of Time per Week in Libraries

As per the obtained data, it is evident from the **Table 3** that among the principle investigator, 50% of them spend more than 15 hours per week, 30% of them spend 12-15 hours, and 20% of them spend 8-11 hours per week. In scientists group, 52% of them spend more than 15 hours per week, 28% of them spend 12-15 hours per week, 12% of them spend 8 to 11 hours per week, 8% of them spend 4-7 hours per week. Among the technical officers, 42.86% of them spend 15 hours per week, 37.14% of them spend 12-15 hours per week, 12% of them spend 8-11 hours per week, 5.71% of them spend 4-7 hours per week and 2.86% of them spend less than 4 hours. Among the researchers, 75% of them spend more than 15 hours per week, 16.67% of them spend 12-15 hours per week, 5% of them spend 8-11hours per week and 3.33% of them spend 4-7 hours per week. Others, 50% of them spend 15 hours per week, 25% of them spend 12-15 hours per week 10% of them spend 8 to 11 and 4-7 hours per week 5% of them spend less than 4 hours per week.

But this difference is not statistically confirmed by the obtained Chi-square value, which is non-significant. So the hypothesis is rejected. Maximum number of staff spends less than 7 hours per week.

Table 4: Level of satisfaction about the Information communication Technology Service

S.No	Information Communication Technology Service	Level of Satisfaction			Total
		Fully Satisfied	Partially Satisfied	Not Satisfied	
1.	E-Mail	91 (60.67)	51 (34.00)	08 (5.33)	150
2.	Internet	85 (56.67)	56 (37.33)	09 (6.00)	150
3.	OPAC System	87 (58.00)	41 (27.33)	22 (14.67)	150
4.	Online Journal	85 (56.67)	37 (24.67)	28 (18.66)	150
5.	CD-ROM	53 (35.33)	67 (44.67)	30 (20.00)	150
Total		401 (53.47)	252 (33.60)	92 (12.93)	750 (100.00)

- Chi-square value = 45.47
- Degrees of freedom = 8
- Level of significant = 1%

Note: Figures in parentheses indicate percentage.

4.3. Hypothesis: Staff Differs in their Level of Satisfaction about the ICT Service.

It is seen from the **Table 4** that, among the ICT service, 60.67% of them are fully satisfied about E-mail and 34% of them are partially satisfied. 56.67% of them satisfied about

Internet, 37.33% of them partially satisfied. Regarding OPAC system, 58% of them satisfied, 27.33% of them partially satisfied. In the case of On-line journal, 56.67% of them satisfied and 24.67% of them partially satisfied, 35.33% of them satisfied about CD-ROM and 44.67% of them partially satisfied. Majority of them are satisfied with e-mail and Internet. This difference is confirmed, so the stated hypothesis is accepted.

Table 5: Respondent's opinion about the Internet usefulness for study /Research or professional Purpose

S.No	Internet Usefulness	Level of Internet Usefulness					Total
		Very Useful	Quite Useful	Occasionally Useful	Useless	No Opinion	
1.	Online E-Journals	53 (35.33)	63 (42.00)	8 (5.33)	0	26 (17.33)	150
2.	Research Project Sites	58 (38.67)	54 (36.00)	27 (18.00)	0	11 (7.33)	150
3.	Scholarly paper & abstracts on the net	42 (28.00)	77 (51.33)	24 (16.00)	2 (1.33)	5 (3.33)	150
4.	Library Site	40 (26.67)	43 (28.67)	28 (18.67)	11 (7.33)	28 (18.67)	150
5.	Academic Dept. on the net	32 (21.33)	39 (26)	43 (28.67)	6 (4.00)	30 (20.00)	150
	Total	225 (30.00)	276 (36.80)	130 (17.33)	19 (2.53)	100 (13.33)	750

- Chi-square value = 99.4
- Degrees of freedom = 16
- Level of significant = 1%

Note: Figures in parentheses indicate percentage.

4.4 Hypothesis: Respondents Differ in the Opinion about the Usefulness of Internet.

The above **Table 5** shows the users opinion about the usefulness of Internet for study/research/teaching or professional purpose. Regarding the various sites available in the Internet, 30% of them say very useful, 36.80% of them say quite useful, 17.33% of them say occasionally useful 2.53% of them say useless. This difference of opinion is statistically proved by the obtained chi-square value, which is significant at 1% level. Hence the stated hypothesis is accepted.

Table 6: Main problems when- trying to use Information communication Technology Resource by the respondents

S.No	Problem	Yes	Not Relevant	Total
1.	In Accessing PC	55 (36.67)	95 (63.33)	150 (100.00)
2.	In Accessing Software	65 (43.33)	85 (56.67)	150 (100.00)
3.	In Accessing external networks for e-mail or internet	77 (51.33)	73 (48.67)	150 (100.00)
4.	Lack of information about how to use	81	69	150

	digital resources	(54.00)	(46.00)	(100.00)
5.	Lack of time to acquire these skills	66 (44.00)	84 (56.00)	150 (100.00)
6.	Lack of high quality information available for using digital resources	59 (39.33)	91 (60.67)	150 (100.00)
7.	Feeling that ICT resources are not relevant to you needs	41 (27.33)	109 (72.67)	150 (100.00)

Note: Figures in parentheses indicate percentage.

The above **Table 6** shows the main problems faced by the users while using Information communication technology resource. As per the obtained data 55% of them face problem with accessing suitable personal computers, 65% of them facing problems with accessing suitable software, 77% of the respondents face problems with accessing external networks for e-mail or internet, 81% of the users face problems due to lack of information about how do use digital resources, 66% of the respondents face problems due to lack of high quality of information available from ICT resources and 41% of them feel that electronic resources are not relevant to their needs. Therefore it is concluded that most of the respondents face problems because most of the respondent do not get a proper training to use the electronic resources in the library.

5. Findings

The following important findings have been drawn:

- The research libraries have good infrastructure facilities like internet, library website, online database of the research libraries have LAN and printer other facilities.

- Due to computerization of library, the faculty members feel that the library activity has been changed for the past two years.

- The result shows that the respondent has awareness about the electronic resources.

- The result also found that the entire respondent used computer / online service.

- Regarding the ICT service, most of the staff members are fully satisfied, E Mail, Internet, OPAC system and online journals.

- Further the researcher found that On-line electronic journals and research project sites are very useful.

- The result found that irrespective of their categories majority of them used Journals and Internet / World Wide Web for their research / study purpose.

- Further the researcher found that irrespective of their category, most of them spend thirty minutes per day.

6. Recommendation and Suggestion

- There are a numerous views and comments offered by the librarians and library users of research and development.

- Research libraries should adopt a hybrid collection development policy.

- Majority of the research libraries should given the need based on value added users services.

- Digital library environment the existing rare and valuable resources should be digitization through ICT for preservation and future use.

- All research and development libraries should safeguard their resources by implementing any one of the electronic security systems in addition to professional security.

7. Conclusion

Research and development libraries are the life blood of research organizations. Every R&D libraries have strong collection of publications to support researchers. The rapid technological developments portrayed that the present information age have left a great impact on research and development libraries in Punjab. The majority of the R&D institutions in Punjab have good hardware and software facilities. The study pointed out that greater part of the researchers working in these institutions has shown positive preference toward application of ICT. These Research libraries are using standards to create internal databases, which are used for information retrieval purposes. The study recommended the R&D institutions to give priority to consortia based subscription and increase the funds and recruitment of information technology trained staff for better ICT based services and products to their users.

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Adoption of Web 2.0 Technologies by Punjab University Library Chandigarh: *A Study*

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Abstract: The purpose of this paper is to provide a reconnaissance of Punjab University Library Chandigarh that has embraced Web 2.0 tools for enhancing library services. The study shows that a lot of user friendly tools have been adopted by Punjab University Library Chandigarh to effectively cater to information needs of its users. The authors have also suggested a *roadmap* towards a revitalized future for providing various information opportunities to techno-savvy users.

Keywords: Web 2.0; Library 2.0; Social media; Blogs; Wikis; RSS.

1. Introduction

'*e*' (electronic) and 'I'(Internet) have become the buzz letters in every sphere of our life. In fact, it has penetrated and swept over the different activities of day-to-day routines related to Health, Governance, Banking, Commerce, Industry and Education with libraries not lagging behind. They have turned around the concept of knowledge and information. Libraries have become the fast and active hubs and harbingers of Knowledge and Information. The revolution in ICT has unleashed new vistas in Information services with the Internet becoming the most dependable media of communication. At the same time, coping with the technological breakthrough and pressing financial constraints, lack of tech-savvy manpower are posing great challenges in this domain. These issues make it necessary to adopt Web 2.0 in accessing and disseminating information. The latest innovations and refinements in Internet-based services mean that the Web has scaled new heights in terms of innovative tools and services, such as providing a collaborative, information sharing and user-centred environment. This facilitates seamless browsing, searching, emailing, and chatting (Singh & Singh, 2013)[1].

- **Dynamic Web**

The Internet is not restricted to static web pages only. New and emerging technologies have made it an expeditious mode of sharing and communication. Application Programming Interface, Social Networking, AJAX, M-Paper Technology, R/W Web have brought sea changes in the layout and usability of Websites. Social Networking Sites have

become the most preferred via media for sharing the information. Web 2.0 refers to the social software tools such as educational blogging, broadcasting, photo and video sharing, collaborative authority etc. The term Web 2.0, initially coined by O'Reilly in 2005, refers to a broader term embracing several new Web tools and technologies and its foundation upholds a number of Web based services. Web2.0 refers to the development of online services that encourage collaboration, communication and information sharing. It represents a shift from the passive experience of static —read only web pages to the participatory experience of dynamic and interactive web pages. In other words, Web 2.0 reflects changes in how we use the web rather than describing any technical or structural change (Jotwani, 2010)[2]. Some of the tools of Web 2.0 which enhance the innovations and applicability include:

- **Blogs**

A Web Log is the broad term for the online variant of a personal diary. It allows people to communicate with each other over the Internet at any time. Writing a Blog is an easy job which does not require any training. People who want to share their views and experiences switch over to the Blogging Bandwagon, making it a powerful Social Networking Tool. The word Blog gives the impression that the account is textual in nature, probably due to the association with the diary. But on the Net, it is commonplace to see blogs with pictures called Photo Blogs. Video Blogs are a step further from Photo blogs. Audio Blogs incorporate audio clips. Moblogging is the latest trend which involves reading and posting to blogs via a mobile phone.

- **RSS Feed**

RSS is Rich Site Summary which offers a way for the creator of an article to distribute it to a larger audience. It allows us to stay easily informed by retrieving latest contents from the sites. People desirous of being informed need to subscribe to the RSS Feed which can be read using specialised applications called feed readers.

- **Podcasting**

It is the Blog where the post is an audio file that can be listened to. The Internet based technologies have continued to improve and enhance our ability to communicate with each other globally, podcasting is a simple means of distributing audio content over the the Internet, taking advantage of power of RSS. The end user can subscribe to a feed of producer's audio content and receive automatic downloads of a due content as it is made available online.

- **Wiki**

In an age, when libraries must provide the users with up to the minute information, Wikis are a powerful tool for collaboration and communication. Wiki's are at the forefront of ways in which libraries are communicating with staff, patterns and other libraries. It is a piece of server software that allows users to freely create and edit web page content using any web browser. Wiki websites make use of various levels of access and privacy, allowing one person, group of people or everyone to contribute or edit an organisation's website

without needing to know HTML or how to ftp to the website server. This is the versatile and valuable tool for the libraries which operates under a different set of circumstances and with varying financial and technical resources.

2. Web 2.0 For Libraries

Libraries provide manifold channels of Information access to its e-users. The rapid expansion of tools, formats, services and technologies has presented many options to unfold Library Collection. Incorporating Web 2.0 in Libraries is gaining momentum, though cautiously. Web 2.0 has been widely used by the libraries to promote functional services like access to catalogue or for external activities like information or photographs of library events.

- Web 2.0 allows the users to remain the member of the Library family and instils a feeling of being apart.

- On social sites students experiences at the academic institutions can be expressed.

- The powerful tools of Web 2.0 like podcasts, video casts, widgets, tweets and RSS Feeds are complementing the Library OPAC for reaching out to readers anytime and anywhere.

- Web 2.0 has been a very helpful tool for the librarians to launch and share their ideas on various tech-savvy platforms be it a site or public announcements to its users.

- The information regarding the use and users of a specific service can be evaluated through this technique.

Though very useful and powerful, Web 2.0 throws open many challenges for the libraries and the librarians. Convincing the users on the ingenuity of sources encouraging them to use these resources frequently and at the same time making those coming to the library are some tasks which must be tackled head on. Although freely available and less cumbersome to implement, Web 2.0 loses its importance if operational cost, orientation of staff and users, duplication of efforts and time lost in dealing with user complaints and inactive user participation out ways its benefits. These hurdles must be anticipated and dealt with at the nascent stage.

3. Review of Literature

Study was undertaken by Majumdar (2012)[3] which is a Web Survey of library web pages of different universities as well as Institutes of National importance. Sajjad and Shehzad Ahmad (2012)[4] in their Study have surveyed the LIS students of University of Peshawar. They have adjudged the acceptability of the students towards the The Internet and its applications. Seena and Pillai Sudhier (2014)[5] conducted a study on the impact of Web 2.0 technology applications in Kerala University Library and found out that Web 2.0 generated interest amongst the Library Professionals and they were keen in its implementation. O'Dell (2010)[6] in her Study also analysed the acceptance of emerging software amongst librarians. Daher and Lazarevic (2014)[7] also provided insight into the various facets of web based technologies. The study revealed that the use of Web 2.0 is the major determinants

of the instructor's preferences towards different groups of Web 2.0. Madaan (2012)[8] in her paper also putforth the compelling circumstances which enable the Library professionals to adopt the latest technologies. A number of Studies has been conducted on Web 2.0 and other Web based services in various academic Institutes in India. The authors have focused exclusively on Library of Panjab University; Chandigarh which is already disseminating Web based services and is on its way to implementing upcoming technologies overcoming the barriers of time and place.

4. About the Study

With the augmentation of ICT, users are facing the challenges of abundance and proliferation of information resources in myriad formats. Users feel lost in ocean of information where finding pertinent information seems impossible (Vasishta, Kaur & Navjyoti, 2012)[9]. The time is to utilize ICT and web 2.0 technologies for analyzing, assessing, filtering, organizing, and presenting information based on users' requirement. The success of a modern library is increasingly dependent on the most effective utilization and strategic management of new technologies in libraries. Library services need to reach the user desktops with the help of technology. This paper explores how A. C. Joshi Library, Panjab University is leveraging and managing web 2.0 technologies to cope with the challenge of disseminating information by implementing these tools in its operations and services.

- **Panjab University Library**

The Panjab University is one of the large academic researches University of India. The University offers Bachelor's, Master's, and Doctoral degrees in a wide variety of majors, with strong programs across disciplines. The main aim of the Panjab University Library is offer appropriate services and tools to meet the Libraries' diverse user population's needs. The Panjab University Library (PUL) subscribes to about 660 current print periodicals. Library subscribes to many databases which includes, MathSciNet online comprising of current Mathematical publications, IEEE Xplore Digital Library, J-Gate Engineering and Technology, J-Gate Social and Management Sciences, Journal of Visualized Experiments (JoVE) so on. PUL has access to approximately 5000 online full text journals, is available through UGC- INFONET and has access to 225 online full text journals as part of print journals subscription.

5. Web 2.0 Services @ Panjab University Library

- **Web Page:** Web page necessitates to staging the facilities and services library has to offer electronically   that allows users to know. In the role of academic libraries, a library Web site presented as a delivery mechanism for databases, electronic texts and journals, and often for the library catalog. Panjab University library has its own webpage within the website of Panjab University. It provides introduction to library as well as staff information of the library. This webpage provides information about library rules and library membership form. This web page provides the links to web OPAC as well as to Digital resources subscribed by the library. Panjab University

Library maintaining its webpage since 2003. The link of library webpage is http://library.puchd.ac.in/

- **Web OPAC:** Web OPAC is a systematic application connected by Uniform Resource Locator (URL) which can be search by user anytime during the day and from anywhere in the world by multiple search options. Panjab University Library provides the facility of Web OPAC to its users. It is possible to search it independently by Author, Keyword, Title or Year under the different material categories like books, Reference books, Thesis, Bound volumes and so on. It supports to search the books on Hindi and Punjabi Languages. Users can also request for the reservation of books as well as one time automatic reissue of book. The link of library web OPAC is http://webopac.puchd.ac.in/

- **E-resources:** Web pages are an excellent place to make users aware about new or important electronic resources. The Panjab University library webpage provides both a informative and functional element with regard to electronic resources. Under the link of Digital Library it informs users about the organized list of databases and electronic resources subscribed by the library. It provides links to E-resources available in Panjab University on LAN and Wi-fi, which are further categorized in resources subscribed by library, UGC-Infonet Consortia resources and resources available in Public Domain.

- **Online reference service:** Panjab University Library provides through e-mail. Library provides CAS by sending the list of new arrival of books to faculty through e-mail. Through e-mail different types of queries were solved by the staff. Overdue books reminders to the users were also sent through e-mails.

- **Digital signage:** Digital signage is the display of information in electronic form, usually on a video display (LCD or plasma) or through a projector aimed at a screen or blank wall. Content can take the form of still images, animation, Web pages, or video. Panjab University Library Started this service for its users in the year 2013. Through this users were informed regarding placement of books, different sections of the library, library rules, new arrivals of the books and information about different countries. Theme display and upcoming displays were also done to inform users.

- **Facebook Page:** Libraries use social networking services such as Facebook as an alternate channel of communication. Panjab University Library has a user account in Facebook that displays new arrivals of books, information regarding upcoming events, share photographs of events held in library and messages posted by both librarians and users. PUL started facebook page in the year 2014.

- **SMS alert service:** The SMS alert facility can be used as a medium for the communication to provide quick and easy access to library services. Now a days, a mobile phone will be carried by the owner all the time and hence the viability of SMS technology in libraries is permissible. Panjab University Library started this service in the year 2014 to inform users instantly about issues and returning of books in their concerned membership accounts.

6. Futuristic Trends Ahead

Change is the only stable variable in all human practices. Technology has touched the unimagined dimensions in a very short span of time and will continue to develop. New innovations are taking place at every juncture. Technology is playing a vital role in generation and dissemination of information. The aim is to 'Think Ahead' and lead the future trend of providing access to library material irrespective of time and location constraints. A roadmap for adopting few of the future trends is given below:

- **Library Blog:** PUL is in planning to develop a library blog, which can be used to disseminate information about new materials acquired, new services started or new database added to the collection of the library. Such blog would act as a brilliant tool to make a tech savvy user aware of the mission and services of the library in digital environment.

- **Online Information Literacy Instructions:** New generation users are privileged with liberated access of information, so some vital skills and competencies are required for effective use of information. Information competence is the fusing or the integration of library literacy, computer literacy, media literacy, technological literacy, ethics, critical thinking, and communication skills (Shapiro and Huges, 1996)[10]. Due to complexities involved availability of information in various formats through diverse interfaces via different software, there is an immense need of formal training in the form of instructions for assessing e-journals from sites of various publishers, guidance in locating documents using OPAC, searching online and CD-ROM databases using Boolean truncation and other search techniques. Library professionals need to develop online Information Literacy Modules for the benefit of users.

- **Providing RSS feeds on website:** Library must develop internal portal environments to allow individuals to view information and e-resources that are specific to their own personal needs. It would also allow customizing their view of information, and in some instances selecting the content most useful or interesting to them. Library users should be made aware of provisions of RSS feeds.

- **E-brochure:** Electronic brochures are multimedia replacement for direct mail paper as these consist of a highly interactive program using still images, graphics, animation, sound, text and data. Motion pictures, video is seldom used due to storage and performance limitations. For Punjab University Library, e-brochures would play a very positive role in online communications.

- **Web-Casting**: A web-cast is a live media file distributed over the Internet using **streaming** media technology. Essentially, web casting is broadcasting over the Internet. More generally, it is referred to as "transmission of linear audio or video content over the Internet". With the help of a web cast, Panjab University Library may use streaming media technology to take a single content source and distribute it to many simultaneous listeners/viewers.

- **Virtual Exhibitions**: Virtual exhibitions are the innovative ways to publicize the services of the library. It is sort of networked exhibition portal for connecting to the

users by providing online events like seminars and conferences. Virtual exhibitions use 3D graphics, audio and video to replicate the feeling of attending the physical events without time and place restrictions. Panjab University Library might create these exhibition-like experiences which would act as an extension of a physical exhibition.

- **Virtual Library Tours:** Library tour is very essential to make the users familiar not only with the physical layout of the building but also associate them with the information resources and services available in the library. A web-based interactive, pictorial and self-guided tour of the library can provide effective orientation in the institution where there are a large number of users making it impossible to make live tours to the library. Such a virtual tour, if developed for Panjab University Library would help users to explore the whole library while sitting at their desks.

- **Social OPAC (SOPAC):** Due to the hold of social networking sites on the mindsets of users, SOPAC is emerging as a one of the user friendly feature of library services. A library catalog that allows tagging, rating and reviewing of materials and shared lists is being called a social OPAC, or SOPAC. It adds value to existing record data, ability to save searches and has ability to customize the user experience. It would be beneficial for users if SOPAC be added to the library services of Panjab University Library.

7. Conclusion

In today's world, if a library wants to vigorously market its information products & services and wishes to be omnipresent, then their appearance on the Internet is must. A significant paradigm is seen in the aspects of providing library services with the help of ICT and various web 2.0 tools. The web 2.0 environment has made libraries more transparent, user-centred to help the users confront the challenges of new millennium. The need of the hour is that the libraries must do everything possible to understand their users who are not only tech-savvy but also very demanding. To deliver the expected goals very possible mechanism in form of web 2.0 technologies must be adopted with an aim to make the information to reach their users across the globe.

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Making Library Resources Easily Discoverable: *an Overview of Web-Scale Discovery Service as Being Implemented in PEC University of Technology*

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Abstract: In the emerging information society, it is for the librarians to provide comprehensive and single point search to thousands of available e-resources on a single platform. Dr. Ranganathan's fourth law of library science 'Save the time of the reader' has become more significant and relevant in the transition towards e-information based society. If librarians are to serve their users in the digital age efficiently and effectively, they will have to save users' precious time by making multiple resources searchable through a single interface. The idea is to offer a way to search all the available resources that are accessible under diverse access platforms are made available through a single access-point irrespective of their mode of access. This could be done by adopting discovery services for the benefit of users.

Key words: Web-scale discovery, PEC university of Technology, Discovery services.

1. Introduction

Resources in electronic form are being added to library collections at an exponential rate as users are fascinated with the concept of digital libraries and their desk-top availability. Main components of digital library include e-books, e-journals, bibliographic database, OPAC, e-patents, e-thesis, and institutional repository. The excessive use of e-resources in libraries is inevitable because their advantages generally outweigh their disadvantages. Demand of the time is to add more and more number of e-resources to the library collections for the dissemination of e-information. But users require that all e-resources in different subject areas that are accessible to them under diverse access platforms are made available from a single point irrespective of their mode of access. In the emerging information society, it is for the librarians to provide comprehensive and single point search to thousands of available e-resources on a single platform. One of the alarming problems in managing access to e-resources is compiling these at a single point for easy access. Dr. Ranganathan's fourth law of library science 'Save the time of the reader' has become more significant and relevant in the transition towards e-information based

society. If librarians are to serve their users in the digital age efficiently and effectively, they will have to save users' precious time, which is generally spent in clicking the mouse umpteen times in accessing various portfolios of digital library. For this, multiple resources in multiple formats should be made searchable through a single interface.

2. Challenges of Digital Library

Even though digital libraries are being accepted enthusiastically all over the world and with great expectations yet no new innovation comes without any challenges to cope with. Some of the challenges being imposed by the digital libraries include:

- **Huge investment in form of high cost:** Libraries are investing a large chunk of their budgets in developing the collection of various components of digital libraries.

- **Enormous resources:** The major challenge confronted by the librarians to incorporate this new medium of scholarly communication is availability of vast number of e-resources from a variety of publishers. Earlier libraries had access to less number of e-resources pertaining to a subject domain, but now the growth of scholarly information on the web has made possible access to a large number of databases, both bibliographical and full text, for even a small-sized library.

- **Google Generation:** Libraries are struggling to reestablish themselves as a compelling place to start re-search (Somerville & Conrad, 2013) as most of the users just wanted to 'Google' the information.

- **Seamless Access:** Tech-savvy users, being aware of many value-added features of e-journals, demand easy and seamless access to current information in electronic form on their desktops. Providing seamless access to e-journals has always been the utopia of library and information professionals.

- **Underutilized or Unused Resources:** Further, each database contains number of e-resources and users may not be aware about availability of e-resources related to the subject domain of his interest. So, the users are confronting the blessings and difficulties of abundance (Okerson, 2000). But, librarians can't leave their users in flood of electronic information where finding pertinent information is very intricate, and at times can be a time-consuming and frustrating experience.

- **Changing Needs of Users:** The move from atoms to bits has complicated the jobs of information professionals (Sreekumar, 2001). Librarians are witnessing changes in the information seeking habits and spiraling expectations of users as well. Users now show high reliance on their own digital library in terms of ease of navigation between the many and varied electronic information resources as they want to input minimum efforts for their information seeking activities.

3. Profile of the PEC University of Technology

The PEC University of Technology, a notified deemed university by Govt. of India in 2003 offers graduate, post-graduate and doctoral programs in nine branches of sciences and engineering and is at 23rd rank amongst the top engineering institutions (both government

and private) in India for the year 2011-12 (Outlook India-MDRA Survey). The institution was originally established as Mugalpura engineering college at Lahore (now in Pakistan) on November 9, 1921. The name of the college was later changed to Maclogan engineering college and it started functioning under this name on March 19, 1924. In the year 1931, the college got affiliated to Punjab University, Lahore. After partition in 1947, the college was shifted to Roorkee (India) and was renamed as East Punjab College of Engineering. In the year 1950 the word east was dropped and it came to be known by its present name Punjab Engineering College. Towards the end of December 1953, the Institute shifted to its present campus in Chandigarh to function under Govt. of Punjab. In 1966, with the formation of Union Territory of Chandigarh, the institute came under control of Govt. of India through Chandigarh Administration. In October 2003, the Govt. of India notified the Punjab Engineering College as a Deemed to be University and thereafter it became known as Punjab Engineering College (Deemed University). In 2009, the Board of Governors renamed the Institution as PEC University of Technology which now works on IIT based Academic Model.

PEC holds the pride of being one of the first ever technological institutions in India, and has a glorious past which is about a century old. In addition, PEC has been nationally recognised as one of the finest technological universities in the country. Consider the following highlights of achievement:

- CSR-GHRDC ranked PEC 5th in the nation among TOP Engineering Colleges of super excellence.
- OUTLOOK MDRA ranked PEC 23rd amongst Top 75 Engineering Colleges in India, ahead of most NITs.

Its Central Library is changing itself from a traditional one to a modern one with adoption of new technologies for its collections and services. The total collection of the library covers more than one lakh (120,591) documents comprising of books, theses, journals and electronic resources in the form of video cassettes and CDs in the fields of science, engineering, humanities, literature and management. It supports a clientele of approximately 2500 comprising of students, faculty and other staff. The library is fully computerized using the Libsys, a commercial software package which provides web-based access to its online catalogue. The library has a fairly well-developed computer and network infrastructure to facilitate the use of all the web-based services. The library also has its own sub-local area network (LAN), which in turn, is connected to the campus LAN. The library has two servers and 27 Internet-enabled PCs. 12 of which are exclusively earmarked for users for On-line Public assess Catalogue (OPAC) searches and accessing e-journal resources in the form of Multimedia Resource Centre.

4. Digital Library Components @ PEC

When the records/information is held in electronic/digital form, these constitute important components of the Digital Library. Thus Digital library is not only digitization of physical resources, but also thoughtful organisation of electronic collection for better

access (Sharma, 2011). The e-journal service was introduced in the library in 2004, with the help of INDEST consortium. At that time PEC library was providing access to more than 200 e-resources of three commercial publishers: ASCE (American Society of Civil Engineers), ASME (American Society of Mechanical Engineers) and IEL (IEEE/IET Electronic Library) under the category of complimentary access for AICTE-sponsored institutions. In the year 2009, PEC library subscribed to three more databases as demand for electronic resources increased.

In 2015, PEC library has access to following Digital Library components for providing electronic access to over three thousand unique e-resources published by learned societies as well as commercial publishers, as per details given in Table 1.

Table 1 - Components of Digital Library in PEC

Sr. No.	Database	No. of journals accessible
Full Text Databases		
1.	ACM Digital Library	32
2.	API	18
3.	APS	18
4.	ASCE Journals	33
5.	ASME Journals	25
6.	Emerald Engg. Collection	
7.	IEL Online	219
8.	Science Direct	276
9.	Springer Link	1400
10.	Taylor & Francis Engg. Collection	
E-resources		
11.	McGraw Hill Access Engg.	4000 articles+ 255 books
Bibliographic/Indexing Databases		
12.	MathSciNet	NA
13.	Scopus	NA
Standards Database		
14.	ASTM SEDL	NA
E-Books		
15.	Springer	775
16.	EBSCO	64
Open Public Access Catalogue		
17.	OPAC	LAN

Most of the collections are subscribed by the library on annual lease basis except e-books where access rights are purchased on perpetual basis. Because of the licensing reasons; the electronic components can be accesses only within the campus. At PEC library users are

provided with a secured and hassle-free log on procedure via IP (Internet Protocol) activation. Users can access all the electronic resources through the Institute's IP ranges. This arrangement helps the user to access all the electronic resources immediately. This also keeps them free from memorizing user ID, Password, publishers URL etc. All the resources are available through campus wide network, but this arrangement restricts access to electronically available journal titles from within the university campus only.

- **Planning of discovery services for PEC**

PEC University of Technology is one of the renowned technical institutions of North India. The University offers Bachelor's, Master's, and Doctoral degrees in a wide variety of majors, with strong programs across technical disciplines. As already stated PEC is subscribing to a lot of resources in electronic form to cater to diverse information needs of the users. But with the growing number and variety of components of digital library, one of the challenges being confronted by PEC library is to find ways and means to select and offer a logical and easy access to growing collection of diversified resources to the users in a manner that enhance the research experience, provides timely and convenient access to relevant and appropriate resources. A mechanism has to be devised to organize the myriad e-resources on a single gateway to disseminate comprehensive and customized information to users in a right way that makes sense to them. Moreover, users generally expect a faster response to their information needs without wasting any time in clicking the mouse umpteen times in accessing full text of e-resources. The idea is to offer a way to search all the available resources that are accessible under diverse access platforms are made available through a single access-point irrespective of their mode of access. This could be done by adopting discovery services for the benefit of users.

- **Providers of Discovery Services**

During the last couple of years, we have seen the development of a lot of 'library discovery services', such as Summon from ProQuest's Serials Solutions business, EBSCO's Discovery Service, and Ex Libris' Primo Central, all of which aim to put the library back at the center of search and information discovery. However PEC Library is planning to activate web scale discovery services developed by two major vendors: Serials Solutions and EBSCO, which are being discussed here.

- **EBSCO Discovery Services**

EBSCO Discovery Service™ (EDS) launched in early 2010 provides web-scale discovery through creating a unified, customized index of an institution's information resources, and an easy, yet powerful means of accessing all the content from a single search box. It is offered as a hosted service and required user authentication for searching the index. Guest mode with limited search capabilities was also released for unauthorized users in later years. The EDS content include metadata from Journal & magazines, index of all the EBSCO host databases, also indexes institutional archives/repositories, catalogue records of the library and other additional databases. The search results are ranked by relevancy based

on the frequency of term in document (Pradham, Trivedi, & Arora, 2011). The interface also provides faceted navigation, search refinement, export to various citation formats, printing, e-mailing and adding to cart, RSS feeds, spelling suggestions, option for adding widgets and also a mobile interface for searching on mobile devices (Chand, 2012).

- **Serial Solutions Summon**

The Summon™ by Serial Solutions was released in the mid 2009. It is offered as a hosted software-as-a service solution providing the Summon service and index (Chand, 2012). The items in Summon include library catalog records, e-journal articles, databases, newspaper articles, e-books, dissertations, institutional repositories, conference proceedings, grey literature, cited references, reports, digital library, etc. The index is updated through an automated process on regular basis varied on the content publication, like daily for a newspaper and on monthly basis for a monthly journal. One of the interesting things is that, it is open to all on the web and does not require any user authentication for searching. The search results are sorted by relevance ranking based on various parameters like peer-reviewed journal articles, citation count of the articles from Web of Science and so on (Pradham, Trivedi, & Arora, 2011).

- **How Discovery Works**

Fagan (2012) defined discovery tools as web software that searches journal article and library catalog metadata in a unified index and presents search results in a single interface. Web scale discovery services for libraries provide deep discovery to a library's local and licensed content, and represent an evolution, perhaps a revolution, for end user information discovery as pertains to library collections (Vaughan, 2012). Web-scale discovery is a transformative search tool that allows library users to search seamlessly across a vast range of local and remote, pre-harvested and indexed content, receiving relevancy-ranked results in a user-friendly interface which is the requirement of present day researchers. Discovery services enable the entire library's material, print and e-books, journal articles, streaming video, everything, to be discovered through one search box. Discovery services don't search live sources, this the basic difference between federated search applications and discovery services. By harvesting metadata from both internal (library) and external (database vendors) sources, discovery tools create a pre-indexed service of unprecedented size and speed. It presents speedy search results because library discovery services don't search the library's locally-held resources one-by-one; instead, they index and search a centrally held database of publisher content, thereby allowing more complete indexing which is much faster in searching, and provides more complex integration of result sets. Another feature which distinguishes it from other is rather than seeing multiple results for the same article if it's held in several different databases or abstracting and indexing services, these search tools display a composite result for each item. Linking from the list of results to the full text of an article is also controlled by the library through their link resolver system, so a user is directed to the most appropriate full text copy a library holds, generally the version of record on the publisher's own platform.

- **Perceived benefits of discovery services**

As envisaged by Vaughan (2011) Web scale discovery services for the library environment have the capacity to more easily connect researchers with the library's vast information repository. This includes locally held and hosted content such as physical holdings, digital collections, and local institutional repositories. Perhaps more significantly, web scale discovery also accesses a huge array of remotely hosted content often purchased or licensed by the library, such as publisher and aggregator content for tens of thousands of full-text journals, additional content from abstracting and indexing resources, and content from open access repositories. With the access to Discovery Services, a number of benefits including single search across the central index; fast response time; relevancy-ranked results list; facets, sort, and other tools for refining and using the results; connections to full text via direct links and OpenURL and End-user accounts and features deemed to be achieved. These can be further elaborated as,

- **Search Interface:** Discovery tools facilitates the searching by providing an interface which is as simple and common as Google with the advantage of discovering credible and reliable library content through pre-indexed metadata.

- **Relevant ranking**: Discovery tools provide search results in a relevancy-ranked list indicting high rank for the most relevant search.

- **Comprehensive Search**: Incorporates the comprehensive knowledge of library's holdings so that researchers can access their results including full-text of electronic articles. This platform works as an integrated access interface for all the e-resources available.

- **Saves the time of the user:** Availability of full-text electronic articles with fewer mouse-clicks provides ease of access by reducing amount of labor to get relevant e-information.

- **Speed of search:** With the discovery solutions users don't have to wait tens of seconds for their search results. In terms of response time, live searching can't compete with index searching. Less perplexity for users to get all the information about e-resources.

- **Enhancing the Results:** Easily navigate and narrow search result sets using multiple methods, such as filtering, faceting and sorting. The discovery also provides time-efficient research for the busy users by allowing results set to be limited to items immediately available in full text online.

- **Citation formatting:** Quickly generating of citations in the preferred style required.

- **Familiarity to print-**content: In addition to above Discovery solutions also provide Book jacket images and publication-type icons.

- **Information Literacy:** There is a new opportunity for user-centred information literacy programs to emerge. The new web-scale discovery systems have also made impact on information literacy programs and pedagogical approaches to library instruction. Discovery systems offer new possibilities to shift instruction programs

away from their historical focus on explanatory searching and citing, towards exploratory higher level thinking in relation to evaluating and using information itself. As library search gets easier and varied platforms become unified, the focus of information literacy on search rules and platform choice and navigation is able to truly give way to critical thinking and imaginative exploration.

5. Conclusion

Discovery tool is vital component of an Information Portal, which provides the speedy results from assorted information resources as this indexes all the content for which a library has electronic access either by indexing the full text or the metadata. To deal with the huge deluge of information, the users get a single window search or a single query like in Google to search the rich content of the collection of the library with the speed they have come to expect. So the Discovery empowers the user with effective tools to manipulate a large and varied search result set and act as a key to users' success with searching the relevant information. Application of discovery tools in PEC University of technology with well organized manner aims to effective usage of e-resources among students and faculty. Awareness and exploitation of huge information resources available in the library is also the purpose to be considered for the access of Discovery tools.

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The Technological Change and Discovery in Services in the library in Government College for Men, Kurnool (A.P.)

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Abstract: There is a great deal of potential to increase the usage of social media technology. Blogging, Face book and now micro blogging through Twitter have grown exponentially over the past two years; this technology will continue to grow, with the increase in 3G enabled phones and access to the internet becoming almost universal. Library 3.0 and the technological changes that will follow will be a vital and exciting part of how libraries develop and extend their formal and informal learning programs. They will allow us to improve our online resources, which will ensure that our services remain relevant to the communities we serve and improve access to informal self-education and lifelong learning opportunities. The Libraries should be aware of the technological changes and implementation and adopting it for the benefit of the student community. The paper deals with the trials and searches done at the Government College for Men, Kurnool is striving for the change and sustainability.

Keywords: On line resources, technological changes, self –education, Library 3.0, 3G enable phones.

1. Introduction

The changing era of traditional Libraries to the Modern Libraries from the www to the 3G enable phones there is a lot of technological revolution taken place. The Blogs, Social media, search engines and the competition among the countries, continents, people and their race towards the achievement of speed make the fast grow the Libraries and their structural change from the digital to virtual. But still the there are exceptions in the thinking and implementation of the ideas into action. There are many hurdles to come across in the way of the Library profession now and in future also especially in the Indian context. The Government College for Men (GCM), Kurnool established in the year 1972 with only B.com and B.A. The Library got the inflibnet – nlist programme from the year 2009, before Reaccreditation of NAAC. The present paper deals with the nature of the staff and students and their nature of searching when they want to get the information from their daily routine study projects, examinations ,time pass and lectures.

2. Objectives:

- To Keep the Library up-to-date with emerging technologies; through broadband Services (incorporating Online Resources) Special Interest Group and other collaborations.

- To develop partnerships with government and non-government agencies to implement best   practice programs relevant to changing community technology needs

- To implement Planned Professional Development which means Libraries should be used for the further develop Staff Training Strategies in order to meet anticipated demand by the community for assistance in accessing new technologies.

- To Use the QR (Quick Response) codes to provide greater access to information services, aiding in promotion of electronic resources, services.

- Libraries need to be aware that the nature of searching for information is changing, and investigate and implement federated searching options to the best of their abilities

3. Methodology

To conduct the study, interview method and questionnaire method are used for data collection. A well structured questionnaire was designed scientifically keeping in view of objective. The questionnaires were distributed to faculty members and students to a sample of 120. However, 87(72.5%) of them responded and the same is used for analysis.

3.1. Limitations of the study

The study is undertaken in the College Library where the users (faculty and students) visit it for various purposes. The faculty does not include the contract and part-time teaching staff. The students are only under graduates doing MSCS, MPCS, B.Com, B.A, and other Science groups.

4. Data Analysis

The data is collected from the respondents for the study

Table: 1. Distribution of Questionnaires

S.No	Respondents	Questionnaires Distributed	Questionnaires Received	Percentage
1	Faculty members	40	35	40.22
2	Students	80	52	59.77
	Total	120	87	72.50

From the above table it is clear that 120 questionnaires were distributed to the faculty and students of the college in all the disciplines and 87 were received. The response rate is 72.50%.

- **Familiarity with E- Resources:**

The respondents are categorized whether they are familiar with the e-resources and other sites of the internet.

Table: 2 showing Users familiarity with e- resources

S.No	Whether Familiar with e- resources	No. of Respondents	Percentage
1	Familiar	59	67.82%
2	Not Familiar very much	28	32.18%
3	Total	87	100

It is evident that 67.82% of the respondents knew about the e- resources and 32.18% of them did not know about the e- resources much.

Table: 3 showing the usage of e- resources by the respondents

S.No	Purpose	No. of Respondents	Percentage
1	Searching for new areas/ pictures/Photographs	48	81.35
2	e- mailing	44	74.57
3	Current Affairs	31	52.54
4	Seminars/Conferences/workshops	25	42.37
5	Teaching/Research	20	33.89

From the above table it is evident that the respondents show much interest in searching for the new things and information in the net. 74.57% of the respondents expressed they use the net for e mailing followed by the Current affairs- 52.54%. The faculty 33.89% of them uses the e- resources for the purpose of teaching and research.

- **The services available in the Library**

  - The users can have the books through the SOUL software for catalogue, circulation, and acquisition and enquiry purposes of the holding of the Library.

  - On line journal services available in the campus with N-List services are used by the staff and students of the college.

  - This facility provides ample opportunities to the staff and students to down load the information from anywhere in the world. It also helps the students to pursue their future career in a planned manner.

  - The catalogue is in three separate sequences to facilitate consultation by the readers. They are 1) Author catalogue 2) Title catalogue 3) subject catalogue. This arrangement helps the students to locate their choice of information with in no time.

  - New Arrivals Rack is provided for easy identification of the newly procured books.

  - Encyclopedias are available in the Library.

- **Frequency of using the e- resources by the Respondents:**

The distribution of the respondents according to their frequency of using the e- content in the college library or in their departments is shown below

Table: 4 showing Frequency of using E-resources

S. No	Fre-quency	On line	%	Inter net	%	e-mail	%	Search engines	%	Social net work	%
1	Daily	25	28.73	26	29.88	30	34.48	34	39.08	40	45.97
2	2/3times a week	22	25.28	38	43.68	19	21.84	12	13.79	05	5.75
3	Once in a week	06	6.89	15	17.24	05	5.75	10	11.49	04	4.59
4	Once in a month	04	4.59	03	3.45	04	4.59	02	2.29	03	3.45
5	Rare use	02	2.29	----	----	01	1.15	01	1.15	07	8.04
6	Never	28	32.18	05	5.75	28	32.18	28	32.18	28	32.18
7	Total	87	99.96	87	100	87	100	87	100	87	99.98

It is clear that 45.97% of the respondents on the social network daily. It is the most used channel in the world of electronics.39.08% of the respondents use the search engines fallowed by the e-mail 34.48%. Internet used respondents are 29.88% daily and 28.73% of them use on line content daily. The users 43.68% take the advantage of internet two or three Times in week.

- **Use Frequency of e –resources by the faculty and students of the Government Degree College, Kurnool.**

Table: 5 showing the Distribution of the faculty and students in usage of e- resources

S.No	Frequency of use	Faculty	Percentage	Students	Percentage	Total	Percentage
1	Daily	04	11.42	22	42.3	26	29.88
2	2/3 times a week	18	51.42	20	38.46	38	43.67
3	Once in a week	10	28.57	08	15.38	15	17.24
4	Once in a month	02	5.71	01	1.9	03	3.45
5	Rare Use	01	2.85	01	1.9	02	2.29
6	Total	35	100	52	100	87	100

It is known that 43.67% of the respondents use the e resources 2 or three times a week whereas 2.29% of them use it very rare. Among faculty members 51.425 of them use it 2 or three times a week fallowed by 28.57% use the e- resources once in week.

The student community 42.3% uses it daily and fallowed by 38.46% use the e- resources 2/3 times a week. So, the clear difference is seen between the faculty and students in the usage of e-resources.

- **Importance of Using QR Codes in Libraries**

How can we make ourselves relevant to the community who expects instant access to all items from newspapers to technical manuals from picture books to popular titles? We need to consider what else is out there. Sometimes it's the little extra things on the market that have a large impact. QR codes or quick response codes might just be that little thing. Potentially, QR codes can be used to give direction to where items are on the shelf and if necessary, used on the shelves themselves if the physical item is out – our respondents could scan the code and reserve the item via the catalogue, or download the item immediately in the form of an eBook.

Table: 6 showing the guidance in accessing the e- resources by the respondents

S.no	Guidance in Accessing	No. of Respondents	Percentage
1	Self access without help	08	13.55
2	Help from friends	12	20.33
3	Instructions from Library staff	17	28.81
4	Guidance from computer staff	11	18.64
5	Institution joined outside	23	38.98

It is clearly shown from the table that 28.81% of them get instructions from the library staff and 13.55% of them able to access without any help.

- **Feeling of satisfaction while accessing the e –resources and whether they get the adequate information or not.**

Table: 7 showing the adequacy of information while accessing the e resources

S.No.	Opinion	No. of respondents	Percentage
1	Always	30	50.84
2	Very often	18	30.51
3	Very Rare	11	18.64
	Total	59	99.99

From the above table it is well known that the50.84% of the respondents felt the information they are getting from the e resources is always sufficient and satisfied but 18.64% of them have the opinion that they does not get the sufficient information from the e – resources. 30.51% of them have the feeling that they often got the satisfied information from the e- resources.

The ability of the accessing of the users and to give them guidance in accessing the e-resources they follow either the help of their friends, colleagues, library staff and sometimes they join the institution outside the campus or else take the assistance of the computer staff working in the college.

5. Major Findings

- It is found that 67.82% of the respondents are familiar with the e- resources available in the Library in Government Degree College, Kurnool and 32.18% of them are in touch with the e- resources and other computer services.

- It is found that the respondents show much interest in searching for the new things and information in the net.

- It is found that 74.57% of the respondents expressed they use the net for e mailing followed by the Current affairs- 52.54%.

- It is found that 33.89% of faculty uses the e- resources for the purpose of teaching and research.

- It is found that the respondents use SOUL software to get the desired information from e-resources with the help of their unique login ID and password.

- It is known from the study that 43.67% of the respondents use the e--resources 2 or three times a week whereas 2.29% of them use it very rare. Among faculty members 51.425 of them use it 2 or three times a week fallowed by 28.57% use the e-resources once in week.

- It is also found that the student community 42.3% uses it daily and fallowed by 38.46% use the e- resources 2/3 times a week. So, the clear difference is seen between the faculty and students in the usage of e-resources.

- It is found from that 28.81% of them get instructions from the library staff and 13.55% of them able to access without any help.

- 50.84% of the respondents felt the information they are getting from the e resources is always sufficient and satisfied but 18.64% of them have the opinion that they does not get the sufficient information from the e – resources.

- It is found that 30.51% of them have the feeling that they often got the satisfied information from the e- resources

6. Suggestions

- Based on the study undertaken, the following suggestions and changes are necessary in the Library of the Government Degree College, Kurnool for better use of the e- resources by the respondents.

- It came to know that 32.18% of the respondents are not familiar with the use of e- resources. They are given learner programmes and help at regular intervals to learn and access.

- As many of the students don't have access for other e-learning and online courses WI-FI is to be set up in the college for the better access of e-resources for all.

- From the study we came to that only 28.81% of them get instructions from the library staff, so many workshop programs should be conducted for them to get

the awareness about the latest methods which are to be adopted to increase the standard.

- Training programmes are given to the Library staff for the smooth handling of the multimedia and other problems to handle while accessing the information.

- Awareness programmes are conducted by the faculty in collaboration with the Library staff to know more about the current affairs in the subject and other important measures for the best utilization of the e –resources in the College Library.

- User education programmes are to be conducted whenever the change in technology or the problem arises.

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The Transition from Print Books to Electronic Books – *A Perspective*

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Abstract: The dissemination of human knowledge is going through an upheaval with the emergence of new technologies. The growth in the availability of books, journals in digital form coupled with increased interest in electronic content, means that libraries need to respond to both the possibility and expectation of delivery of e-content. This paper reports some of the issues   concerning the integration of e-books in academic libraries of India. Some features of e-books over print books are graphically illustrated.

Keywords: E-resources v/s print resources

1. Introduction

The digitalization of knowledge and information content has shaken the economic foundations of the print media. Considerable growth in the global e-book market has taken place in the last few years, while there are predictions for even higher growth in the near future (International publishing forum 2010). The literature suggests that e-books present new challenges for academic libraries as there are many questions regarding the management of the introduction and development of e-book collections and services (Vasikiou etal 2012) .

The processs and criteria that libraries apply in the selection and acqustion of e-books has significant implications in the digital market. The present study is aimed at presenting some of the advantages of e-books over print books and tries to analyze different aspects of integrating e-books in academic libraries.

2. Literature review

E-books are commonly perceived as offering great potential for teaching and learning (Armstrong etal 2006), they are attractive to scholarly communities (Nicholas etal 2007) and have great potential to change information landscape (rowlamd etal 2007). Some studies show that the use of e-books lay well behind that of other resources such as e-journals and there is a sense that e-books are not yet fully embedded in academic practice (Mckiel 2007).

A broad international review of e-books in academic libraries was presented by Tedd (2005). The review (Blummer and Kenton, 2012) tracked literature from 2005 that focused on academic librarians best practices for acquiring, cataloguging, maintaining and promoting e-books at their institution. In (Vasileiou etal 2012) e-book management in academic libraries is examined and framework of the stages in the e-book management process is generated summarizing the key activities and associated issues and challenges for each stage.

3. Observation and Findings

- **Pricing:** Many publishers are offering different types of pricing. They are offering yearly or perpetual access. i.e that particular library can own it life time. The pricing is different from publisher to publisher. Some give pricing for each book as similar to that of the printed

book ,as pick and choose but they stress on taking minimum number of books. Another type is bundle offer where the publisher gives no choice for the libraries, he mentions the number of books and the price is fixed.

- **Usage:** The ebook can be accessed by any number of users simultaneously. They cannot download or take any print out. Some publihsers are providing printing and downlaod options also. The useage of ebooks is now increasing slowly. Many ebooks are available freely in different websites. In future the libraries will shift from print books to ebooks.

- **Space Saving:** Ebooks eliminates physical space. No stacks are required and simplified user search is also available in ebooks. This helps the libraries to reduce the costs, damage and loss of books can be avoided.

- **Search:** An E book are used more effectively as it helps the user to search the books more in simplified manner, easire and faster and is also available 24x7 and can be downloaded easily.

- **Usage:** In print books only the elementary useage statistics typically exist. But where as in ebook collection the actual useage is known, the number of times that particular books has been read and download etc.

- **User Analysis:** Users are of the view that immediate permanet, 24x7 simultaneous access is made avialable in ebooks. Ebook users are citing availability, convience, content fresheness and navigation and search capabilities as the foremost advantages.

- **E-Books Rating:** E-Book Benefits on Scale 1-7 Enhanced User Access enhanced functionally, and access to greater amounts of content areas all scored highly as areas in which e Books provides clear advantage over print.

4. Procurement of E-Books

Ebooks are priced through bulk order is more efficient and cost effective. We get more ebooks with less price liciencing and agreement is becoming complicated in procruing ebooks. The cost of processing acquired through print and that of electronic books are almost equal. The libraries need not stick labels any more on the books but stock taking procdure is more or less the same as that book enters the library accession register.

5. Infrastructure

Ebooks save shelf space, but there is no savings in the cost which may increase due change in the dollar rate. The price normally increases 5 to 10 % every year.

6. Conclusion

The ebooks are seen as future books rather print books which may disappear. E books saves time cost and are available 24x7. The drawbacks is that there must be propers internet, computer, LAN connectivity and power back etc., which are ostly and in the country like India the cost of ebooks is more and all the libraries cannot afford to pay specially public libraries users reported that there are obstacles to using e-books that are controlled by e-books vendors such as requiring an online profile to fully use their content and limitations on printing or copying. Librarians and library associations can advocate for fewer limitations on printing or copying and for the elimination of online profiles for content use. There are many free books are available in internet.

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Public Libraries and Digital Scholarship

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Abstract: Today, the world is a world full of information. Public libraries are developing innovative portals taking the advantage of convergence of media, computing and communication technologies, interactivity and social networking tools, and new possibilities to provide a world class medium of resources and services to its users. The resources and services of the public library are oriented to all age groups, with the relevant material, from the recreation to research informational needs, by organizing and presenting information; integrating the open access and licensed newspapers, journals and databases, text, multimedia, and other relevant sources. Public libraries as a local gateway to knowledge are facilitating for lifelong learning, independent decision-making and cultural development of both the individual and thereby contributing to the information society.

Keywords: Public libraries and Open access; Public libraries and scholarship; open access resources and public libraries; Digital Scholarship.

1. Introduction

The public libraries are the local centers of information, making all kinds of knowledge and information readily available to its users. Library professionals bridge the gap between the users and the vast ocean of knowledge and information and also match the information and its users, present it in a functional mode. They are the collectors and promoters of the heritage; they are organizers of the knowledge in the materials and add value by cataloguing, classifying and describing them; and, as public institutions, they assure fairness of access for all citizens. They take the knowledge of the past and present, and lay it down for the future.

From the middle of the 20th century, the invention of modern information technology has made radical changes in every aspect of human life including libraries. Libraries are facing challenges to cope with the transition to the digital age. Traditional libraries have transformed from paper to digital multimedia; thereby providing access to global information easier, faster and instantaneously. In the past, library, according to Aina (2004), '*is a store that stocks all kinds of knowledge and information carriers that are meant to be consulted and used by readers with little or no expense on their part*'. This is changing. Akintola and Olayiwola (2004) affirm that libraries must understand the revolutionary change and evolve a strategy of linking organizational form to the pace of change.

In the present digital era, diminishing budgets, increasing costs of infrastructure and resources, availability of diverse formats of global information in various languages, physical constraints and information overload are making libraries to face an increasing challenge to provide relevant information to diverse populations with differing needs, while competing with Web search engines like Google. The digital age marked a decline for libraries. Text is no longer the sole source for information. Users are opting and interested in multimedia formats. They are looking for quick and direct access to the best information.

2. ICT and Public Libraries

In the new Internet era, library websites are hubs for users to find services and locate resources, study guides, etc. The rapid evolution in Information Communications Technologies, ICT, is providing new tools and efficient opportunities for communication of information and interacting with citizens. Emergence of web-based content, licensed resources, born-digital documents, and institutionally significant digital collections are empowering libraries to create new discovery tools and access points for users to quickly locate information in a reliable way using the technologies. Library portal is the best discovery tool to provide online access to multimedia collections. Library portals support one stop solution for the discovery and retrieval of local and remote resources such as books, journal articles and digital objects. Public libraries are developing innovative portals taking the advantage of convergence of media, computing and communication technologies, interactivity and social networking tools, and new possibilities to provide a world class medium of resources and services to its users.

The library portals or websites can be designed making the libraries resources organized intuitive with a simple search box that would automatically search all the resources so that the users should feel comfortable and accept it as an information tool of choice. The search must allow filtering for a specific format, date range or locating only those items that are immediately available on the shelves or online from the collection.

The resources and services of the public library are oriented to all age groups, with the relevant material, from the recreation to research informational needs of the communities, by organizing and presenting information; integrating the open access and licensed newspapers, journals and databases, text, multimedia, and other relevant sources.

One may need information on a variety of topics, including biography, history, health, news, science and technology. Information about an event will appear overtime in different types of resources. In Minutes and days on ***Web***, in a day or days in ***Newspapers***; in a week or fortnightly in ***Popular Magazines***; in a month or Quarter in a ***Scholarly Journals***; in a year or years in ***Books and Reference works***. One can search multiple e-resources or a single resource. One can also read books and newspapers, listen to music or watch videos online. With an aim of giving the *best reading for the largest number at the least cost*, managers and policy makers of Public libraries can use open access resources that are freely available on the web. Specialized websites and databases can help to provide authoritative information by looking at particular groups of resources instead of the entire web. There are various directories of open access valuable resources available on the web free of cost. The library managers as curators, facilitators can link these resources to its users.

3. Open Access Movement and Public Libraries

Open-access (OA) solves the budget crisis for scholarly journals. Librarians can help users find the information they need, regardless of the budget-enforced limits on the library's own collection. Open-access (OA) literature is digital in form, available online, free of

charge, and free of copyright and licensing issues. Public libraries, if through their websites, link to the directory of open access journals, the users of that public library can have 10,289 Journals,6,139 searchable at Article level from 136 Countries out of 1,842,943 Articles as on 3rd March 2015. This online directory is a readymade source to provide access to quality open access, peer-reviewed journals with indexes. OpenDOAR provides a quality-assured listing of open access repositories around the world. There are around 2600 listings of open access (OA) repositories available on the web, which are organized by discipline or by institution. *Open*DOAR staff harvest and assign metadata to allow categorization and analysis to assist the wider use and exploitation of repositories.

There are various websites giving links to thousands of e-books on various subject both fiction and non-fiction e-books available under free licenses such as Creative Commons license, Project Gutenberg License and other freedom to use.

Today the world is a world full of information and news. To stay ahead in the world of cut throat competition a person needs to be informed about the changes taking place around him in the world. The best way of information is through Newspapers. It is practical not possible to buy all newspapers published throughout the world. Though all leading newspapers provide information on their sites it becomes where difficult to remember the name and site address of all such papers. There are dedicated websites for global newspapers to browse and read hundreds of full content premium newspapers and magazines from around the globe by selecting the choice of Region, Language, Category or Periodicity. These websites provide most convenient, complete and cost-effective way to read all the favorite publications in daily newspapers in all languages around the world on one site with just a free- registration. The mission is to satisfy all age group of users, students, researchers and intellectual curious with unlimited access to books and information available on web, free of cost.

President of India, Hon'ble Pranab Mukherjee, while launching the National Mission on Libraries referred public libraries as "the people's university". Mr. Mukherjee emphasized on up gradation of libraries providing services to the public and appealed libraries to contribute in promoting inclusive and sustained development of the people. Public library websites through a search interface give a facility to search and link to most of the e-resources including online catalogs of library print holdings, full-text materials from electronic journals, databases, and websites of directory of journals, reference sources, multimedia databases, institutional repositories, and other specialized collections that meet the needs of the local research community.

Almost or many of these dynamic websites are indexed and organized incorporating the Web 2.0 features and online services. Digital technologies can increase the content in the public libraries by linking its website to various free e –resources like newspapers across the globe, e-journals or e-books, reference sources or research sources, citation sources or gaming sources, listen to music, speech, lesson or watch an interview, movie or surgery, with descriptions of articles and citations.

In order to make use of these resources and facilities, regular and frequent orientation programs to the users is very much essential. Arranging workshops, hands on training and posting video tutorials, the users must be informed about the new resources and services.

4. Conclusion

Public libraries can make a lot of information available online *via* their library websites from home computer connected to internet for accessing hundreds of high quality books, journals and other required information 24 hours a day, 7 days a week. Public library as a local gateway to knowledge is facilitating for lifelong learning, independent decision-making and cultural development of both the individual and thereby contributing to the information society.

Therefore, Open Access resources help public libraries to increase and accelerate the broad dissemination of valuable information in digital form, free of cost, to their audience and impact, and help the community raise its digital scholarship.

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Open Source Content Management System for Content Development: *A Comparative Study*

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Abstract: Designing dynamic and static web pages have been possible with many good software like Frontpage, Dreamweaver etc. but gradually it became difficult for web developers to design pages due to dynamic nature of these software and different file formats. Butevolvement of open source content management system such as Joomla, Drupal, Wordpress, Plone, DotNetNuke etc. have been found as an alternative to this. This paper deals with comparative study between Joomla and Drupal. The basic objective of this paper is to find out the best content management system for content development based on selected criteria which includes installation, platform support, browser support, documentation, community support, modules, extensions, user management, usage, design, performance, scalability etc.

Keywords: Content Management System, Joomla, Drupal

1. Introduction

There has been tremendous change in information generation, distribution and access in the present information society which has affected most of the human's life, the same way, there has been affect and growth in Information on the web alsowhich has made the searching more complex. Due to Information explosion, a new set of problem has arrived for the administrator who produces and manages the content. So, a system which can allow to manage, create and distribute various forms of content was needed, thus CMS was created. Joomla and Drupal are two most popular open-source content management systems to design powerful and dynamic websites. Both have similarity in nature such as open licenses, strong community support for further development, LAMP-based (Linux, Apache, MySQL, PHP) hosting architecture &environments. Joomla and Drupal, both are also flexible and able to deliver content management functionality with ease. This paper describes about the differences between Joomla and Drupal for the content development and involvement of costs. This information is provided for web developers, library professionals, IT department heads etc. who are facing the difficulties while choosing the choice between Joomla and Drupal. Reading this paper, one should be in better position to understand the differences between these two CMS.

2. Content Management System:

A system which is used to manage the content is called as Content Management System which consistsof two elements: the Content Management Application (CMA)and the Content Delivery Application (CDA).The element ofContent Management Applicationallows the web developer or author (who may not be familiar withHypertext Markup Language(HTML)) to manage the creation, modification, and removal of content from a

web site without having the expertise of HTML or web designing. The element of Content Delivery Application uses and compiles that information to update the web site.

An individual can use a template as well as wizard and other tools to create or modify web content with its web publishing feature. Documents including electronic and scanned paper can be formatted into HTML or PDF using format management feature for the website. The content can also be updated to new version using revision control feature. Content Management Systems have additional features such as indexing, searching and retrieval. A Content Management System indexes all data available on the site. Individual can then search for data using keywords, which the CMS system retrieves. A Content Management System consists of different subsystems that interact with each other:-

- Collection

- Management

- Publishing

3. Need of Content Management Systems

Content Management System is the fastest way to create content and update the website. It gives freedom to create new pages in one click,and inactive unused pages, without worrying about disturbance in the design. A website holder need not to be pay every time he wants to modify the content of hiswebsite. It also saves money and time. A powerful content management system has the following advantages.

- CMS is generally web-based and it can be accessed over network system through browser.

- CMS allows to add, change and remove the text, images, and videos.

- CMS allows editing the page titles, descriptions and URLs.

- CMS allows to create or delete the new category or page in the website.

- CMS allows editing the tag.

- CMS also allows changing the text of the navigation bar.

A CMS keeps websites well organized, increases the data security, and reduces the site maintenance costs. Several open source content managementsystems such as Joomla, Drupal, Wordpress, Plone, DotNetNuke etc. are available that may be of much use while designing a website.

- **Joomla:** Joomla is an award winning open source content management system which is written in PHP scripting language and uses MySQL database for the backend. Joomla is gaining more popularity among users due to ease of usability and extensibility. More than 5000 extensions and modules enhances the functionality of the core Joomla package. The important feature is that it can be installed and run on different operating systems such as Linux, Windows or Macintosh and can be

distributed under General Public License (GPL) means it is free to use. Model-View-Controller (MVC) design pattern is mainly responsible for advanced component of Joomla. It contains the basic features such as blogs, RSS feeds, caching, search functionality, printable versions of pages, create and manage menus, administer the system and support for language internationalization. Database which is used in Joomla can be utilized for dynamic formatting. Look and feel of Joomla can be customized using templates which are composed of XHTML block and in line tagged element. The whole system consists of two types of pages: **Categories and Articles**.

- **Joomla File Structure:** At the time of installation of Joomla, some of the important file will be created either on the local machine or on the server. The example is given below showing how each folder has all the important documentation structured and organized.
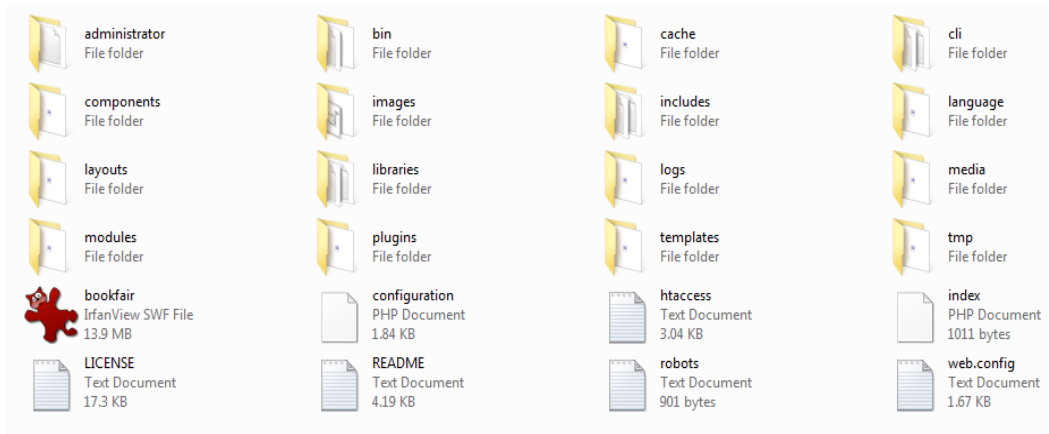
Figure 1 - Joomla File Structure

- **DRUPAL**

Drupal is also an open source content management systemwhich is written in PHP and uses MySQL or PostgreSQL. It can be installed on different operating system such as Linux, Windows or Macintosh. Drupal is distributed under General Public License and is free to download. The Drupal's architecturehas been designed in such a way that the three different layers work independently and correlate with each other to give the final output. These three layers are the content which generate the website.
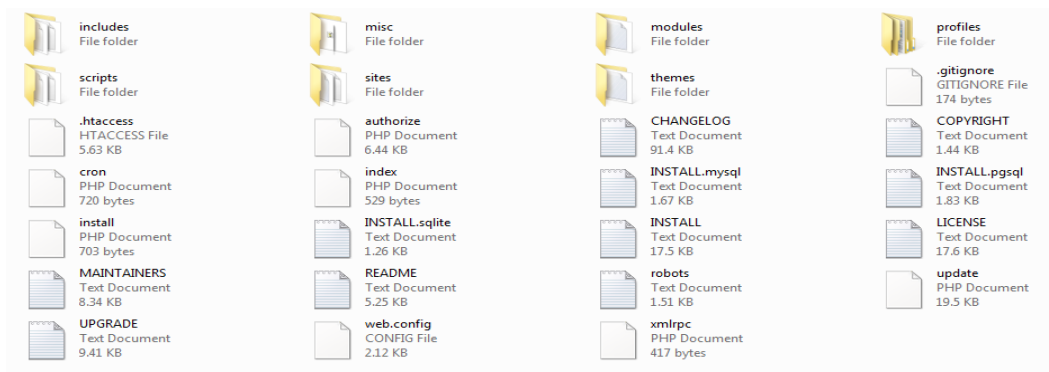
Figure 2 - Drupal File Structure

- **Methodology to compare**

Internal and external variables have been the biggest challenges in comparison of two full-featured content management system. These variables are mainly responsible for implementation processes and real cost involved in implementation. In addition, one system may be better suited than the other to handle a particular requirement of the website, even though both are capable of supporting it.

When we compare two content management systems, itrequires a deep familiarity with both platforms and experience with multiple deployments with special requirements. It is also important to understand that how a particular CMS can fit into the context of a project and can go a long ways toward effectively managing integration costs, support and ongoing maintenance.

Both Joomla and Drupal have developed several versions in past few years. Comparison about capabilities and details of two content management systems relate to the most recent, stable, long-term-support releases i.e. Drupal 7 and Joomla 3, respectively.Both Joomla and Drupal are very easy to learn and deploy.

- **Setup and Configuration of Hosting Environment:**
A number of tasks involve to create the environment for web hostingwhich includesselection of hardware and system configuration, operating system and installation of software on webserver and configuration & network setup.

Joomla runs well on any properly configured system with Apache and PHP.

Drupal runs well on properly configured server same as Joomla.

Environment setup and configuration costs for hosting Joomla or Drupal locally or on web server are effectively the same. However, for large-scale websites that require load balancing across servers, as well as projects that must support multi-site capabilities, **Drupal may require less time for server planning, setup and deployment**.

- **Installation of CMS and Configuration:**
Installation process for both Joomla and Drupal is almost same. The process involves uploading files to your server (hosting environment), create database for the CMS then visit URL at the install location (localhost or web address) and walk through a series of step by step configuration. Once the installation is complete, a default version of the CMS is available at the install location, and from there, it can be further configured, customized and populated with content.

Joomla installation is straightforward and nearly all steps take place within Joomla's step-by-step installation process. After successful installation, it provides a default version of both the front end and back end sides of Joomla. In addition, Joomla also provides options to work with demo content as part of the installation process, which provides freedom for implementers to works easily with example site.

Drupal installation is also straightforward but it requires minor server-side manipulation of file permissions and file names (in case of installation through control panel) and then the process is very similar to a Joomla installation. Initial Drupal configuration settings are implemented via control panels and include things like front page designation, cache settings and basic site information.

Process of base installation of the content management system is similar between Joomla and Drupal and the time required for installation is essentially the same for both.

4. Content Types and Structures

The construction of well-organized website with rich content provides a versatile and stable platform for growth of website content. Implementation of content types and structures includes setting out the nature of the content the site is to display, as well as creating the hierarchical structures used to organize and display that content.

Joomla includes several core types of content which includes Articles, Contacts, Banners, Newsfeeds and Weblinks. Each of Joomla's core content types contains capabilities and settings supporting that specific type of use, and they are all available as soon as Joomla is installed. It uses a nested category hierarchy for organizing its content as default method. A single content item can stay at any level of Joomla category tree. Joomla can have unlimited number of categories and articles.

Using specific set of tools, site structure are planned and built in Drupal. The site designed with Drupal requiresexpertise and can support very high versatility, many different use cases, and extremely complex site.
Joomla is considered less expensive and much faster to implement structured site content. Most of the sites designed with Joomla employ its general-purpose article content type as the main method for containing web page content to keep things organized using the default categories/subcategories. Whereas Drupal websites require implementers to plan and create content types first before meaningful content build-out can begin. This process requires enough time for specialized content items and complex website. **In general Drupal requires 50% more time than the time required in Joomla for site structure construction**.

5. Site Design and Layout

Both Joomla and Drupalhave some common characteristics and contain systems for managing the layout of site elements, as well as implementing completely custom web designs with the help of HTML and pre-defined layouts.

Joomla has pre-defined structure and it uses 'Template' to control site design and layout. It includes two front-end templates for users and two back-end templates for administrative area at the time of installation. Joomla administrator control the template selection through template manager at the back end of Joomla.

Drupal uses "**Themes**" to customize a website's design and layout through conventions and processes focused around discrete sets of files in a Drupal installation. By default, Drupal ships with four in-built Themes, any of which can be extended or customized by spawning off a copy, registering the copy within Drupal under a new system name, and then adjusting CSS files and template files (named with *.tpl.php file name extensions in Drupal). A top-level *.info file declares the Theme within Drupal; references CSS, JavaScript and other files used within the Theme; and defines page layout areas, which Drupal calls "**Regions**."

Both**Joomla and Drupal**include highly capable systems for managing site design and layout. Joomla has in-built capabilities and standards which makes it easier and faster to implement website designs. Based on the design and capability requirements, Drupal may take up to 50 percent more time than Joomla to implement a web design and layout.

- **Site Navigation**

Any website designed with content management system, navigation consists of menus or individual menus. Both Joomla and Drupal are benefited from third party developers who provides additional plug-in and modules that can change and improve the appearance and behavior of menu.

Joomla's Menu Manager allows administrator to add, edit and delete menus as well as control the items within a particular menu. While creating a new menu item, selection of the type of content such as article, contacts, Weblinks etc. is compulsory and based on this menu is created. After defining destination type of content, additional parameters for the particular menu in order to display further options to target content. In Joomla, menus are associated with module which is positioned as per template structure which can be rearranged and moved from one menu to another anytime.

Drupal manages the menus through its Menu Module which allows developer to add, edit and delete the menu on the site. In order to contain a link pointing toward internal link site content, the defined menus must be linked with the particular content type of targeted page. Both Joomla and Drupal has mature system for building menu and configuring menu items. Drupal may take slightly longer time to implement menu but the time expense is still nominal for both of them.

- **Editorial Tools**

A good content management system's editorial tools is mainly responsible for enabling content formatting.

Joomla includes many tools for formatting and managing content at the time of installation. It ships with WYSIWYG editor with rich content editing options. Using control panel which is associated with content items, expiry of content can also be set. Through 'Media Manager' file uploading and storage is maintained.

Drupal does not ship with WYSISYG editor which is a common complaint. By default, Ituses plain text area for drafting and changing the content. By default, Joomla includes more in-built editorial tools and controls than Drupal, including a native WYSIWYG editor, scheduling controls and interfaces for managing the presence of content item elements. For primary content formatting needs, Joomla offers more tools and options by default.

- **Rich Media Support**

Rich media consists of flash, audio, video, image galleries or other non-text elements within web page content. Both Joomlaand Drupal support rich media display through the installation and configuration of additional third party software.

Joomla can support rich media display through the installation and configuration of third-party extension software. **Drupal** requires additional software in order to manage rich media display. The Drupal administrator manages rich media support by adding rich media fields, configuring different options. Few good Drupal Modules supports publication and management of rich media content. Both Joomla and Drupal require third- party extension software to support the easy display and publication of rich media elements. Joomla has more flexibility and it provides tools to manage the rich media content at fast rate whereas Drupal requires additional tools to manage the same. As a result, **enabling rich media support in Drupal tends to take more development time than in Joomla**.

- **SEO Support**

Search engine optimization (SEO) is the process of configuring website structure and elements to best synchronize with the methods that search engines like Google to evaluate, index and rank content. Both Joomla and Drupal include significant support for SEO features, however, each implements them in very different ways. **Joomla**'s native support for SEO is extensive, and it can be further expanded with the installation of third-party software. **Drupal**'s SEO support can be significant, and it requires planning and implementation by the Drupal developer. By default, Joomla has more rich and easy-to-implement SEO features than Drupal.Drupal requires significant configuration and site-specific development to enable SEO throughout a site, especially for high-quality SEF URLs.

- **Social Media Features**

Social Media such as Facebook, Twitter, and LinkedIn etc. are playing major role for marketing of the successful web site. The third party extensions are available for implementing social media features on both Joomla and Drupal sites, the costs are essentially the same.

- **Site Membership Features**

Both Joomla and Drupal have inbuilt access and permissions control to allow site administrators, content developers and other authorized users to log into the webpage and edit the content, configuration settings and add extra features. **Joomla**ships with several in-built features to support site administration and membership options. At the time of installation, a single super user account is enabled for Administrator (back end) and End

User (Frond end users). **Drupal** installs with two types of user "**Roles**" available to the system: an anonymous (or public) user role, and an authenticated user role, used to enable Drupal administrative login. Both Joomla and Drupal install by default with extensive capabilities for site administrators to log in and conduct site build out. **By default, Joomla offers more site membership features than Drupal.**

- **Tuning & Testing of Performance**

Any website is benefited from good performance which includes dynamic web pages, CSS, media assets and quick delivery to the browser. **Joomla** provides site wide caching control accessible through its back end whereas Drupal provides system-wide caching settings and controls, including the ability to enable site-wide caching, dump the site-wide cache, and aggregate CSS and JavaScript files to result in fewer server calls. Joomla's site-wide caching controls are well-balanced, easy to implement and effective: **In general, it takes less time to configure site-wide caching for Joomla than it does for Drupal**.

- **Deployment of Website**

To launch a new website, it involves moving files and the database from development server to the live server. Once a website is functional and running, there is complexity in implementation of new updates. **Joomla**provides control panel settings which allows the administrator to keep the website in offline mode in order to update the changes. A user having privileges of administrator can login during off-line mode and interact with the content in order to update the website. **Drupal** provides a maintenance mode setting that allows administrators to temporarily take a site offline and display a custom message to site visitors. When in Maintenance Mode, only the top-level super administrator account has login access to the Drupal site in order to conduct updates and make other changes. Both Joomla and Drupal sites follow the same process and have the same general costs for launching a website. Both also offer similar features for taking a site offline while updates are implemented, although **Joomla lets multiple authorized users log in while a site is in offline mode, whereas Drupal limits this to the superadministrator**.

- **Platform Support**

Every content management system is designed for a Linux platform in which Apache is preferred webserver. It can be deployed on either Windows or Linux, both are written in PHP. Database support varies between the two. Joomla and Drupal both supports MySQL versions above 4.1. Drupal also supports PostgreSQL version 7 and above. For both Joomla and Drupal, LAMP (Linux Apache MySQL PHP) is the targetenvironment. Since Joomla and Drupal share verysimilar requirements, database support plays largepart in the decision.

- **Community Support**

Joomla has strong community support for which registration is free. Anyone can register and get the benefit of community support. A group of people working on Joomla answer the question and provide the tutorials as ready reference. There are also companies who provide professional community support by taking some nominal charges. Drupal also has strong community support and it also offers professional community support by charging

some nominal fee. Acquia offers Drupal support in a variety of plans based on number of servers, sites, or single issue packages. Drupal and Joomla have very similarity in support systems.

Table 1 - Comparative Table

Attributes	Joomla	Drupal
Setup and Configuration of Hosting Environment	It requires time to plan.	It requires less time for server planning.
Installation of CMS and Configuration	Straightforward	Requires server side manipulation
Content Types and Structure	Excellent	Requires 50% more time than Joomla.
Site Design and Layout	Highly capable	Highly capable
Site Navigation	Mature system for building menu	Requires longer time to implement menus
Editorial Tools	Includes more in-built editorial tool	It has less no. of tool than Joomla.
Rich Media Support	More flexible	Requires additional tool to manage
SEO Support	Rich SEO feature	Requires significant configuration
Social Media Features	Excellent	Excellent
Site Membership Features	Has more site membership feature	Limited
Tuning & Testing of Performance	Requires less time to configure site-wide caching	Requires more time for caching
Deployment of Website	Multiple users are authorized to login during offline mode	Limited to super administrator
Platform Support	Supports Windows & Linux	Supports Windows & Linux
Community Support	Strong community support	Strong community support

6. Conclusion

Hopefully by reading this article, one will be able to understand the basic differences between Joomla and Drupal. However, based on difference resources and study, it is found that Drupal is the first choice for web developer for complex and complicated site. But, at the same time, Joomla is considered good for simple site. But in my opinion, neither Drupal

nor Joomla can be considered appropriate software. While designing the website, we are not only supposed to design the site simply but look into other options available into content management systems and as per our requirement, one should select the appropriate content management system for content creation.

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Metamorphosis of libraries: *from Papyrus to Clouds*

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Abstract: Since the opening of the first library, there have been many significant and dramatic changes in the trends of library, the way they evolved and the way they developed. The "Royal Library of Alexandria" in Alexandrine, Egypt, was the Largest and most significant library of the Ancient World. The library was opened during the region of Ptolemy-I Soter (323-283 B.C). Latest advancements in the fields of information technology have compelled libraries to embrace automation as the facilities provided by the automated Libraries go far beyond the services delivered by the traditional libraries. Computerization of libraries started in 1940's. In India first use of computer in Libraries and information center was reported in 1965 at INSDOC, now known as NISCAIR. Later on several libraries, particularly those attached to industrial and research organization started using the parent's Mainframe computer. The automation of the libraries started by late 1980's and early 1990's, by mid 90's the Libraries started maintaining on-line catalogs, which provided a more clear view of the information present in the library to the user. Today library automation has moved far beyond the concept of maintaining databases of books available in the library.

Keywords: Chhattisgarh, Cloud Computing, Library Automation, Knowledge Hub.

1. Introduction

Cloud computing is the delivery of computing and storage capacity as a service to a community of end-recipients. The name comes from the use of a cloud-shaped symbol as an abstraction for the complex in infrastructure it contains in system diagrams. Cloud computing entrusts services with a users data, software and computation over a network. Up to the early 1990s, 'Digitizing the library' meant computerizing the traditional library functions of distribution, cataloging, the public catalog, acquisition, and serials check-in using the library's database as the foundation''. Early library automation centred around the development of "systems that were fundamentally local, with importance on controlling and accessing resources within a distinct library or defined network of libraries, and not on accessing remote databases or library catalogues. Modern library

automation has now moved ahead of this to the point where access to information now means that clients obtain resources and information in all formats wherever it was located, from anywhere, at any time, day or night. Currently, library automation assumes 'a wider scope of definition, referring now to the library user accessing not only the local library collection, but also the global and networked ''information and knowledge base''. Cloud computing has a considerable place in the higher education landscape both as a omnipresent computing tool and a powerful platform that can boost engagement among educational researchers and educators to understand and improve practice, and thus, increase the quality of their students' learning outcomes. The higher education (HE) scenery around the world is in a constant state of change and development, mainly as a result of significant challenges arising from efforts in adopting emerging technologies and pedagogies in their teaching and learning environments. This is mainly because of a new variety of students with learning needs vastly different from their predecessors, and it is increasingly being known that using new technology effectively in higher education is essential to providing high quality education and preparing students for the challenges of the twenty-first century. The cloud model offers a much cheaper way to acquire and use IT services.

2. Impact on library and Information services

- With cloud computing students can have 24X7 access of the library regardless of their location and time, providing the students the freedom to study with their choice of time and place.

- Large university or a consortium might become a supplier of cloud services. Storage and processing needs can also be met by the cloud. Institutions pay only for the resources used, and users can access the applications and files they need from nearly any Internet-connected computer.

- A number of universities, service providers and government organizations are investing in study around the topic of cloud computing.

- In July 2008, HP, Intel Corporation and Yahoo! declared the creation of a global, multi-data center, open source test bed, called Open Cirrus designed to encourage research into all aspects of cloud computing, service and data center management.

- In July 2010, HP Labs India announced a new cloud-based technology intended to reduce to bare bones taking content and making it mobile-enabled, even from low-end devices.

- The objective is to improve students' knowledge of similar computing practices and better prepare them for increasingly accepted large-scale computing that takes place in the "real world," such as search engines, social networking sites, and scientific computational needs.

- Google and IBM have joined to offer millions of dollars in resources to universities in order to promote cloud computing projects.

- Yahoo! has extended its partnerships with top U.S. universities : The University of California at Berkeley, Cornell University, University of Massachusetts at Amherst and the Carnegie Mellon University to advance cloud computing research through the use of Yahoo!'s cloud computing bunch large-scale systems software.

- IBM established an association with the European Union and universities to research new cloud-computing models to reduce the cost of hosting and maintaining Internet-based services.

- The Qatar Cloud Computing proposal led by Carnegie Mellon University, Qatar University and Texas A&M University aimed to develop cloud computing technology and provide a stage for local organizations to test applications in the cloud.

Cloud computing solution can create the new workflows needed by librarian because it offers the opportunities for a supportive platform for libraries to build on. There are four key ideology of a cooperative platform:

3. Chhattisgarh at a Glance

Chhattisgarh was formed on 1st November 2000, separating 16 (now 27) Chhattisgarhi speaking districts of Madhya Pradesh, as the 27th state of India, situated in the heart of the country; the state enjoys a tropical climate. It is one of the important electricity and Steel producing hub of the country accounting for 15% of the total steel produced in India. Chhattisgarh receives an annual rainfall of 50.9 inches yearly which makes it suitable for cultivating paddy thus making it the "Rice bowl of India". Since its formation in year 2000 the state has set many benchmarks in the field of Industries, Agriculture and Education. With a per capita income of rupees 46573/-, Growth rate of 13.1% and GDP of 11.57%, Chhattisgarh is one of the most rapidly developing states of the country.

- **Barriers in access to information in Chhattisgarh**
  - Poor means of Transportation- 26.21 km of roads/ 100 km

  - Poor means of Communication- 30.7% people connected via phone

  - Least per Capita Income of the AADIVASI- Less than Rupees 15000/year

  - Less educational resources- Literacy 64.7%

  - Densely forested and remotely located- Approximately 47% covered by dense forest

  - Less technological advancements.

  - Mostly tribal and Naxal affected areas

- **Statistics from Chhattisgarh**

People	%
Deprived from Transportation	41%
Deprived from communication	69.30%

Deprived of education	33.33%
Below poverty line	42.91%
Gross Enrollment ratio	13.60%
naxal affected	33.00%
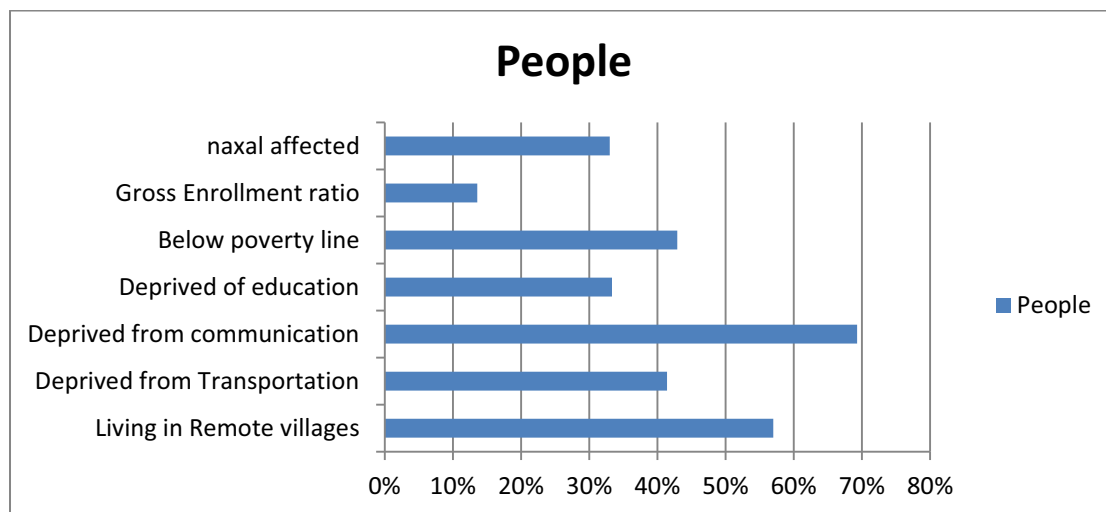
Figure 1 - Various Reasons Affecting access to information in Chhattisgarh

**Comparative Study of Cloud Computing Vendors & Pt Ravishankar Shukla University**

Windows Azure	Google cloud Storage	IBM Smart Cloud	Amazon EC2	Pt Ravishankar Shukla University
Supports 10 Instances at a time (High CPU and Memory Instance)	Supports 6 Instances at a time (High CPU and Memory Instance)	Supports 7 Instances at a time (High CPU and Memory Instance)	Supports up to 12 Instances at a time (High CPU and Memory Instance)	1,65,000 books equivalent to 8056 GB
720 hours of monthly access.	100 parallel static IP upports.	100% access all time	12.48 paisa for per hour usage.	10 hours of daily Access
High Bandwidth of 1000 Gigabits.	Medium Bandwidth	Medium Bandwidth	2.5 rupees /GB download.	–
75 Gigabytes of SQL database.	7.5 rupees/ GB download	10,000 GB download	Up to 10 GB free Access	–
7 Virtual machines of 1.6 GHz processor, 7 GB RAM and1000 GB application storage space.	6 Virtual machines of 1.6 GHz processor, 5 GB RAM and 512 GB application storage space.	7 Virtual machines of 1.6 GHz processor, 6 GB RAM and1024 GB application storage space.	8 Virtual machines of 1.6 GHz processor, 7 GB RAM and1690 GB application storage space.	Rupees 1666.66/- Yearly expenditure per Student as per 2012
30,000 Gigabytes of Georedundant data.	No uploading charges	1000 GB upload	No limit on upload	–
Yearly subscription fees- Rupees 40,00,000/-	Yearly subscription fees- Rupees 35,00,000/-	Yearly subscription fees- Rupees 42,00,000/-	Yearly subscription fees- Rupees 39,00,000/-	Yearly expenditure of Rupees 50,00,000/-

4. Possibility of Cloud Computing in Chhattisgarh

A very important role can be played by cloud computing in overcoming all the barriers and hurdles that come in the way of exploring the educational resources and can pave the way for the state to set benchmarks in the field of education by forming a consortium of all the educational institute of the state to share their resources, forming a "knowledge Grid" that can be accessed by the user all around the state irrespective of their geographical location and that can be accessed 24X7. Implementing such "Knowledge Grid " will lead to the foundation of a very strong educational system where users can share their views, get updated with latest technological facts, debate and discuss over the current and important topics related to country, technology and development all by just the click of a button. Sharing data and information in such a way will lead to creation of Geo redundant data, giving the user clearer and concise view of the topic.
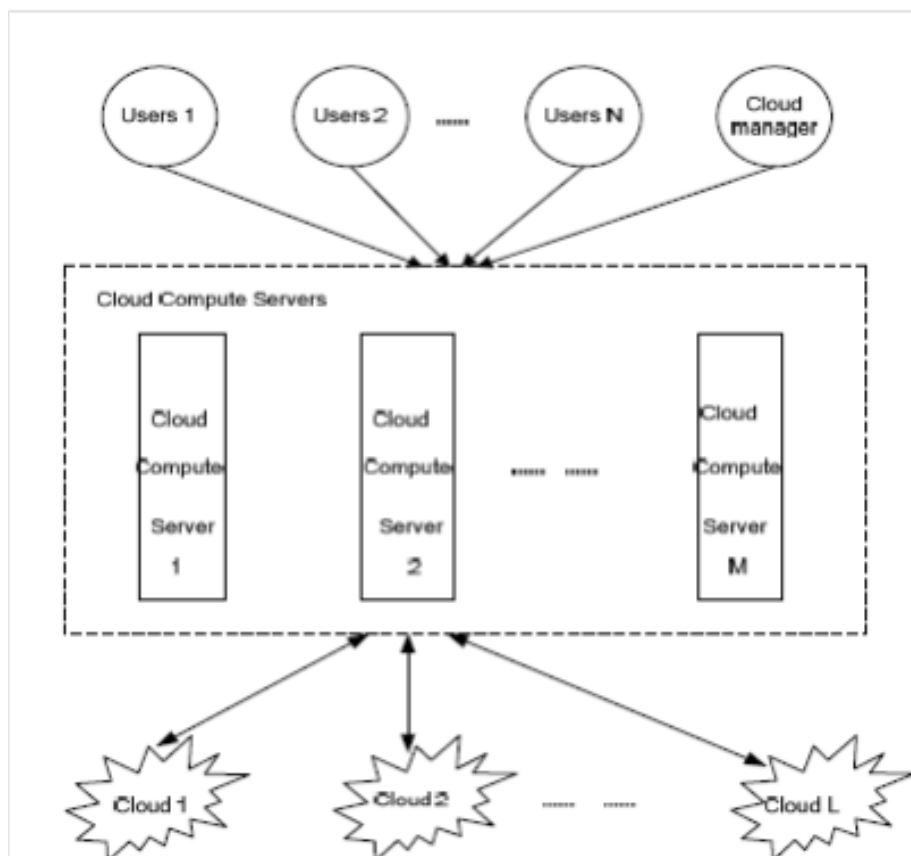
- **Knowledge Hub**

Referring the comparison provided between Cloud computing vendors and Pt. Ravishankar Shukla University Library presented in the table above, we can clearly draw the conclusion that cloud computing can provide more access time, better service , Performance, Reliability and Resource utilization than the manual Library management process that too in a much cost effective manner. The whole concept of the paper is to deploy a technique that can share resources among the various libraries of the state and the country to create a "knowledge Grid" that can be accessed by the user round the clock 24X7 irrespective of their geographical location. The Vision is to develop a consortium of the educational and non educational Institutes ready to share their information, which is also the objective of the National Mission on Libraries formed in 2012. Sharing data in this way will not only reduce the cost overhead of hiring services from the cloud vendors but will also add to the knowledge base of the state thus empowering the state to meet the ever growing standards of primary to higher education.
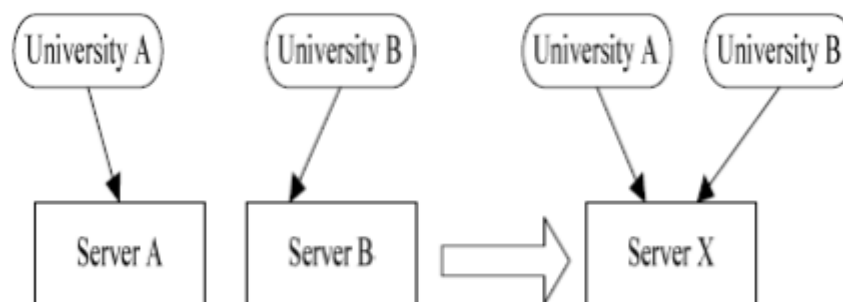
Figure 2: Two libraries sharing same server

Figure 3: Sharing of servers to create a Knowledge Grid

- **Policies of Government that may Encourage Cloud Computing**:

  - Government of Chhattisgarh has declared to establish livelihood colleges in several naxal hit district like Dantewada which will provide vocational trainings.

  - Honorable HRD minister Shrimati Smriti Irani   has declared to distribute Akash Tablets to student free of cost.

5. Conclusion

According to *Michael King*, IBM's vice president of global education industry: "Cloud computing is ultimately going to enable a significant transformation of education to increase quality, increase access to educational resources, and at the same time lower costs . . . I think the next two to three years will really be about developing shared services, exploiting cloud computing models, and really driving fundamental transformation in how we organize education and deliver value to students and the education community."

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An Overview of Cloud Computing Services in Libraries

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Abstract: Cloud computing is a new technology which many organizations are adopting. "Cloud Computing "refers to the use of computing resources on the internet. Libraries are not left behind to take an advantage of this new technology. The paper discusses usage of cloud services for libraries, as cloud computing has emerged as one of the most popular virtual technology for libraries to deliver services in an effective manner. The technology is offering great advantages for libraries to connect their services not only promptly but also in new formats. Libraries are using cloud computing services for enhancing its services by resource sharing on the cloud, building digital libraries corporate cataloguing, acquisition, storage and sharing on virtual environment on the cloud. The paper also bring forth some forefront considerations about ownership and control of data, data security and privacy of library's huge data that is being maintained by the cloud service.

Keywords: cloud computing, IaaS, PaaS SaaS, digital libraries, cloud services , security

1. Introduction

Cloud computing is providing facility to share IT resources such as applications, processes, storage of databases with flexibility that includes scalability according to user's demand, resources which are available on the cloud are accessible through the internet. And the biggest advantage is that it allows users of the cloud to pay for the services when needed and used along with cost and storage benefits.

2. Cloud Based solutions for libraries

Discovery services: The main focus of libraries moving into the cloud is to disclose their vast collections on the web. OCLC WorldCat is the first example which is forty years old. In the library environment OCLC has functioned as cloud computing vendor providing cataloguing tools over the internet which allow partner institutions to draw and contribute to the data store. Fox (2009).OCLC offers library services like circulation, cataloguing, acquisition and other related services on cloud platform through web share management system. It is offering collaborative platform in which each library can share their resources, ideas, services and problems. Libraries are using software as a service (SaaS) and some popular examples of discovery tool include ExLibris Primo, EBSCO EBSCO Discovery service (EBSCO n.d.) and aggregated subject gateways or e-resource management suite like serials solutions Summon (serial solutions resources n.d.) Nowadays these cloud based services are saving libraries from investing in hardware and incurring huge maintenance costs by providing software updates, backup and so on.

Google Drive has been used by libraries for information Literacy assessment because of its collaborative nature, since it helps to share findings with faculty to address weak areas of information Literacy. (Hsieh & Dawson, 2010). Google Drive helps to create or import spreadsheets from variety of formats. It can be used to share instruction statistics or schedule an event, even allowing students to sign up for library tours.

DropBox (www.dropBox.com/) is one of the most widely used cloud computing services. Through this service users access and store photos , documents, videos making it easier to share it electronically with anyone. Dropbox as an application is available for iPhone, iPad, Kindle Fire, Android & BlackBerry. These services virtually share the data and provide access anytime and anywhere without ant need of special hardware or software. Oher services like LOCKSS(Lots of copies keeps stuff safe) , CLOCKSS (Controlled LOCKSS) are used by libraries for the purpose of digital preservation.

Google Forms another online survey creation tool can be used for gathering library instruction related feedback, including instruction education other popular web based survey software are Zoomerang(www.zoomerang.com/) polldaddy (http://polldaddy.com/) and survey monkey (www.survey monkey.com/) are the web-based survey software that turns everyone into a researcher.

 SaaS software as a services refers to applications via hosting service, without access to underlying software. An example is subscription to electronic journal management system such as Thomas Reuter's scholar One. Two softwares widely used by libraries to build dilital libraries are Dspace and Fedora Common .DuraCloud provides software solutions for building digital repositories with standard interfaces and open source codes for both the softwares but Dspace an open source software platform which supports more than 1000 digital libraries all around the world is most widely used. By creating a free account in delicious.com, it is possible to put together the resources like Facebook, useful websites, web-quests, library links. Even a library catalogue can be included as a tag in delicious.com. Acc. to Macgregor and Mcculloch (2006) tagging can be effective method for organizing resources to support faculty in teaching and in the process it can replace subject guides. Another example of IaaS service is **Amazon's Elastic Computing Cloud (EC2) service**, which offers IT infrastructure with differently sized servers using a choice of operating system, and it provides service to use server's storage space to host library's website and other computing needs like maintaining backup of integrated library management system and digital repository. It is a service for hosting websites outside the library's servers and giving access to multiple editors from varied locations. Platform as a service (PaaS) refers to a platform supporting a specific application where particular organization hosts a platform on which pre-confined tools run offering space and various computing resources. the web platform as a service (PaaS) as in the use of **GoogleApp Engine.**

For searching scholarly content **Knimbus** is a collaborative platform for researchers which facilitates access to million of journal articles, patents and e-books. For users tagging, sharing and discussion of contents with their peers. Recently INFLIBNET has added Knimbus as a cloud service into its UGC-INFONET Digital Library Consortium in order to search and retrieve scholarly content.

3. Challenges with Cloud service

Where uncontrolled or unauthorized enterprise system exist, so do the potential risks of information security problems, data integrity issues and compromises to the integrity of business processes. (Livingstone, 2011)

- Lesser control over data once it is handed over to cloud services, it could lead to providers mining the data to sell to other companies. Another concern is malware that could infect both client and server machines in cloud services.

- To avoid loss of knowledge assets in the cloud, it demands the institutionalization of standardized protocols for storage and access.

- As we all know cloud computing is not full proof and the way one has to face problems with all forms of outsourcing, cloud raises security concerns related to data that is provided to cloud service providers.

- Switching to cloud also requires that the amount saved by the library by opting for cloud based services should in turn be utilised in improving internet connectivity and bandwidth along with expansion in server security and backup services.

- An in-depth analysis should be done by the library before deciding payment methods for hiring cloud services, whether to opt for "Pay-as-you-go" or ""subscription" method., it will depend by taking into account the number of users in the library.

- Risks and cost associated with cloud implementation should be clearly understood by the library while negotiating with a vendor for a contract term, understanding own institution's requirements and its users are important.

- Standards for verifying the integrity of files obtained in the cloud should be used for this PGP (pretty good privacy) is a software that uses asymmetric keys to encrypt, decrypt and digitally sign message or files. OpenPGP is a non-proprietary protocol that defines standard formats for implementing the encryption and signing technology.

- Therefore it is time for the libraries think seriously before aggregating services with cloud based technologies and provide reliable and rapidservices to their users.

4. Conclusion

The shift of library core applications to cloud-based services will reduce or eliminate cost of managing server hardware and operating system underlying different applications. Although libraries are switching to cloud based services for building digital libraries, information literacy programmes , social networking and information communication with manifold flexibilities but certain issues and concerns related to security, privacy and service level agreements need to be solved .Cloud computing tools can also enhance engagement among students educators and researchers in a cost-effective manner.

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Cloud Computing and its Application in Libraries

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Abstract: Cloud computing, an altogether new and emerging internet technology offering innovative model is showing infrastructural IT resources "as a service" on demand by users without bothering for the hassles of storage and management problems. Library acts as a knowledge resource centre in the present era of knowledge society. Cloud computing technology came up as a boon for libraries and is offering various opportunities for libraries to connect their services with cloud. The paper presents an overview of cloud computing and its possible applications that can be combined with library services on the web based environment. This study may be helpful in identifying and generating cloud based services for libraries. It highlights the concept of Cloud computing, Models of Cloud Computing, Types of cloud computing, Applications of Cloud computing in Libraries, Role of cloud computing in libraries.

Keywords: Cloud computing, Cloud computing and libraries, Problems associate with cloud.

1. Introduction

In present scenario, web enabled technologies developed on virtual platforms and generating large opportunities and virtual paths to use their services for the various purposes. Nowadays, cloud computing has emerged as one of the most popular virtual technology for libraries to deliver the services in an effective manner. Cloud computing is a computing paradigm, where a large pool of systems are connected in a private or public networks, to provide dynamically scalable infrastructure for application, data and file storage. Cloud computing contains features of different technologies including utility computing, grid computing, unified computing, web 2.0, service oriented architecture and so on. Cloud computing technology is offering great advantages for libraries to connect their services not only promptly but also in new formats with the flexibilities such as pay as you use model, access any where any time and so on.

2. Risks in using clouds

- **Shared access**: One of the key tenets of public cloud computing is multitenancy, which means that multiple, usually unrelated customers share the same computing resources: CPU, Storage, memory, namespace, and physical building.

- **Vulnerability testing reports:** cloud service providers are hesitant to furnish vulnerability testing reports and often refuse to allow scanning for the fear of compromising their infrastructure.

- **Excessive dependency on internet:** basic drawback of cloud computing is its dependency on the internet for accessing cloud and because of this dependency service interruptions and outages at any time always remains there to count for.

- **Virtual exploits:** Every large cloud provider is a huge user of virtualization. However, it holds every risk posed by physical machines, plus its own unique threats, including exploits that target the virtual server hosts and the guests.

- **Cloud visibility**: Even when the cloud computing risks are known, they're difficult to calculate with real accuracy.

- **Difficulty in developing hybrid system:** It's difficult to create hybrid systems of cloud computing. Big organizations holding sensitive information normally have their inbuilt IT services and don't like to share it offsite despite the benefits of efficiency and performance.

- **Security and integrity of data:** security and integrity of data hosted in-house remain at risk when we put it off site to take the services of cloud computing.

- **Sustainability:** the emerging problem with the use of cloud computing is phenomenal increase in the use of electricity and it is propelling us to the polluting energy sources instead of clean energy abundantly available today.

- **Over-concentration on a single service provider:** "cloud computing is undergoing a seismic shift and is fundamentally shifting the economics of IT, of business and of delivery of governance, however the biggest hindrance that is stopping us from adopting cloud is the fear of losing control," said Bhaskar Pramanik, chairman, National Committee on IT, ITeS & e-commerce, CII and Chairman, Microsoft India Corp. Pvt. Ltd. Innumerable users relying on a single service provider and subsequent overconcentration may cause failure in service resulting in catastrophe.

- **Infrastructural and Logistic concern**: For a healthy and secure growth of cloud computing environment it is imperative for cloud service providers to follow all relevant organizational information technology policies and possess capabilities essential for implementation and managing it. To name with, demand management, relationship management, data security management, application life cycle management risk and compliance management are those capabilities.

3. Purpose of Cloud Computing in Libraries

Cloud computing is the alternative to the traditional computing and in cloud computing, hardware, software and operating systems are rented through Internet. In the cloud computing, the user need not bother about infrastructure, installation, maintenance, security and so on, which are looked after by the cloud service provider. Libraries are witnessing tremendous changes from the very beginning of traditional form. In the beginning, libraries have used floppy disks followed by CD-ROMs (Compact Disk –Read Only Memory) to procure or to provide information service to the users. Now the trend is changed with storage of information on Internet, Digital Library, Library Consortia, Institutional Repositories, etc. Most of the people in near future may not work with their PC-based computers; instead, they will work with web-based online environment, where all the software will be loaded in the domain. Now, the latest stage in which libraries rely is

on cloud computing, which is latest developments and provides more benefits to the libraries. Through the cloud, libraries can be connected for sharing of information, which is easier. In this computing, the library can pay for what it has used. Since the libraries are moving towards paperless society, librarians have to depend on cloud based computing services, where spending huge amount for hardware, software, networks and services can be minimized. It is also predicted that with short period of time, most of the libraries in India have a chance to join in the cloud computing, there by all the collections, services and systems will be available through cloud.

4. Role of Cloud Computing in Libraries

Cloud computing is a completely new ICT based technology and it is known as 3rd revolution after PC and internet. Cloud computing has large potential for libraries. Libraries may put more and more content into the cloud. Many libraries already have online catalogues and share bibliographic data. More frequent online catalogues are linked to consortium that share resources. In the library, storing of the data is the major task, which needs data server, technology, data backup, maintenance and technical manpower to look after all the network related activities. Whereas libraries are service oriented centres have the major role in procuring the information, organizing and disseminating the same to the users in the right time. Data storage could be a main function of e-libraries, particularly those with digital collections storing large digital files can stress local server infrastructures. The files need to be backed up, maintained, and reproduced for patrons. However, with faster retrieval times for requests and local server space it could improve storage solutions for libraries. Cloud computing or IT increased capacity and less need for updates and maintenance, and has gained wider acceptance among librarians. Libraries are very much interested to provide cloud based computing services to the users, but in the real sense, initial budget, identifying the good service companies and technical skill of the library professional in use of advanced technology were the constraints for any library. OCLC is one of the best example for cloud computing. Web share management system, provides collaborative platform, through which the libraries can share their resources, services and problems with the library community through clouds. But, it is reality that some of the services like digital libraries, open sources, library websites, usage of web 2.0, social networks already running in a successful mode. Some of the services like Dura cloud for developing digital libraries/institutional repositories OCLC, Google are also in the cloud computing service.

5. Applications of Cloud Computing in Libraries

Libraries are shifting their services with the attachment of cloud and networking with the facilities to access these services anywhere and anytime. In the libraries, the following possible areas were identified where cloud computing services and applications may be applied:

Building Digital Library/Repositories: Today every library needs a digital library to make their resources, information and services at an efficient level to ensure access via the network. Dura space is having two softwares namely Dspace and Fedora Commons but

Dspace is widely used for building digital libraries/ repositories relative to Fedora Commons. Dura cloud provides complete solutions for developing digital libraries/ repositories with standard interfaces and open source codes for the both software.

Searching Library Data: OCLC is one of the best examples for making use of cloud computing for sharing libraries data for years together. For instance, OCLC World Cat service is one of the popular service for searching library data now is available on the cloud. OCLC is offering various services pertain to circulation, cataloguing, acquisition and other library related services on cloud platform through the web share management system.

Website Hosting: Website hosting is one of the earliest adoptions of cloud computing as many organizations including libraries preferred to host their websites on third party service providers rather than hosting and maintaining their own servers. Google Sites serves as an example of a service for hosting websites outside of the library's servers and allowing for multiple editors to access the site from varied locations.

Searching Scholarly Content: Knimbus is cloud based research platform facilitates to discover and share the scholarly content. Knimbus stands for Knowledge Cloud which is dedicated to knowledge discovery and collaborative space for researchers and scholars to find and access millions of journal articles, patents and ebooks, for the users tagging, sharing and discussing of these contents with their peers Currently, Information and Library Network (INFLIBNET) Centre (http://www. inflibnet.ac.in) has been incorporated Knimbus cloud service into its UGC INFONET Digital Library Consortium in order to search and retrieve scholarly contents attached therein.

File Storage: To access any files on the internet, cloud computing present number of services such as Flicker, Dropbox, Jungle Disk, Google Doc, Sky Drive and so on. These services virtually share the files on the web and provide access to anywhere and anytime without any special software and hardware i.e. LOCKSS (Lots of Copies Keeps Stuff Safe), CLOCKSS (Controlled LOCKSS) and Portico tools are extensively used for digital preservation purpose by libraries and other organizations.

Building Community Power: Cloud computing technology offers great opportunities for libraries to build networks among the library and information science professionals as well as other interested people including information seekers by using social networking tools. The most famous social networking services viz. Twitter and Face book etc. This cooperative effort of libraries will create time saving, efficiency and wider recognition, cooperative intelligence for better decision making and provides the platform for innovation and sharing the intellectual conversations, ideas and knowledge.

6. Types of Cloud Services for Libraries

Infrastructure as service: In this method, the service providers will provide the hardware components to the libraries. Servers with available capacity, communication technology and OS for utilising the services will be provided by the vendor and it is the library's part to enter the service level agreement with the third party for hardware requirements. In this way, the libraries need not worry about the capacity of server, platforms, and communication technologies to be purchased for providing the service. The cost will be

charged by the company what the libraries has used. The librarians' job is just uploading the information over the web from any part of the world, and can access the information. In India, companies such as Infosys, Bangalore, TCS, and Wipro are some of the companies providing infrastructure as service

Platform as service In this method: The service provider will give software and programming languages to the users. For instance, .NET, JAVA, UNIX environment will be provided by the vendor. In libraries, operating system required for library operations will be provided by the vendor is a platform as a service. Some of the service providers are Windows Azure, Google AppEngine.

Software as service: Software as service is another service, which will be extended by the vendor on demand. The librarians need not worry about the installation and maintenance of the software, which is major issues for most of the librarians to use the new software. In this method, the librarians can work with software from any part of the world if they have Internet connection.

Examples of Cloud Libraries:
1. OCLC
2. Library of Congress (LC)
3. Exlibris
4. Polaris
5. Scribd
6. Discovery Service
7. Google Docs / Google Scholar
8. Worldcat
9. Encore

7.   Service Providers of Cloud Computing for Libraries

Ex Libris: Ex Libris is a well known cloud service provider based in USA. They are providing cloud solution in the field of library with all the software and hardware support needed to provide services to the users. Ex Libris is built on various standard and contains number of features like compatibility with Unicode font, flexibility, migration of data, customization etc.

Polaris Library systems: Polaris is one of the cloud based library automation system available in the market. The company also provides standard acquisition and processing system. Also, with the Polaris ILS Clint license, the library can integrate various PC and print management systems at not extra cost. The system uses number of well known standards like MARC 21 for bibliographic data, XML, Z39.50 for information retrieval, Unicode etc.

Dura Cloud: Dura cloud is providing cloud solution for digital library services .It is a sister concern of the Dura space which is a collaboration of the Dspace digital library software and Fedora Commons. It is a framework for digital repository. It offers complete solution

for digital library with standard software and hardware solutions. Dora cloud also provides open source code and the code needs to be installed on your machine.

OCLC's Web scale: OCLC has set an example for making use of cloud computing for libraries. Years together OCLC has been functioning as a cloud computing vendor because they provide cataloguing tools over the internet and allow member institutions to draw on their centralized data store.

OSS Labs: OSS labs from India is using Amazon's elastic cloud computing plat form owing to the various capabilities of Amazon such as high durability of data, storage information security based on ISO standards , capability and flexibility

8. Limitations of Cloud Computing in Library services
 Any technology will have its own limitations. Below mentioned are some of the limitations in Cloud Computing.

- Security: Library deals with information and has large volume of information. In order to have cloud computing the data has to be uploaded to the cloud machine. Hence, there should be strict service level agreement before entering into the process.

- Reliability: reliability is the big question in cloud computing. Once entered in to cloud computing, if the companies satisfy as per the service agreements, it will be good. Otherwise there is a chance of having discomfort.

- Data backup, intellectual property rights are the other problems which have to be taken care before.

9. Cloud Computing Solutions for the Library:

- The library community can apply the concept of cloud computing to amplify the power of cooperation and to build the significant, unified presence on the web. This approach to computing can help libraries save time and money while simplifying workflows.

- Most library computer systems are built on pre-web technology System distributed across the Net using Pre-Web technology is harder and more costly to integrate

- Library store and maintain much of the same data hundreds and thousands of times.

- With library data scatter across distributed systems the library's Web presence is weakened.

- With libraries running independent systems collaboration between is made difficult and expensive

- Information seekers work in common Web environments and distributed systems make it difficult to get the library into their work flow

- Many systems are only used to 10% of their capacity. Combining systems into a cloud environment reduces the carbon footprints, making libraries greener.

10. Conclusion

Cloud computing builds on decades of research in virtualization, distributed computing, utility computing, more recently networking, and web software services. It implies a service oriented architecture, reduced information technology overhead forth end-user, great flexibility, reduced total cost of ownership, on demand services and many other things. Libraries have the opportunity to improve their services and relevance in today's information society. Cloud computing is one avenue for this move into the future. Cloud computing is increasing profitability by improving resource utilization. Costs are driven down by delivering appropriate resources only for the time those resources are needed. Cloud computing has enabled teams and organizations to streamline lengthy procurement processes. So in the new era, library should improve itself constantly by adopting many new IT technologies.

Although study of Cloud Computing is still in the initial stage now, impacts brought by Cloud Computing are obvious. With the introduction of Cloud Computing to university library, services of libraries will have a new leap in the near future. Services provided by libraries will become more user-centric, more professional and more effective, etc. We all believe that libraries will create more knowledge benefits for our country with the help of Cloud Computing. Cloud environment is a highly developed network environment; it appears to the users of high-quality service and high security. It can bring several benefits for libraries and give them a different future No doubt, libraries are moving towards cloud computing technology in present time and taking advantages of cloud based services especially in building digital libraries, social networking and information communication with manifold flexibilities but some issues related to security, privacy, trustworthiness and legal issues were still not fully resolved. Therefore it is time for libraries to think seriously about cloud based technologies and provide reliable and rapid services to their users.

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Intellectual Property Rights in the Digital Age

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Abstract: With the development of information and communication technology (ICT), information appears in various forms and format. These electronic/digital information resources can be accessed from through networks particularly over the Internet from anywhere. Storing of work in electronic format and electronic transmission of copyright material should be protected. Intellectual property rights (IPR) have become important in the face of changing trade environment which is characterized by global competition, high innovation risks, short product cycle, need for rapid changes in technology, high investments in research and development (R&D), production and marketing and need for highly skilled human resources. Regardless of what product an enterprise makes or what service it provides, it is likely that it is regularly using and creating a great deal of intellectual property. This paper provides a conceptual view of intellectual property, intellectual property rights etc. The paper also highlights the intellectual property rights in the digital age.

Keywords: Intellectual Property, Intellectual Property Rights (IPR), Information and Communication Technology, Digital Age, Copyright.

1. Introduction

Libraries are committed to provide equitable access to information to the communities they serve. How do intellectual property rights and copyright affect this mission? The purpose of copyright is to protect the author while at the same time benefiting the user of information. It balances the interests of the copyright holder and the users. (Large, 2007). Librarians and their role in society have evolved in pace with technological development and Intellectual Property Law. Originally, a repository for published works which could be borrowed or physically accessed by the public, libraries are now "information brokers" operating as part of an international network of libraries that have the ability to digitize works and provide users with online access to a worldwide repertoire of works. Digital technology has led to new uses of copyright works both on and off the internet. It allows copyright works to be copied, manipulated and disseminated with minimal effort and cost that cannot be matched using analogue technologies.

2. The Object of Intellectual Property

There are three fundamental preconditions for an object of intellectual property to be subject to protection. First, the created work must be original. This means that the work must be based on an original idea of the author's and not be an imitation or a piece of plagiarism. No qualitative judgment is attached to this term: i.e. there is no requirement that the work be of artistic or intellectual value. In English law, for instance, "original" simply means "not copied", i.e. the degree of originality need not to be great (Oppenheim, 1997)

Second, a created work must be man-made. A work "created" by a machine is not susceptible to legal protection, even if the user of the machine has put original work into the machine, e.g. by programming, although in such cases legal protection would be available for the programme itself. Similarly, a work "created" by an animal cannot be legally protected. Since the creator/ originator/author must always be a natural person, intellectual property cannot originate with a legal person. The rights, however, may – in full or in part – be acquired by a legal person (an institution or an enterprise).

Third, the work must be fixed or recorded in some way. This principle excludes, e.g. unrecorded conversations or speeches from being subject to intellectual property. (Helge,2004)

3. Nature of Intellectual Property Rights

IPR are largely territorial rights except copyright, which is global in nature in the sense that it is immediately available in all the members of the Berne Convention. These rights are awarded by the State and are monopoly rights implying that no one can use these rights without the consent of the right holder. It is important to know that these rights have to be renewed from time to time for keeping them in force except in case of copyright and trade secrets. IPR have fixed term except trademark and geographical indications, which can have indefinite life provided these are renewed after a stipulated time specified in the law by paying official fees. Trade secrets also have an infinite life but they don't have to be renewed. IPR can be assigned, gifted, sold and licensed like any other property. Unlike other moveable and immoveable properties, these rights can be simultaneously held in many countries at the same time. IPR can be held only by legal entities i.e., who have the right to sell and purchase property. In other words an institution, which is not autonomous may not in a position to own an intellectual property. These rights especially, patents, copyrights, industrial designs, IC layout design and trade secrets are associated with something new or original and therefore, what is known in public domain cannot be protected through the rights mentioned above. Improvements and modifications made over known things can be protected. It would however, be possible to utilize geographical indications for protecting some agriculture and traditional products (Saha, 2010).

4. Rights Protected under Intellectual Property

Following are the different types of important property protected under intellectual property rights:

- **Patent**: A patent is an exclusive right granted by a country to the owner of an invention to make, use, manufacture and market the invention, provided the invention satisfies certain conditions stipulated in the law. Exclusive right implies that no one else can make, use, manufacture or market the invention without the consent of the patent holder.

- **Copyright:** It provides legal rights exclusively given for a definite period to the creators of an intellectual work, e.g. literary works, artistic works, musical works,

film ,sound. recording, computer programs for sale or any other use. Copyright protection begins when works are actually created in the tangible form. Copyright was designed for three basic reasons that are to reward creators for their original works; to encourage availability of the works to the public; and to facilitate access and use of copyrighted works by the public in certain circumstances. The technological advances like the digitization of information, networking and worldwide web have changed the economics of information upside down.. Digitization of information has changed the economics of reproduction, networking has changed the economics of distribution and the worldwide web has changed the economics of publication.

- **Trademark**: A trademark is a sign, word, picture or other symbol, which is used to differentiate goods produced by different manufacturers or merchants. It provides the trader a trust to market the goods with confidence.

- **Design**: In the context of intellectual property 'design' refers to ornamental or shape related aspects of useful objects. Design itself is intangible but refers to a drawing or plan which is tangible.

- **Utility Models**: It is a registered industrial property right which confers protection similar to patents but, unlike patents, protection is granted without a novelty search and the exclusive rights granted here is shorter than in case of patents (normally 4 yrs).

- **Geographical Indications of Source**: It is a sign used on goods that have a specific geographical origin and possess qualities or a reputation that are due to that place of origin. e.g. 'Darjeeling' tea, 'Tuscany' olive oil, etc.

- **Industrial Designs**: are the visual features of shape, configuration, pattern or ornament (or any combination of these) applied to a finished article of manufacture. It is an ornamental or aesthetic aspect of an article. The design may consist of three dimensional features, such as the shape or surface of an article or of two dimensional features such as patterns, lines or colours.

- **Integrated Circuit Topographies**: It is three dimensional configuration of the electronic circuits used in microchips and semiconductor chips in integrated circuit products or layout designs.

- **Trade Name:** A symbol used to differentiate companies, unlike a trade mark and service mark used to identify goods or services.

- **Service Mark**: A service mark is a sign, word, picture or other symbol, which is used to differentiate services provided by different enterprises.

5. Duration of Intellectual Property Rights in India

- Term of every patent will be 20 years from the date of filing of patent application, irrespective of whether it is filled with provisional or complete specification. Date of patent is the date on which the application for patent is filed.

- Term of every trademark registration is 10 years from the date of making of the application which is deemed to be the date of registration.

- Copyright generally lasts for a period of sixty years.

- The registration of a geographical indication is valid for a period of 10 years.

- The duration of registration of Chip Layout Design is for a period of 10 years counted   from the date of filing an application for registration or from the date of first commercial exploitation anywhere in India or in any convention country or country specified by Government of India whichever is earlier.

- The duration of protection of registered varieties is different for different crops namely 18 years for trees and vines, 15 years for other crops and extant varieties.

6. An Overview of the Intellectual Property Rights in India

India has made definite strides in the protection, administration, management and enforcement of IP. The growth of the IP system has acquired a palpable vibrancy during the last two decades. The nodal department for trademarks, patents, designs and geographical indications is the DIPP which functions under the Ministry of Commerce and Industry; copyright is administered by the Ministry of Human Resource Development; semiconductor integrated circuits layout-designs by Department of Information Technology; plant varieties and farmers' rights by the Ministry of Agriculture; and biodiversity by the Ministry of Environment and Forests.

Indian laws provide for both civil and criminal remedies for IP enforcement. The Government has taken effective steps at all levels to enforce IPRs. The legal, administrative and enforcement machinery has been strengthened. The customs and police enforcement machinery has been streamlined and the measures for curbing piracy and counterfeiting related activities have become progressively more effective.

India has a very large copyright-based creative industry. The Copyright Act is comprehensive and with the recent amendments, the rights of creators have been strengthened. India was the first country to ratify the Marrakesh Treaty 2013 for Access to copyright works for visually impaired persons. The challenge in the future is the enforcement of copyright in digital platforms for which the statute has adequate provisions.

The creation of the Traditional Knowledge Digital Library (TKDL) has been a major achievement for India which has a vast pool of traditional knowledge. India has been able to thwart attempts to misappropriate its traditional knowledge. The next challenge is to use India's strength in traditional knowledge for its effective promotion, development and utilization (Srideven, 2014)

The Rules and Laws governing Intellectual Property Rights in India are as follows (Adukia, 2013):

- The Copyright Act, 1957, (as amended in 2012)

- The Patents Act, 1970 (as amended in 2005) The Patents Rules, 2003, The Intellectual Property Appellate   Board (Patents Procedure) Rules, 2010 and The Patents (Appeals and Applications to   the Intellectual Property Appellate Board) Rules, 2011.

- The Trade Marks Act, 1999, The Trade Marks Rules, 2002, The Trade Marks (Applications and Appeals to the Intellectual Property Appellate Board) Rules, 2003 and The Intellectual Property Appellate Board (Procedure) Rules, 2003

- The Geographical Indications of Goods (Registration and Protection) Act, 1999 and The Geographical Indications of Goods (Registration and Protection) Rules, 2002

- The Designs Act, 2000 and The Designs Rules, 2001

- The Semiconductors Integrated Circuits Layout-Design Act, 2000 and The Semiconductors Integrated Circuits Layout-Design Rules, 2001

- The Protection of Plant varieties and Farmers' Rights Act, 2001 and The Protection of   Plant varieties and Farmers Rights' Rules, 2003

- The Biological Diversity Act, 2002 and The Biological Diversity Rules, 2004

- Intellectual Property Rights (Imported Goods) Rules, 2007 .

7. Intellectual Property Rights in the Digital Age

The libraries as a service have allowed their users to read a document, to browse through the whole collection; to search through the library catalogue; to supply Xerox copy for specific individual research and education purpose; to procure photocopies of articles from other libraries or clearing centers; to widely distribute the re-produced copies of documents requiring public awareness and to provide inter library loan service. Whether all these activities will continue in the digital age? If digitization is considered as reproduction, it is clear that in digitization the initial work is merely changed into the digital form and the process of changing is accomplished by a machine, without any creativity. At the same time if it is considered as a translation from one language to another, the digitization is also a change from natural language of humans in to binary language of machine. In digitization however, there is no creativity involved and it could be considered as an activity similar to reprography. The copyright protects creative works. Simply transformation in to the digital form of an original document cannot be considered as creative.

Copyright laws are an instrument of balancing the interests of creators and the societal obligations to facilitate the free flow of information. The digitally networked world has threatened this cultural topology and has dramatically shifted the balance with the ability to download materials, to make any number of perfect copies and distribute these with virtually no extra cost or effort. Creators feel threatened and have become paranoid in view of the threat to their market potential, and so technology is being used to enable copyright holders to exercise enormous restrictions and controls over use. Safeguarding the private

and public interests has been reduced to a win or lose situation. The Digital Millennium Copyright Act (DMCA) of 1998 in the US is one such example which has endangered the legitimate "fair use" of creative works. Retaining the balance between public and private concerns is the key to addressing the challenge of achieving equilibrium of intellectual property rights.

8. Are Existing IPRs Applicable in the Digital Age?

In today's networked society, the community served by the library is no longer confined to the academic. The community is the entire world, accessing information from anywhere. Libraries, too, have expanded and have websites that act as portals to information that they contain. In addition, inter-library loans can be in the form of materials sent digitally. On the other hand, while information technologies have enhanced the creation and distribution of information, these same technologies can control public access to information. Commercial companies have added tools to their products that disallow access unless the proper user identification and passwords are presented. These practices hinder electronic transfer of information. The purpose of copyright law is to balance the rights of copyright holders and users. Is existing copyright law still applicable to the digital age? Libraries pay for information to equitably deliver it to their communities. As more and more information becomes available in digital format, care must be taken by libraries to ensure that the public can enjoy the same access rights as with printed information.

Today, libraries do not purchase digital materials to own. Instead, they purchase the right to access, which requires an ongoing subscription. Licenses are contracts between the library and the supplier of the information and dictate what the library can or cannot do with the materials. Although access is faster and wider, what users can do or cannot do are also affected by licensing issues.

9. Exemption for Libraries and Archives

"Section 404 of the Digital Millennium Copyright Act (DMCA) updates section 108 of the Copyright Act to allow libraries and archives to take advantage of digital technologies when engaging in specified preservation activities. The amendment to subsection 108(a)(3) is intended to ease the burden on libraries and archives of the current law's requirement that a notice of copyright be included on copies that are reproduced under section 108. Under this amendment, such notice would be required only where the particular copy that is reproduced by the library or archive itself bears a notice. The amendment to subsection 108(b) permits a library or archive to make up to three copies or phonorecords, rather than just one, for purposes of preservation and security or for deposit for research use in another library or archives, and permits such copies or

phonorecords to be made in digital as well as analog formats. The amendment provides that any such copy in a digital format must not be otherwise distributed in that format and must not be available to the public outside the premises of the library or archives." (Band,,2000).

Provisions of Section 108 "Limitations on Exclusive Rights: Reproduction by Libraries and Archives" state:

- Libraries may photocopy journal articles, book chapters, etc. and send these copies to other libraries through inter-library loan.

- Copies must include a notice of copyright that appears on the copy when available.

  If the work does not include a notice of copyright stamp, a note must be included to state that the work is protected by copyright.

- A library may make up to three copies of a published work to replace a damaged, deteriorating, lost or stolen work (when an unused replacement cannot be obtained at a fair cost). The library may also make up to three digital copies to replace a work in an obsolete format as long as that format is not made available to the public outside of the library or archives.

- A library or archives may reproduce, distribute, display or perform in facsimile or digital form any work in the last 20 years of its copyright term for purposes of preservation, research or scholarship provided that the work is not subject to normal commercial exploitation, a copy cannot be obtained at a reasonable price, and the copyright holder has not filed notice with the Register of Copyright Regulation that either of the above conditions apply.

The DMCA was passed on October 12, 1998 by Congress and became effective in 2000

10. Conclusion

The complexity and jurisdictional issues relating to ICT are changing the IPR regime drastically. IPR in the digital age have added a new dimension to the traditional regime of IPR. Certain technological measures and techniques have also been adopted to protect IPR in the digital environment but their efficiency and effectiveness is doubted and to be judged. The librarians in the digital environment have the same responsibility to collect information and help the readers by giving it even if the form is electronic information. The role of librarian is to be protected and enhanced. The copyright protection should be encouraging the use of information for creativity and not for creating hurdles in the use of information. The Librarians should continue to work as catalyst for the free flow of information between the owners of copyright and the users of the information. There is an emergent need for enterprises and professionals to systematically consider the steps required for protecting, managing and enforcing intellectual property rights, so as to get the best possible commercial results from its ownership.

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IPR Issues in e-Learning in Digital Era

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Abstract: Intellectual property rights have until recently been relatively obscure parts of the e-learning but they are now rapidly becoming crucial to future development. In addition they are in turn influenced by regulation of areas such as e-commerce. IPR information is vital for digital libraries and repositories as it records who owns the e-learning resource, who can access it and use it, and under what conditions the resource is made available. The issue of IPR is one of growing importance and seems to increasingly permeate discussions of e-learning.

Keywords: E-learning systems; e-commerce; Copyright, Trademarks, Patents, Open Source;

1. Introduction

Intellectual Property Rights (IPR) is a broad term that refers to the legal protection available in relation to certain property that is intangible which can be created by individuals. It is fair to say that the law is lagging behind the digital technology which is changing the way that the creation, publication and access to the products of intellectual activity now happens. New technology creates challenges that the law is responding to. But it would be a mistake to think that the use and management of technology is unregulated or beyond the law.

Intellectual Property Rights (IPR) is the collective name for new and unique ideas, products and creations resulting from human creativity and innovation. Copyright, Trademarks, Patents, Database Rights and Performance Rights are the most relevant rights with regards to those that may apply to digital content. In most cases, once a creative endeavour or innovation is protected, like property, the associated rights can be traded, bought and sold, bequeathed and licensed.

2. Intellectual Property Rights In eLearning

Good management of intellectual property (IP) rights is critical for the successful implementation of eLearning, courses and materials. The effective application of intellectual property rights in the creation, development and implementation of eLearning courses is a critical component in the field of education, as it plays it part in a knowledge-based economy. Not long ago, the terms eLearning and mLearning implied laptop computers and mobile carts that were wheeled from classroom to classroom. However, technological advancement has enabled the rapid development of new types of digital

publishing and tools which in many instances, have overtaken the current provisions of the law. In spite of this however, there has been significant legal advances and discourse regarding intellectual property rights of eLearning courses and materials. The history of intellectual property rights is one of adaptation to educational, technical and commercial change. It is therefore vital that developers, practitioners, and consumers of eLearning content have a clear idea and understanding of what is permissible with the product of their labors and what is impermissible.

As a growing number of digitized and eLearning courses increase and are offered on a global scale, eLearning practitioners have expressed legitimate discussions and concerns about the legal ramifications of their work and products. Questions of ownership of copyrighted or digitized products also abound as well as issues pertaining the legal download of copyrighted materials and resources, patents and trademarks. eLearning practitioners often find themselves involved in situations that are less than desirable and that may likely pose legal ramifications.

3. Intellectual Property Rights and the eLearning Landscape

The issue of intellectual property rights is one of growing importance and increasingly permeate discussions among eLearning experts (Duncan, C., & Ekmekcioglu, C., 2003). The rise of eLearning courses and materials with the capabilities of mobile technologies small enough to carry in one's pocket, and the increasing power and functionality of these devices, is causing both a shift, and an opportunity for eLearning experts and practitioners. Legal questions and concerns become more crucial as practitioners forge ahead and make significant milestones in the area of content management, content delivery and eLearning implementation. Inherent in this technological advance, are real challenges of intellectual property rights. Knowledge about **intellectual property rights** have until recently been relatively obscure parts of the eLearning and the mobile learning world but are now rapidly becoming essential. eLearning practitioners crave access and use to vital legal information that will assist them in their content development, delivery and management. Therefore knowledge about intellectual property rights information is vital for practitioners, individuals, students, digital libraries and repositories as it records who owns the eLearning resources, who can access it and use it, and under what conditions the resources is made available.

4. Copyrights in eLearning

A copyright provides protection for original works of authorship, fixed in a tangible medium of expression including literary, musical, and dramatic works, as well as photographs, audio and visual recordings, software, and other intellectual works. (Hinson, 2015). Copyright protection begins as soon as the work is fixed in a tangible medium. An eLearning practitioner should begin using the copyright symbol immediately development of original works commences, as a method of informing others that he intends to exercise control over the production, distribution, display, and or performance of his or her work. While it is not necessary to file for copyright protection, doing so for work of significant

value will make it easier to seek court enforcement of your copyright if there happens to be a material breach. (Hinson, 2015).

Copyright protection give owners exclusive rights to reproduce their work, publicly display or perform their work, and create derivative works. Additionally, copyright owners are given economic rights to financially benefit from their work and prohibit others from doing so without their permission. As an eLearning content developer or practitioner, it is important to realize that copyrights do not protect ideas. Copyright protects how ideas are expressed. **Copyright** protected works for eLearning practitioners includes literary, musical, and dramatic works, as well as photographs and graphics, audio and visual recordings, software, and other intellectual works. A copyright provides protection for original works of authorship, fixed in any tangible medium of expression. In order for the work to be "fixed in a tangible medium of expression", it means that it has been set in a form in which it can be perceived either directly or with the aid of a device.

5. Patents in eLearning

Patents unlike copyright are unique inventions that are crucial to the success of many organizations, institutions or businesses. While copyright protects the material expression of ideas, the patent system protects the ideas themselves. For example, if you produce a new system for the management of digitised material, it may be worth considering patenting the idea and in that way, preventing others from using your idea without you benefiting economically from that exploitation.

e-Learning practitioners or content developers who have developed new and better products or processes that are unique, useful, and non-obvious, need to protect the competitive advantage this gives them by obtaining a patent. The implications of obtaining a patent for a unique invention is that the holder of a patent can stop third parties from making, using or selling his or her invention for a period of years depending on the type of invention.

6. Implications and Best Practices Of Intellectual Property Rights In e-learning

Protecting your **intellectual property rights** is crucial to the success of any institution or organization. In order to do so, institutions need sensible policies and practices for managing the intellectual property rights represented in the field of elearning. As a general rule and legally, intellectual property produced in the course of employment belongs to the employer, but, traditionally, for example, individual members of academic staff in higher education have controlled the IP in their publications. It is therefore vital that developers, practitioners, and consumers of elearning content have a clear idea and understanding of what is permissible with the product of their labors and what is impermissible. It is also crucial for participating institutions and organizations to including IPR management in their project planning and management activities.

7. Open Source

Copyleft and Free Software Licences can vary enormously and organisations in the cultural heritage sector should be aware that alternative forms of licensing are both relevant and

available for consideration within their role as licensors and licencees. In contrast to traditional digital content suppliers who have limited the terms under which digital content can be accessed, the Open Source, Copyleft and Free Software movements encourage rights holders to share content under more open terms. The ethos behind this is to promote collaboration, dispel with licensing agreements reliant upon payment and provide the means to disseminate digital content and software more broadly. By relinquishing certain rights in software code, the Open Source movement encourages software code to be shared amongst users, allowing for problems to be fixed more easily and technological progress.

8. Conclusion

Importance of following good practice Following pre-determined good copyright practices and implementing the necessary support mechanisms will satisfy the responsibilities to rights holders, users and potential clients. Rights issues need to be handled at an organisational level and therefore approached strategically. The potential benefits of devising a strategic approach to these issues can be summarised as follows:

- Helping to identify the key copyright concerns and issues facing your organisation

- Reducing the risks of infringement

- Helping organisations achieve their public access remit

- Assisting in the full exploitation of assets

- Clarifying the role of staff and raising the general awareness about the importance of copyright

- Preventing rights from being inadvertently given away because they have not been recorded properly

- Pinpointing when copyright should be dealt with for projects

- Cementing the position of the guardianship role of the cultural heritage sector

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Copy right laws of India and USA: *an LIS perspective*

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Abstract: The authors have tried to explore Indian copyright law especially the 2012 amendment, US copyright law and Digital Millennium Copyright Act (DMCA) in a Library and Information Science point of view. The authors have also tried to examine whether the copyright acts are threat to library and information science. It was inferred that, copyright acts of India and USA are not an hindrance to library and information service.

Keywords: Copyright, Indian Copyright Act, Copyright Act of USA, DMCA

1. Introduction

Copyright is one of the intellectual properties. Intellectual property is the property which is generated by human intellect, the intellectual property is ownership of something intangible (Raju, C.B 2006 and Satakar, S.D 2003). The intellectual properties are divided into two main categories. They are 1. Industrial properties and 2. Copyright. The former consists of patents, trademarks, industrial designs, trade secrets, geographical indications, technology transfer etc. and the latter protects the authors of original works of literary outputs, music and film. Each country has their own laws regarding the protection of intellectual properties.

World Intellectual Property Organization is the international body for protection of intellectual properties. The origins of WIPO go back to 1883 and 1886 when the Paris Convention for the Protection of Industrial Property and the Berne Convention for the Protection of Literary and Artistic Works, respectively, were concluded. Both Conventions provided for the establishment of an "International Bureau". The two bureaus were united in 1893 and, in 1970, were replaced by the World Intellectual Property Organization, by virtue of the WIPO Convention (www.wipo.int).

2. Copyright

Copyrights are a set of exclusive rights granted by law to the creators or producers of forms of creative expressions such as literary, musical, artistic and cinematographic works. The rights are protections to the copyright owner. These rights provide the copyright owner the control over the use of his/ her works like their reproduction and distribution for a limited period of time. The creator of a work can prohibit or authorize its reproduction in various forms, including printing, recording, broadcasting, public performance translation or adaptation.

The world's first copyright law, the Statute of Anne, was enacted in England in 1710. Exercising its power under the newly adopted Constitution to secure the rights of authors and inventors, Congress passed an act almost identical to the Statute of Anne as the first American copyright law in 1790. Presently each country has their own copy right laws, such as Indian copy right law for India, US copyright law for America and UK copyright law for Britain (www.historyofcopyright.org).

2.1 Theories behind copyright

There are two theories behind copyright (Hombal,S.G and Prasad, K.N 2012), economic protection theory and moral argument theory. The economic protection theory says that, creativity in society is a good thing. In order to encourage creativity, the creator needs incentives. Such incentive includes providing limited monopolies with an economic value, such that the author can sell or dispose of his creation for monitory benefit. The moral rights theory argues that, there is an intangible relation between a creator and creation and this relationship remains even after the sale of creation.

3. Copyright Act of India

In India, copyright act was passed in 1914 (www.copyright.gov.in). It was an imitation of the British copyright act 1911, which was suitably modified in the context of British India. The present copyright act was passed in 1957. The Copyright Act, 1957 came into effect from January 1958. This Act has been amended six times since then, i.e., in 1983, 1984, 1992, 1994, 1999 and 2012. The Copyright (Amendment) Act, 2012 is the most significant one especially in this digital era. Indian Copyright office functions under the Department of Higher Education, Ministry of Human Resource Development.

3. US copyright Act

The U.S. Copyright law is handled by Copyright Office; it is a separate department of the Library of Congress, which was established in 1897. Presently copyright registration is centralized in Library of Congress and formerly it was concentrated on district courts. The present Copy right law in USA is called "The Copyright Act of 1976". Before the Copyright Act of 1976, federal copyright was the American copyright law. Many amendments have been attached to the Copyright Act, including the Digital Millennium Copyright Act of 1998, Protect IP Act (PIPA) of 2011 and Stop Online Piracy Act (SOPA) of 2011. According to US Act, the duration of copyright is for a term consisting of the life of the author and 70 years after the author's death for single authored work and the copyright endures for a term consisting of the life of the last surviving author and 70 years after such last surviving author's death for a joint authored work (http://copyright.gov).

5. Academic issues in each Acts.

Indian copyright Act and US copyright Act have handled the issues of academic community very clearly.

5.1 Indian Copyright Act: Section 52 of the Indian copyright Act is exclusive for academic issues. Section 52. says that, "Certain acts not to be infringement of copyright. -(1) The following acts shall not constitute an infringement of copyright, namely: (a) a fair dealing with a literary, dramatic, musical or artistic work (not being a computer programme) for the purposes of- (i) private use, including research; (ii) criticism or review, whether of that work or of any other work".

5.2 US Copyright Act: Section 107 of the US Act, is exclusively for academic related issues. According to this section "the fair use of a copyrighted work, including such use by reproduction in copies or phonorecords or by any other means specified by that section, for purposes such as criticism, comment, news reporting, teaching (including multiple copies for classroom use), scholarship, or research, is not an infringement of copyright. In determining the fare use, the act further says the following criteria are to be checked. They are-

- the purpose and character of the use, including whether such use is of a
- commercial nature or is for nonprofit educational purposes;
- the nature of the copyrighted work;
- the amount and substantiality of the portion used in relation to the copyrighted work as a whole; and
- the effect of the use upon the potential market for or value of the copyrighted work".

5.3 Analysis and interpretations

It can be interpreted by analyzing the Section 52 of the Indian copyright Act and Section 107 of the US Act , that copyright law in not at al an obstacle to the academic community. The word 'Fair deal' has been used in Indian copyright act, where as in the US Act the word 'fair use' has been used in this regard. Moreover, it encourages personal, study, research, critical and review. Reproduction is allowed for these purposes without the prior sanction from the authority or copyright owner and it will not be considered as copyright infringement. The same inference was pointed out by Reena Hobbs (2010) and Sabuj Kumar, C (2012) in their studies.

6. Library related issues.
There are positive clauses for libraries in both of these acts.

6.1 Indian copyright Act: Section 52 clause (1)(O)- says that, "the making of not more than three copies of a book (including a pamphlet, sheet of music, map, chart or plan) by or under the direction of the person in charge of a public library for the use of the library if such book is not available for sale in India.

6.2 US Copyright Act: Section 108 of the US Copyright Act is exclusively for library related issues. Some of the major points in this section have been quoted below. "108 (a) it is not an infringement of copyright for a library or archives, or any of its employees acting within the scope of their employment, to reproduce no more than one copy or phonorecord of a

work, except as provided in subsections (b) and (c), or to distribute such copy or phonorecord, under the conditions specified by this section if—

- the reproduction or distribution is made without any purpose of direct or indirect commercial advantage;
- the collections of the library or archives are (i) open to the public, or (ii) available not only to researchers affiliated with the library.

108(b) The rights of reproduction and distribution under this section apply to three copies or phonorecords of an unpublished work duplicated solely for purposes of preservation and security or for deposit for research use in another library. 108(c) The right of reproduction under this section applies to three copies or phonorecords of a published work duplicated solely for the purpose of replacement of a copy or phonorecord that is damaged, deteriorating, lost, or stolen, or if the existing format in which the work is stored has become obsolete. 108(e) The rights of reproduction and distribution under this section apply to the entire work, or to a substantial part of it, made from the collection of a library or archives where the user makes his or her request or from that of another library or archives, if the library or archives has first determined, on the basis of a reasonable investigation, that a copy or phonorecord of the copyrighted work cannot be obtained at a fair price".

6.3 Analysis and interpretations.

As per the section 52 clause (1)(O) of Indian Copyright Act, maximum three copies of a document can be taken for public library. In the explanation of public library as per Section 2 (fa), it is given that, "Nonprofit library or no-profit educational institution means a library or educational institution which receives grant from the Government or exception from payment of Income Tax under the Income Tax Act 1961". Taking this, university libraries and government special libraries can also be included in this category. The US Act also allows libraries and archives to take copies for preservation, use, interlibrary loan etc. But the relaxation is given under a strict condition that the library should be accessible to public and no financial benefit is done by using this. The act also allows taking the copies of even the unpublished work for the above mentioned purpose.

7. Digital library related issues

Digital revolution is treated as the greatest revolution in the history of mankind. This revolution wiped out the problems of time and space (Fareed Ahmed and Iftikar Hussain, 2013). Here any person can access and transmit information any time to anywhere. Digital libraries became more popular in this technological era because of easy accessibility, round the clock accessibility and anywhere accessibility.

7.1 Indian Copyright Act

Section 52 clause (1)(n) says that- "the storing of a work in any medium by electronic means by a non· commercial public library, for preservation if the library already possesses a non-digital copy of the work".

Section 52 clause (1) (zb) says that " the adaptation, reproduction, issue of copies or communication to the public of any work in any accessible format, by- (i) any person to facilitate persons with disability to access to works including sharing with any person with disability of such accessible format for private or personal use, educational purpose or research."

7.2 US Copyright Act

Digital Millennium Copyright Act (DMCA) is an amendment to the US copyright Act. Section 404 of the DMCA amends section 108 of the Copyright Act to accommodate digital technologies and evolving preservation practices. Before the amendment of the DMCA, "section 108 permitted such libraries and archives to make a single facsimile (i.e., not digital) copy of a work for purposes of preservation or interlibrary loan. As amended, section 108 permits up to three copies, which may be digital, provided that digital copies are not made available to the public outside the library premises".

7.3 Analysis and interpretations

In India, as per 52 clause (1)(n), libraries can digitize the work which they possess the hard copy. But it very clearly mentioned that the purpose is for 'preservation'. As far as libraries are concerned, they procure information resources, organize, and preserve for dissemination to its clients. Storing the information and not allowing for usage is against the first law of library science, ie 'books are for use' (information resources are for use). In America, after the amendment in DCMA the problem of digitization has been removed. As per this amendment, library can digitize any document in the library collection for library purpose and not for any financial benefit. Here there is a clause, that it should not be made available to the public out side the library. So it means that, remote accessibility of the digitized resources is prohibited. So libraries can make digital libraries with accessibility inside the library so as to avoid the misuse. An appendix that can also be added to this point is that, according to Webster's third New International Dictionary 'Preservation' means, "to keep up and reserve for personal or special use".(page No 1794). More over libraries are non profit service organizations. So it can be inferred that in this digital and technological era, libraries can digitize their collection by controlling the access for the benefit of academic community. Ayush sharma ((2009) and Ujwala Uppaluri (2012) have had the same inference in this issues.

8. Conclusion

Both Indian and US copyright laws are capable to cope up with academic community, library services and digital libraries. Both acts strictly demand to avoid the economic exploitation of copyrighted materials. Both acts have their own clauses regarding the

copyright infringements to prevent the so called misuses and to protect their rights. In short the copyright acts are not a threat to academic and library community and it is a safe guard of misusing special privilege of copyright holders.

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The Legal Aspects of Data Protection in Digital Libraries

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Abstract: The advent of digital information technology and high-speed computer networks have brought a new wave of digitization in every sectors of the economy including the offices, workplaces, Institutions, companies with an effect of increase in electronic databases. This rapid advance of information and communication technologies (ICT) has led to the creation of digital libraries. Digital libraries provide better and enhanced services to their end-users besides retaining the basic library services. Digital libraries offer wider choices of resources whether in-house or online external resources. This study attempts to find out the level of awareness of the library personnel and library users on privacy and data protection and to discover the library users' perceptions with regard to the collection and use of their personal data. In addition, this study also examines the policies and practices adopted by libraries in relation to users' privacy.

Keywords: Digital library, Data protection, Data privacy. Digital era

1. Introduction

The library plays the role of the brain of institutions; India is being seen as an emerging information society, where more people are engaged in activities in relation to collecting, processing and disseminating information. It is largely a post liberalization phenomenon which began in the early 1990's. The contribution of the information technology sector to the Indian economy has been immense. The laws however have not been able to keep up with the changing scenario – so much so that the Information Technology Act, 2000 did not have any specific provision to deal with issues relating to privacy and data protection, although it has been amended in 2008.

Privacy is a fundamental human right and denotes an individual's right to control dissemination of information about himself or herself as it is his own personal possession with increasing number of databases being created about the clientele by many businesses, a great threat to the individual privacy can easily be foreseen, along with it new forms of crimes also developed dealing with the personal information eg. Credit cards frauds etc. The new information technology is increasingly coming to be recognized as a threat to privacy rights. The concept of privacy needs to be redefined and examined in the context of information society.

The existence of the digital library has moved access to the information needed electronically and made it more attractive. Applications of interactive multimedia in libraries will allow users to explore the information needed effortlessly. The library should have a privacy policy to show the concern of library management. Thus, it is important to have a professional code of ethics and conducts as a guideline. One of the sources of the professional code of ethics and conducts states clearly about confidentiality between users and the libraries is: "We protect each library users' right to privacy and confidentiality with

respect to information sought or received and resources consulted, borrowed, acquired, or transmitted".

2. Data protection

Data Protection aims to protect and personal information of individuals. It provides a regulatory protection regime around personal information privacy, or personal data. Personal data is data or information which relates to or identifies, directly or indirectly, an individual.

In this present scenario, the digitization of information combined with continuous and dazzling technological developments has increased the flow and application of data. The growth of computer industry and information and communication technology in the last two decades has been amazing. This information and communication technologies provide unique opportunities for growth and human development. It can shape and enhance a wide range of development applications- from electronic commerce to access to financial markets, from generating employment to providing opportunities for investment to entrepreneurs, in particular small and medium sizes enterprises, from improved agriculture and manufacturing productivity to the empowerment of all sections of society, from long-distance education to tele-medicine, from environmental management and monitoring to prevention and management of disasters.

The key to this information age is the swift transfer and storage of digital data. In this era of globalization, the innovative ideas and the smart use of information rather than the production and distribution of goods have made a transformation and brought about a transition in the workplace, the economy and the society at large. As the information plays such a predominant role in the present society, that it can be termed as information society. In this information society, the mass transit of information, especially of personal data by the companies and in the cyberspace gives rise the needs of protecting such databases, particularly those which are sensitive in nature.

3. Privacy and data protection in the digital library environment

Sturges et al. (2003) which used several methods including sending postal questionnaires to libraries, administering questionnaires for users and telephone interviews with software system suppliers. The findings suggested that users had low levels of anxiety about privacy when using libraries because they expected that libraries would not pass on personal data to other bodies. Meanwhile, the librarians respected privacy as a professional value in principle and did not give it a high rating against other values.

Sturges, Teng & Illife (2001) believed that privacy is strongly considered to be a human right, and it is stated in the United Nations' Universal Declaration of Human Rights, adopted in 1948. The confidentiality of the transaction between the user and the library is explicitly protected in all the most prominent statements of the ethics of the librarian. There are various types of resources which discuss ethical guidance in professional codes of ethics and conduct. One of them, the American Library Association (ALA)'s Code of Ethics states; "We protect each library user's right to privacy and confidentiality with respect to

information sought or received and resources consulted, borrowed, acquired or transmitted". (ALA, 1995).

Library services also play an important part in maintaining user privacy such as digital reference services. Neuhaus (2003) viewed that there are six types of digital reference records derived from digital reference services. They are chat reference, e-mail, web forms, librarians and computer researchers with automated reference tools, Frequently Asked Questions (FAQs) and transaction logs. He suggested the digital reference policy must be a part of the library policy because it is a good mechanism for safeguarding user privacy. He stated that the good privacy policies can address ethical issues regarding user confidentiality which are not covered by statutes.

4. Implementation of privacy and data protection in the digital library environment

The online and computer network application in the digital library also require privacy and data protection. This privacy and data protection should be included in the library policy. It will generate the information management practices more efficiently and protect privacy as a part of users' rights. Digital libraries depend on the Internet and Intranet connections. Everybody must be ready to face the transformation from an era of scientific management to systems and structural management. Sharma and Vishwanathan (2001) mentioned that the points that should be considered in changing from the traditional to the computer based system are:

- Anticipated traffic to flow over the network

- Origin and destination of that traffic

- Types of applications that will be made available on the network and

- Set procedures if part of or the whole network fails

The restriction of access will help the library to safeguard the privacy of library users. The different methods of authentication have different implications for user privacy. Each method has trade-offs between ease-of-use, privacy, manageability, and security. One of the authentication mechanisms is client authentication. Client authentication means making users prove that they are who they say they are before allowing them access to a particular area (Guenther, March 2001). It is the second step from two steps. The first step is a login or user name and the second is asking user to prove who he is with a password, a signature, or biometric identifications (using a physical attribute to prove identity, e.g. retinal scan or thumb print). She also mentioned some of the basic methods in authentication that can be chosen:

- User name and password authentication

- Cookie file authentication

- Encryption and authentication

- Digital certificates

- Smart cards

5. Conclusion

The concept of data protection is not a new concept today. The development of automatic data processing, which enables vast quantities of data be transmitted within seconds across national frontiers, and indeed across continents has made it necessary to consider issue of data protection specially personal databases. Computerization increases the social importance of information.

This manifests itself in many ways. One involves a dramatic change in the value that individuals and businesses as well as government place on the ability to handle and control personal information concerning individuals. Further, Data protection law is necessary to provide protection to the privacy rights of people and to hold cyber criminals responsible for their wrongful acts.

Data protection law is not about keeping personal information secret. It is about creating a trusted framework for collection, exchange and use of personal data in commercial and governmental contexts. It is to permit and facilitate the commercial and governmental use of personal data.

The stringency of data protection law, whether the prevailing law will suffice such needs, whether India needs a separate legislation for data protection etc are questions which require an in-depth analysis of the prevailing circumstances and a comparative study with laws of other countries. However, it is apparent that the present legal mechanism is lacking in providing a proper protection to the databases in this present digital world.

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Search Engines for Information Retrieval: *A Comparative Study of Google, Yahoo, Altavista, Bing, Lycos*

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Abstract: A Search Engine (SE) is a program that searches documents on the Internet for specified keywords and returns a list of the websites of the documents. World Wide Web has become an indispensable source of information for any one, it needs to understand how people search and retrieve information as search engines have been playing an important role in finding the required information from ever growing internet. Search Engines (SEs) on internet have improved continually with application of new methodologies to satisfy their users by providing them with relevant information. The paper explores on how Search Engines discover web pages, indexes content, and provide search results. The paper discusses about the technological evolution of SEs, and working process of SEs. The paper also explores the search features of Popular Search Engines i.e Google, Yahoo, AltaVista, Bing and Lycos. Finally paper presents conclusions and suggestions for further research.

Keywords: Search Engines, World Wide Web (WWW), Web Searching, Search Features

1. Introduction

A Search engine retrieves web resources from its database by matching the keywords entered by the user. The web has plenty of useful resources, but its dynamic unstructured nature makes them difficult to locate, the quality of search in web pages. The growth of the Web is an unprecedented phenomenon. The search engine technologies are sophisticated technologies, and the sophistication is increasing day-by-day. Thus, there is a considerable trend in the technologies that are related to search engines. Effective use of Search Engines is a challenging task for Library and Information Science Professionals. The main problem is displaying only important pages relevant to the keyword(s) typed by users. Each search engines has its own algorithm. The importance of a web page can be judged based on the content specified in it or based on link information. Searching for information on the World Wide Web (WWW) is done in much the same way that you look for information in a library, using an on-line catalog system (the updated version of the old index card system). The difference-and the advantage-is that you can get information from all over the world,

instead of from a single library collection. The term "search engine" is typically used to describe all of the different programs that allow people to search the World Wide Web.

2. Objectives

- To explore the genesis of search engines technology.
- To find out the Architecture and working process of search engines.
- To find out the search features of select search engines.

3. Statement of the Problem

The present study has been undertaken to answer what is web search engine, how web search engines works, an individual simply cannot read billions of pages available on the web, so he need help from search engines to zoom in to a small number of pages worth looking it.

4. Significance of the study

Web search engines have become an indispensable tool in our everyday life. When we seek information we often go to our favorite search engine and look at the returned pages. In this context we felt it is essential to have a study of usage and impact of web search engines. This study would help to assess the working process, technological evolutions of SEs.

5. Methodology

The study is based on an extensive review of literature available in the print journals, online journals on internet to investigate about the search engines technology, and how search engines retrieve the information from their databases.

6. Limitations of the Study

Search Engines are available globally but the present study is confined to the search engines trends and technologies, Development of search engines, working process of search engines, search features of the select search engines only i.e Google, Yahoo, AltaVista, Bing, Lycos.

7. Review of Related Literature

Web search is now a major interdisciplinary area of study, including the modeling of user behavior and web search engine performance. Studies on Web search engine crawling and retrieving have evolved as an important are of Web research since the mid-1990s. There are a number of studies related to the use of web search engines. There are many factors which affect the use of web search engines. The related studies discuss some of these issues. The present study is conducted in the light of the previous studies

Egri and Bayrak (2014) in their paper entitled, 'The Role of Search Engine Optimization on Keeping the User on the Site' mentioned that 93% of internet traffic is managed by search engines, exploring the potential of search engines is crucial, it shows the critical role of search engines on routing users to the right websites. Due to the important effects of search engines, search results are getting more crucial for websites to compete with other rivals. Kim and Tse (2014) in their article entitled 'Search engine competition with a knowledge-sharing service' compared the competition between an inferior search engine and a superior search engine with the option to introduce a knowledge-sharing service. White (2013) made a study on search engines and published it with the title 'Search engines: Left side quality versus right side profits'. He stated that Search engines face an interesting trade off in choosing the way to display their results. While providing high quality unpaid, or "left side" results attracts users, doing so can also cannibalize the revenue that comes from paid ads on the "right side". Shafi and Rather presents the result of a research conducted on five search engines- Altavista, Google, Hotbot, Scirus and Bioweb for retrieving scholarly information using bio-technology related search terms. The search engines are evaluated taking the first ten results pertaining to scholarly information for estimation of precision and recall. It shows that Scirus is the most comprehensive in retrieving 'scholarly information' followed by Google and HotBot. Biradar and Sampath Kumar found that Altavista searched more number of sites while Excite searched least number of sites. In case of relevancy of search engines majority of relevant sites were found in case of Google (28%) followed by Yahoo (26%) and Altavista (20%). Further analysis shows that more number of irrelevant sites was found in case of Hotbot (61.6%), Lycos (59.6%) and Altavista (54.8%). 7.6 Lewandoski et al study measures the frequency with which search engines update their indices. Thirty eight websites that are updated on a daily basis were analysed within a time-span of six weeks. Found that Google performs the best overall with the most pages updated on a daily basis, but only MSN is able to update all pages within a time-span of less than 20 days. In terms of indexing patterns, MSN shows clear up date patterns, Google shows some outliers and the update process of the Yahoo indexes seems to be quite chaotic. Thelwall study compared the applications programming interfaces of Google, Yahoo! And Live Search 1,587 single word searches the hit count estimates were broadly consistent but Yahoo and Google reported 5-6 times more hits that Live Search. Yahoo tended to return slightly more matching URLs than Google and Live Search returning significantly fewer. Yahoo retrieved URLs included a significantly wider range of domains and sites than the other two, and there was little consistency between the three engines in the Number of different domains. Google is recommended for hit count estimates but Yahoo is recommended for all other Webometric purposes. Uyar investigates the accuracy of search engine hit counts for search queries using Google, Yahoo and Microsoft Live Search and the accuracy of single and multiple term queries. The results of the study shows that the number of words in queries affects the accuracy of estimations significantly. The percentages of accurate hit count estimations are reduced

almost by half when going from single word to two word query tests in all three search engines. With the increase in the number of query words, the error in estimation increases and the number of accurate estimations decreases. The Page Rank Citation Ranking: Bringing Order to the web 1998 explains that every page on the World Wide Web into a single number, its Page Rank. Page Rank could be used to separate out a small set of commonly used documents which can answer most queries. Page Rank may be a good way to help find representative pages to display for a cluster center. Page Rank suggests that the structure of the Web graph is very useful for a variety of information retrieval tasks.

8. Search Engine Trends and Technologies and Chronological Development

In the beginning search engines were very primitive and they had rudimentary general search options, from general search options there was a trend of developing advanced search features and thus evolved Meta Search Engines, subject directories, etc. and they did not stop there. Presently the trends towards Federated search and semantic web search engines. The search engine technologies are sophisticated technologies, and the sophistication is increasing day-by-day. Eventually, this trend seemed to be profitable and the demand for better search engines has resulted into a big business.

Chronology of Search Engines Development: (1990 -2013)

Sl.No	Year	Search engine Development
1	1990	Alan Emtage developed Archie at McGill University in Montreal. (The first world Wide Web software was created by Tim Berners-Lee)
2	1991	Mark McCahill developed Gopher at University of Minnesota
3	1992	University of Nevada launched Veronica
4	1993	Matthew Gray created World Wide Web Wanderer at MIT
5	1993	Mosaic, Lynax, Jugahead released.
6	1994	David Filo and Jerry Yang started Yahoo at Stanford University.
7	1994	In Pinkerton introduced Webcrawler
8	1994	Lycos search engine launched by
9	1994	Infoseek becomes default search engine for Netscape
10	1995	Excite search engine launched
11	1996	Rediff.com launched as an Indian Search Engine.
12	1998	Larry Page and Sergy Brin founded Google Search Engine
13	1998	Microsoft Launched MSN search engine.
14	1999	Yahoo buys Geocities
15	2001	Go to renamed as Overture
16	2003	Overture buys Altavista
17	2003	Yahoo buys overture
18	2004	Amazon launches A9 search engine
19	2004	Google Scholar launched
20	2005	Google introduced maps feature, books search, translation facility.
21	2006	Microsoft Live search (sept.2006)
22	2007	Wikiseak search engine launched
23	2008	Cuil search engine launched
24	2009	Microsoft launched "Bing" search engine (june 2009)

25	2010	Yandex Search Engine (Russia)
26	2011	Yacy P2P Web Search Engine
27	2012	Volunia (Inactive)
28	2013	Halalgoogling (Islamic Search Engine)

Source: Searchenginehisotry.com

- **Search Engine Architecture and working process**

Search Engine Gathers the contents of all web pages (using a program called a crawler or spider) Organize the contents of the pages in a way that allows efficient retrieval (indexing). It takes the query and determines which page matches the query and show the results finally (ranking and display of results).
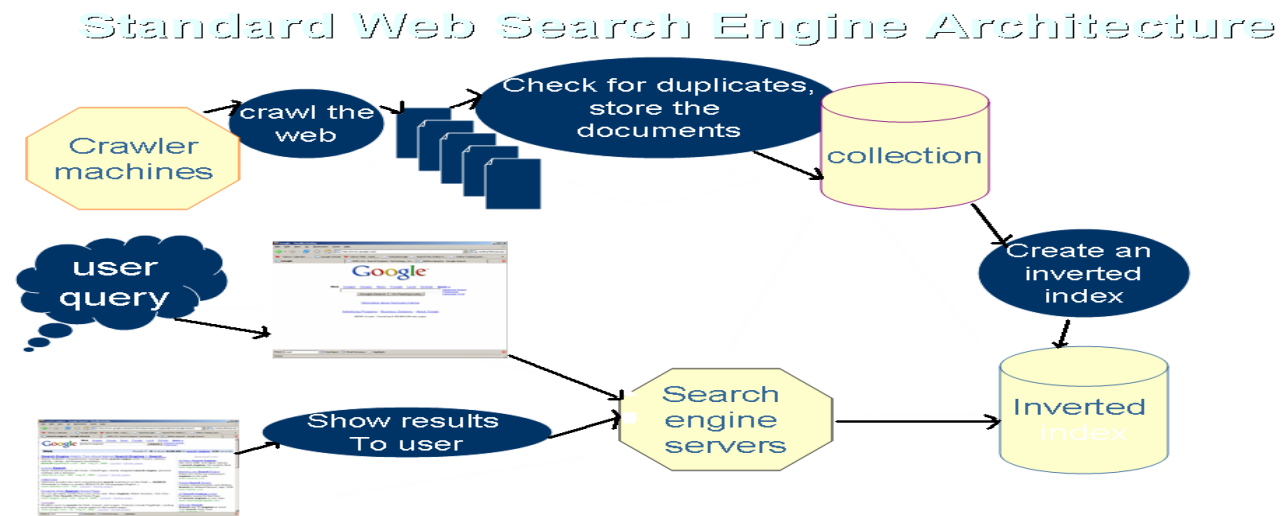
Figure 1 - Standard web search engine architecture

- **Working Process of Search Engines**

Search Engines allow the user to enter keywords that are run against a database. Based on a combination of criteria, the search engine retrieves WWW documents from its database that match the keywords entered by the searcher. "Search Engine works on the four main principles:

- Web crawling,

- Indexing web pages,

- Ranking the results, and

- Search and display the results.

For searching process, search engines, simultaneously adopt "Best match searching" as the default mode of operation with "Boolean Searching" as an alternative and advanced

retrieval options. A single search engine cannot cover every available web resource, but may do contain references to millions of resources and thus results may vary from one search engine to another.

- **Search Features of Google, Yahoo, AltaVista, Bing, Lycos Search Engines**

Search Features of Google, Yahoo, AltaVista, Bing, Lycos Search Engines

Search Engine Features	Google (1998) www.google.com	Yahoo (1994) www.yahoo.com	AltaVista(1995) www.altavista.com	Bing (1998) www.bing.com	Lycos (1994) www.lycos.com
Founders	Sergy Brin & Lary Page	Jerry Yang & David Filo	Louis Monier	Steve – Ballmer	Bob Davis
Current Status	Active	Active	Defunct 08.07.2013	Active	Active
Type of site	Search Engine (SE)	Web Directory/ SE	SE	SE	Web portal/ SE
Boolean Searching	Yes	Yes	Yes	Yes	Yes
Phrase Searching	Yes	Yes	Yes	Yes	Yes
Truncation	Yes	Yes	Yes	Yes	No
Stop Words	Yes	Yes	Yes	Yes	No
Available Languages	123	41	13	41	120
Display per page	10	10	10	10	10
Media Search (Image & video)	Yes	Yes	Yes	Yes	Yes
Outstanding Special Features	Weather, Spell checker, Stock quotes, File formats, Domain search, Unit conversion, Numeric ranges, Area code etc..	News, Sports, Astrology Shopping, Country wise Search, File Format, etc..	Anchor search, Applet, Domain, Host, Natural Language, etc.	Tiger indexing technology, Redesign side bar, Design language Metro, etc.	Ybrant Digital, Tripod, Angel Fire, HotBot HTML Gear, Webon,etc.

Other searchable Databases	Maps, Books, Blogs, News, Shopping, Earth, Patents, etc	Maps, Jobs, Directory, Creative commons People, Travel, etc.	Bibliographic Meta Data, Babel Fish Translation service, Multilingual search. Etc.	Explorer pane, cached pages, integration with apple, etc.	Games Ville, Lycos Television Lycos Video (Blinkx), etc

8. Selection of Search Engines (SEs)

As the number of SEs available on the internet increases, so it is very difficult to find out the right SEs for a user's need. The central aim of search engine selection is to accurately profile each search engine. It is impossible to manually track and index all SEs as their number is in hundreds of thousands. As more and more specialist search engines are becoming available electronically, the need for SEs research will increase. The importance of search engine selection has grown rapidly as more and more databases are migrated to the web each day.

9. Conclusion and Suggestions for future research:

This paper understands the endless vistas on Web Search Engines and their Information retrieval features. We need to welcome web search engines for information retrieval. Searching the entire Web in less than a second is a challenging task for information professionals. Rapid growth and evolution of web is posing new challenges to SEs. Emergence of Web 2.0 services like social networking, weblogs, RSS feeds, and increase in non textual information like podcasting, online videos and convergence of non convention forms of communication such as mobile phones with interest will require easy information retrieval in these areas. The possible extension of this work is an urgent need to dig deep web (non-indexable) to develop a new ranking method or new search mechanism that can potentially identify high quality pages and exact search results in the web.

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Digital Plus Era: *Profile of a Law Librarian*

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Abstract: Stresses that next generation digital Law Librarian is a specialist librarian to handle legal information to manage & organize the digital/virtual law library and eventually handle specialized tasks of digitization, storage, retrieval, digital data mining digital reference services, etc. in the specialized field of law. Next generation Law Librarian/Court Librarian acts as a guardian of the information superhighway/global digital library. The paper also emphasizes requisite skills required for next generation law librarian especially a Court Librarian in information retrieval, navigation & browsing, access to different legal online and offline software etc.

Keywords: Digital, Law Librarian, ICT, information, retrieval, legal, databases etc.

1. Introduction

Digital libraries are needed to let libraries offer new and improved services and also to deal with a cost crisis now affecting their current tasks. Dreams of computer based libraries which have been around for decades are now practical. It is happy augury that some libraries (Ex. especially Pharmaceutical companies) are already spending more than half of their budget on electronic resources alone rather than conventional hard copy resources, paper. On the contrary, many university libraries are finding it impossible to maintain their traditional collecting practices within the constraints of their institutional budgets. They look especially to the new technology as solution. Law libraries are also not exceptions for the same.

2. Law Librarianship in the Digital era

Law Librarianship especially the librarianship in Judicial Institutions is different from librarianship in any other organization. What makes it different, is the degree of accuracy and urgency by its clientele and services are to be provided pinpointed and very expeditiously. This aspect is more fully explained by Prof. Iger I. Kavass that, "the reason for law librarian being different from other types of libraries is that, they serve a profession which is literally unable to exercise to exercise its work without the use of books. (Kavass 1975). Now, this definition of Kavass needs to be modified to some extent. This holds good even in the digital era if the word "book" will be replaced by the words "virtual/digital resources".

Today while Indian Judiciary is in urgent need of reengineering its process with the new concept of E-courts by harnessing the potentiality of the available ICT and digital information system to its fullest extent for enhancing the judicial productivity both qualitatively and quantitatively and also to make justice delivery system affordable

accessible, cost effective, expeditious, transparent. Against this backdrop, the law librarian cannot stun away from becoming the digital Law Librarian.

Digital information system coupled with ICT can help us to brighten the image of the law libraries as well as Law Courts and can become to more efficient, fast and user friendly. In an era of digital information, electronic technology, WWW, are gaining popularity & simultaneously, there is a tremendous growth of CD-ROM products/Legal Softwares, digitalLaw Libraries that offer a huge range of multimedia information. Mention may be made of the following digital sources.

1. **Few Free Open Access Digital Libraries use to law professional**:

   - Supremecourtofindia.nic.in

   - Bombayhighcourt.nic.in

   - Advocatekhoj.com

   - Mahaonline.gov.in (for Mah. State Govt. GR and E- Gazettes search)

   - E – Gazttes of India

   - JUDIS

   - INCODIS

   - INDIA CODE etc

2. **Few On – Line Legal Databases against subscription are:**

   - supremecourtcases online/ Web Edition (Platinum and Platinum Plus)

   - LEXIS-NEXIS

   - West Law

   - CDJ Online

   - MhLJ online

   - AllMR Online etc

3. **Few Off – Line / CD ROM Legal Databases against subscription are:**

   - Supreme court cases Full Text on Cd Rom

   - Learned Judgments Software

   - AII India Reporter (HC, SC, SCW, CrLJ)

   - Bombay Cases Information Search etc

In building the next generation of digital law libraries, multimedia and artificial intelligence will play several important roles. Thus it is clear that, the advent of digital libraries presents a plethora of challenges and opportunities to the digital law librarian. The Digital Law Librarian has to provide value added information and can make digital libraries truly useful and user friendly.

3. Need for a digital Law Librarian in the Management of Digital Law Libraries

The emerging digital law libraries and worldwide digital legal information centers generate the need for creating a new job title "Digital Law Librarian" to manage the digital knowledge resources.

The Digital Law Librarians are required to:

- Manage digital law libraries
- Organize digital knowledge and information in the field of law
- Provide digital reference service and electronic information services
- Classify and catalogue digital documents and digital knowledge
- Handle the tasks of massive digitization, digital storage process and digital preservation

4. Skills and competencies required for a Law Librarian in a Digital era:

Digital information system management in law libraries refers to overall competencies necessary to create, store, analyze, organize, retrieve and disseminate digital information (text, images, and sounds) in digital law libraries or any type of general information.

It may be inferred that, the competency of a digital law librarian is represented by different sets of skills, attitudes and values that enable a digital librarian to work as digital information professional or digital knowledge worker or digital knowledge communicator. There are skills and competencies that a digital law librarian should develop. One is the ability to manage the digital libraries and digital knowledge management. The following are the essential skills, required in a digital librarian in the management of digital information systems and digital libraries are:

(1) Internet, WWW:

- Navigation, browsing, filtering;
- Retrieving, accessing, digital document analysis;
- Digital reference services, electronic information services;
- Searching network databases in a number of digital sources and Web sites;

- Creating home pages, content conversion, downloading techniques;
- Web publishing, electronic publishing;
- Web authoring.

(2) Multimedia, digital technology, digital media processing:

- Multimedia indexing, image processing, object-oriented processing;
- Cataloguing and classification of digital documents, digital content;
- Searching and retrieval of text, images and other multimedia objects;
- Conferencing techniques including teleconferencing, video conferencing

(3) Digital information system, Development of digital information sources:

- Digitization of print collections;
- Development of machine readable catalogue records;
- Design and development of databases;
- Conversion of print media into digital media;
- Knowledge in digital knowledge structures.

Apart from these, there are additional skills a Law Librarian should develop. These are:

- Digital Law Librarian is a bridge between digital resources and users (Role of Facilitator)
- The concept of digital law librarian is as mentor, as a friend of the user, as personal trainer, who guides the user.
- The social role of the librarian is still strong, even stronger in digital environment (the concept for social inclusion in digital environment)
- Pedagogical skills get stronger in digital environment (the concept of the digital library as a virtual classroom)
- The digital law librarian must has commitment to continuous learning and lifelong improving of skills in all areas of digital applications, services etc.

5. Legal Reference Service in practice with reference to Court Libraries

A Court Librarian often needs to give Reference Service for Hon'ble Judges, Courts, Lawyers etc. Sometimes Court Librarian also needs to serve Faculty in the field of law, Research Students etc. on demand.

There may be lots of queries from the legal professionals. Some of these are:

- Provision of particular section of particular Act/Rule
- Bill of particular Act
- Statement of Objects and Reasons (Legislative intent) of a particular Bill/Act
- Latest amendment to Acts/Rules
- Case Laws on particular point of Law
- Meaning of a particular word, phrase, Legal Maxim t=etc
- Government Notifications, GRs , Rules, Regulations etc.

Most of the above queries, a law librarian may solve with the help of in-house databases created by his own efforts, On Line a& Off Line legal Soft wares and also by surfing Internet for Digital Law Libraries. For making Legal search, special retrieval skill is required with the law librarian. If a Law Librarian acquires expertise in Legal knowledge, may solve such queries in better and expeditious manner. When a Law Librarian receives any requisition or query form the legal professional, for ex. Hon'ble Lordship, then at first he has to understand the requisition. If the query is to find out the judgment/case law by party name, Judge Name or section wise, then this will be very simple to find out from the help of legal soft wares with correct key words.   But, when only the subject is given and judgment is to be found, then librarian has to first analyze the subject , form the accurate keywords and then only search could be possible, otherwise, no results would be found. Ex. Of some Queries are:

- "Whether a Judicial Magistrate has power to dispose of the Forest Property"?
- CrPC Section 406, Section 407, Transfer Case, Fair Trial.
- Guidelines of Supreme Court for entertaining PILs.
- Supreme Court Judgment on Bar of Back Door Entries/Appointments etc.

This search will be time consuming if carried out manually. Only use of digital SWs makes it easier to solve speedily.

6. Digital Plus Age : Multiple Media Formats

 Most challenging of these changes of digital era is the range of expectations that our patrons have with respect o how they find and interact with information. In this new environment – one in which information is available both in digital and analog formats and where the field of law is growing more international as well as interdisciplinary in it's scope - more and more is expected of law libraries in multiple dimensions. (Philip 2005)

The Law library of 2015 onwards is not entirely digital. Nor, in all likelihood, will the law library ever be entirely digital. Our future will be hybrid of yesterday's predominantly

print based world and tomorrow's primarily digital world. Print will also continue to play a key role in the preservation of legal material. As librarians, we emphasize the need to take precautions to print out backup copies of born-digital materials and store them in a safe place for long term to mitigate a risk of data rot. (Roger 2009) . There is strong case to made for printed books in their current format as a central part of libraries for the future (Robert 2009)

7. Conclusion

The digital Law Librarian working in the digital knowledge domain is a specialist in the area of digital law libraries. He is the manager of this digital library. Several characteristics and new skills are essential for a digital law librarian to create and manage digital library collection and services of Law Libraries.

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Research Data Curation in Higher Education Institutions of India

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Abstract: For the purpose of research in various fields, datasets are created, processed and the results, if good, get published. Most of the initial datasets and the intermediate results are generally discarded after a period of time. Even if they are retained by the researcher, it remains out of reach for the other researchers in the same area, leading to duplication of efforts in dataset creation. In this paper, some successful data curation efforts are analyzed and essentials for combined effort are presented for research data curation in India with active role of libraries.

Keywords: Data curation, digital curation, data sharing, data science, research data management.

1. Introduction

Research activities cover a wide range, from the lone Ph.D. researcher doing research work for Ph.D. degree, to the international collaborations on an identified project of international importance. Researchers are now producing, storing, and disseminating digital data, which is the basis of the research reports, in much larger volumes than the text. These researchers collected small, precious parcels of data after investment of huge amount of time and money. Data are being recognized as intellectual objects that can undergo quality checks, peer review, distribution and reuse. The reuse of data contributes as much to society as the reuse of a concept in a journal article with appropriate attributions. So, the digital data our researchers create should be stored, found and re-used or repurposed. Lehrer (2010) argued that scholarly articles are certainly of great value, if we can validate that data are accurate and that conclusions are true when we have direct access to the original data. Getting to the original data is even more critical because of the observation that it appears that original strong findings tend to get weaker if replicated later.

Due to obvious reasons of digital form of data being the common form, the terms "data curation" and "digital curation" are being used interchangeably. The Wikipedia article for digital curation defines it as "selection, preservation, maintenance, collecting and archiving of digital assets" and it refers to "the process of establishing and developing long term repositories of digital assets for current and future reference by researchers, scientists, historians, and scholars" (Wikipedia, 2015a).

The activity of replication and validation is a basic principle of the scientific research method. In 1620, Francis Bacon strongly stated that experiments and observations must be replicable and open to evaluation (Bacon, 1620/1830). Research data are made open for two purposes. One is to provide evidence that the research was conducted properly with factual basis and the second is to provide data for reuse and the generation of further

findings and outputs. Scientific research data might have release restrictions, such as, an embargo period imposed by the data originator for protecting the researcher's intellectual property rights before publishing. During this period, the original data creators may publish their findings before others have access to the data. The dataset may then be released with condition of appropriate attributions.

Internationally, open access to research data is being given increasing importance within research establishments and higher education institutions and they are, increasingly, being required to ensure the implementation of explicit research data management frameworks. Advancements in instrumentation and computerization enable scholars and civil servants to collect data with volumes equal to the text content of the entire Library of Congress in a matter of days (Baraniuk, 2011). However, providing sufficient contextual information to enable data reuse is also a significant challenge for quantitative research projects (Faniel et al., 2010).

2. Literature Review

The term "data curation" started appearing regularly in LIS literature as early as 2000. As can be expected from a new area of specialization, a majority of the literature has been of a descriptive nature and focuses primarily on the concept of curation or offering different opinions on why data curation services are important.

The Atkins Report (Atkins et al., 2003, p. 43) acknowledged the need for "trusted and enduring organizations to assume the stewardship for scientific data" and said that "Stewardship includes ongoing creation and improvement of the metadata by people cross-trained in scientific domains and knowledge management". But, it assumed that much of this work could be automated with the development of "middleware, standard or interoperable formats, and related data storage strategies". The report concluded that "each discipline is likely best suited to creating and managing such repositories and tools". It noted that "interoperability with other disciplines is essential", but it implied that this problem could be largely resolved by technological means.

Anna Gold (Gold, 2007) pointed to the growing importance of research data by stating that data is the currency of science, even if publications are still the currency of tenure. To be able to exchange data, communicate it, mine it, reuse it, and review it is essential to scientific productivity, collaboration, and to discovery itself. Some authors have opined that research libraries traditionally have controlled access to research data in the form of published documentation, and that it, therefore, would be a natural extension of that function if they were to control direct access to the research data in raw form (Lewis, 2010; Shearer et al., 2010; Heller et al., 2011). Heller et al. (2011) advocates integration of and access to large datasets with the purpose of identification, retrieval, sharing, and recycling, require description, organization, and consistent control and treatment according to harmonized rules, formats, and protocols. This is precisely what research libraries do today in relation to documents. Weber et al. (2012) argued that research data often are complex datasets of very different kinds of information, and that they are domain-, context- and provenance-dependent. The maintaining of such datasets requires scientific knowledge of

the domain and advanced technological knowledge in order to store and organize the data so that it can be properly preserved so that other researchers are able to effectively query the information.

3. State of Affairs in Data Curation

Increased recognition of importance of research data has caused governments as well as individual institutions, both research and higher education, to venture into data curation practice and research. There are research data repositories involved in curation of data generated by institution's research activities, and also registries of research data repositories. Prominent international initiatives and the present scene in India have been discussed below. The contribution of research data repositories is also discussed.

3.1 International Initiatives

Among the first initiatives, the Digital Curation Centre (DCC) was launched in March 2004 at National E-Science Centre of University of Edinburgh to help solve the extensive challenges of digital preservation and digital curation and to lead research, development, advice, and support services for higher education institutions in the United Kingdom (Rusbridge et al., 2005). On September 28, 2007, the U.S. National Science Foundation's Office of Cyberinfrastructure announced a request for proposals with the name "Sustainable Digital Data Preservation and Access Network Partner" (DataNet). The request solicited to create a set of exemplar national and global data research infrastructure organizations, dubbed as DataNet Partners, that provide unique opportunities to communities of researchers to advance science and/or engineering research and learning (NSF, 2007). The two prominent partners of DataNet are DataONE and Data Conservancy. DataONE (Michener et al., 2015a) at University of New Mexico covers ecology, evolution and earth science. The Data Conservancy (Choudhury et al., 2015a) at Johns Hopkins University covers astronomy, earth science, life sciences and social science.

The Australian National Data Service (ANDS) was established in 2008 to help address the challenges of storing and managing Australia's research data, and making it discoverable and accessible for validation and reuse. In October 2012, Thomson Reuters launched a new citation database, Data Citation Index, on its Web of Knowledge platform (Thomson Reuters, 2012). This new index is concentrated solely on digital, web-based resources. It selects and index data repositories, which are databases or collections comprising data studies and datasets to store and provide access to raw data. Constituent data studies, and sometimes individual data sets, are tagged with metadata to provide context for the associated raw data.

In addition to the above mentioned prominent initiatives in the field of data curation, there are some registries hat offers researchers, funding organizations, libraries and publishers, an overview of existing international repositories for research data. Following a paper by Brase et al. (2009), DataCite, an international not-for-profit organization, was founded in 2009 by organizations from 6 countries aiming to establish easier access to research data on the Internet, increase acceptance of research data as legitimate, citable contributions to

the scholarly record and support data archiving that will permit results to be verified and re-purposed for future study. After this initiative two prominent registries came into being as "Databib" by Purdue University Library and "re3data.org" by German Research Foundation (DFG). The two services are in the process of merging, and in the future the combined service will be absorbed into DataCite (DataCite, 2015a).

3.2 Initiatives in India

The data repository registries of Databib and re3data.org have registered 27 databanks from India in their registry of research data. It is worthwhile to note that none of these 27 databanks belong to higher education institutions of universities and colleges present in India. It is reflected that the universities and colleges in India are not sharing their research databases among the research communities.

The Department of Science & Technology, Government of India has framed National Data Sharing and Accessibility Policy (NDSAP) – 2012. The earlier policy was based on "open series data model", in which any data not specifically included in the "Open Series Dataset" remains inaccessible for public use. The NDSAP envisages a migration towards "Negative List" of data. All the data holding organizations will be re-classifying their data and prepare a negative list of sensitive data, keeping in view, the broad guidelines of RTI Act, 2005 (NDSAP, 2012). Under this policy, the web platform of www.data.gov.in provides access to 13714 datasets contributed by 86 government agencies, as on March 3, 2015. Another prominent source of economic data is the Database on Indian Economy (DBIE) provided by the Reserve Bank of India through its web postal www.rbi.org.in.

The research data collected by research groups and individual researchers in universities and colleges of India are more or less confined to their private ownership. With International Workshop on "Data Curation in the University: Libraries, Research and Learning" organized in March, 2013 at JNU, New Delhi, the participation of universities and colleges is expected to grow for research data curation pertaining to research activities conducted by their researchers.

4. Essentials for research data curation

The increasing importance of data management in an academic context requires higher education institutions of universities and colleges in India to consider the essentials of data curation, as the first steps towards delivering research data management support services. Presented here are the essentials of research data curation for higher education institutions. The essential preparations should comprise of following, so as to promote the research data curation in higher educational institutions:

- **A policy framework:** Before embarking on the nationwide research data curation programme, a policy framework suitable for curation of research data should be in place. The NDSAP-2012 has been designed keeping in mind the datasets with the government departments. So, the need of a separate policy framework, specifically

for research data curation is needed. The policy framework should also address the concerns of research groups belonging to higher education.

- **An inter-institutional coordination authority:** An inter-institutional coordination authority covering the universities, colleges and research institutions should be in place to coordinate between the institutions for standards, manpower training and other coordination activities for research data curation.

- **Set of technological standards:** Various technological standards, e.g. database technology, file formats, exchange formats, metadata standards, etc., should be in place. As the institutions have heterogeneous research practices, for data sharing among the institutions, either a specific standard for each activity should be used or mapping between heterogeneous standards should be developed. As a higher educational institute deals with a wide array of knowledge areas and the datasets belonging to different knowledge areas need different file formats and exchange formats, the technological standards should be designed to promote interoperability of the varied formats.

- **Manpower planning:** The practice of data curation involves human expertise in contrast to automated data mining activities. The datasets need to be carefully prepared with proper metadata. The manpower needed for such a specialized work should be expert and needs to be prepared with proper manpower planning. A higher education institution deals with many specializations, the personnel should be able to coordinate with researchers belonging to completely different knowledge areas.

- **Advocacy and user education:** Although the realm of research data curation is widely considered as beneficial to society, a group of researchers may think otherwise. Even if agreed, a researcher may not be able to utilize the full potential offered by the data curation. Establishing the awareness, education, and support of research communities is one of the biggest challenges facing the successful capture, documentation, dissemination, and reuse of research data. Hence, a programme of curation literacy, education and advocacy will be needed.

- **Role of Institutional Libraries:** The activity of research data curation in a higher education or research institution needs to be internally coordinated among various departments, units and research groups. There already exists a central academic coordination centre, which we call as library, in all the higher education and research institutions. It has always been the job of academic librarians to know about and be familiar with relevant databases, to advise users as to their proper and ethical use, and to include them in the bibliographic guides. The role of libraries is to collect, preserve, and disseminate the intellectual output of the society. The library can easily coordinate the research data curation activity with records management, giving processes/techniques that are relevant to them, for example, file plans, helpful naming conventions, version control, distribution control, security and backup, permissions management, and appraisal, retention and disposal. As data archives developed, a specialized profession of data librarian/archivist emerged, blending knowledge and skills from information technology, librarianship, statistics,

and the social sciences. Moreover, the librarianship has already transformed from the role of document manager to information managers. Therefore, it is imperative upon the higher educational institution to give the responsibility of research data curation to the institutional libraries.

5. Conclusion

Research data curation has been acknowledged as an important activity for helping and promoting research in various fields of knowledge. The developed countries are now actively involved in curation of research data. They are also collaborating on various fronts to share their data among the research communities. In India the datasets created by government organizations and some research institutions are being curated. But, the higher educational institutions of universities and colleges are lagging behind. Therefore, a need has been identified for these institutions to start the activity of research data curation. The collaboration is expected to be beneficial, as the collaborating institution will be able to get readymade datasets from other institutions as well as refine their own research activities. Librarians and data managers act as advisors for researchers. They help to identify the project data management needs and map these needs to existing tools for data curation either inside the source institution or in disciplinary repositories. Therefore, the library may be entrusted with the responsibility of running research data curation activity in a higher education institution.

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Digital Preservation of Indian cultural Heritage Data: Project Overview

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Abstract *Digital preservation involves the use of well-defined techniques to prevent the digital material from deteriorating further need to perhaps even improve it to the point where is can be better disseminated through modern techniques for maximum use of the digitized information. This paper presents an overview of successful development of SanskritiDigitalya, an Open Archive Information System for Digital Preservation of India Cultural Data by Human-Centred Design and Computer Group, C-DAC, India. The Paper discussed different varieties of cultural data i.e. rare-book; Manuscripts written on palm leave, Burch bark, cloth, paper etc.; slides/photographs; artifacts and archival audio visual material available in IGNCA. Also throne light on the challenges perceived by IGNCA in management of these digital data. This pilot project is a part of Indian National Digital Preservation Programme and after successful completion it would be implemented in all cultural institutions. It also describes the overall structure and workflow for digital preservation tools, techniques and standards.*

Keywords: Digital Preservation; Digital Preservation – Cultural Data; Digital Preservation-Tools and Techniques; Digital Preservation Strategies; Digital Cultural Data-IGNCA, India.

1   Introduction

The term cultural heritage refers to knowledge created by the people associated with Art, culture and allied areas. Cultural Heritage may be classified as Tangible cultural Heritage and Intangible Cultural Heritage; Tangible Cultural Heritage may be further divided as moveable, immoveable and natural heritage. Moveable Heritage includes books, manuscripts, artifacts, art objects, artwork etc. Immoveable heritage refers architecture, monuments, archeological sites and building of historical significance. Natural Heritage may include the record of the countryside, natural environment, flora and fauna, etc.

2   Cultural Heritage at IGNCA

Government of India has established Indira Gandhi National Centre for the arts (IGNCA) as the nodal agency for all matters relating to the setting up of a national data bank on arts, humanities and cultural heritage. This Centre encompasses a wide area of studies, such as creative and critical literature, written and oral; the visual arts, ranging from architecture, sculpture, paintings and graphics to general material culture; photography and film; the performing arts of music, dance and theatre in their broad connotation. The uniqueness of the IGNCA's   approach to the arts lies in the fact that it does not segregate the folk and classic, the oral and the aural, the written and the spoken and the old and the modern. Here the emphasis is on the connectivity and the continuity between the various fields that ultimately relate human-to human and human-to-nature.

Kala Nidhi (treasure of arts) Division of the IGNCA is a National Information System and a Data Bank of the arts, humanities, and cultural heritage with a fully supported reference library of multimedia collections. It has a large collection of primary and secondary

material in the broad areas of humanities and the arts. Material relating to different genres in the original and in the other forms of copies is collected, classified and catalogued in the cultural achieves of the Centre. The archives are enriched by personal collection, ethnographic collections, documentation and cultural exchange. These collections are conserved, documented and made available for the purposes of research and dissemination.

Some of the IGNCA collections and various issues concerning copyright, ownership rights and permission rights are discussed below:

2.1 Rare Books

Rare books are crowning jewels of any library and the illustrations in these add to its antiquity. IGNCA has a good collection of 2700 rare books, some of them are 250 years old. IGNCA is making all efforts to identify such books held in large number of institutions and individuals all over the country, to further develop this unique collection. All these books are out of copyright as per Copyright Act, 1957.

2.2 Cultural Archives Collection

The Cultural Archives focuses on the collection, classification and cataloguing of personal collections of scholars/ artists who have devoted a life time in collecting materials pertaining to their fields of interest or discipline. It consists of 37 personal collections of eminent scholars in the field of photography, music, paintings, audio visuals of some living legends, slides, masks, artifacts, sculpture, art objects, and textiles etc.

2.3 Manuscripts Collections

Recognizing the need to encompass and preserve this knowledge resource and to make these accessible to scholars and researchers, IGNCA in year 1989 has initiated the most important manuscript-microfilming programme. The IGNCA has approached many of the private and public institutions and individuals who are in possession of valuable manuscripts preferably in Sanskrit Language and has signed MOU with IGNCA for microfilming of their manuscripts. The IGNCA has, so far, microfilmed over 2.6 lakh manuscripts in 23,000 microfilm rolls. Out of these, 20000 rolls have been digitized and 14000 rolls duplicated. Some of the reprographic material of various primary and secondary texts has also been obtained from many foreign institutions including Bibliotheque Nationale (Paris), Cambridge University Library (Cambridge, UK), Staatsbibliothek(SBPK) (Berlin), INION (Russia), and Welcome Institute for the History of Medicine (London), and India Office Library & Records (London).

2.4 Slide Collection

IGNCA has a collection of 1.1 lakh slides on subject such as Indian arts, paintings, sculpture, architecture, illustrated manuscripts and the performing arts. Over the years it has acquired and generated carefully selected slides from 17 centres in India and 15 abroad. Notable among such acquisitions from museums abroad are the important slides collection from the Victoria & Albert Museum (UK) and the Chester Betty Collection through the

courtesy of INTACH (Charles Wallace bequest). In addition to this, the American Association of South Asian Art has also gifted a complete set of 8,000 slides. Besides slides, the Unit also has a collection of more than 2000 photo-negatives. All slides have been digitized.

3. C-DAC Project at IGNCA

A collaborative project of Indira Gandhi National Centre for the Arts(IGNCA) and Centre for Development of Advance Computing(C-DAC), Pune was started a pilot project in April 2012 for the Digital Preservation of Cultural Data of IGNCA. This project has been sponsored by Department of Electronic and Information Technology (DeitY), Ministry of Information Technology, Government of India, New Delhi.

3.1 Pilot digital repository of cultural digital data

As part of the Centre of Excellence for Digital Preservation Project, the digital preservation technology development team at C-DAC Pune is working with Indira Gandhi National Centre for the Arts (IGNCA), New Delhi in order to develop the pilot digital repository of cultural digital data. IGNCA collects and manages the cultural heritage of India in terms of ancient manuscripts in Microfilm/Microfiche form, rare-books, slides, masks, audio visual material of cultural significance. IGNCA have already digitized a significant portion of this material and maintained the digital copies in various kinds of digital storage media such as CDs, DVDs and hard disks. There are such thousands of CDs and DVDs which has turned into another library of its own kind. The digital preservation technology development team at C-DAC Pune is developing the Rupāntar and Sanskriti Digitālaya an open source software for preserving this cultural digital data. Long term preservation of such data in terms of images, audio /video clips and 3D models is main focus. It is extremely important as the cultural digital data is subjected to digital obsolescence, media failure and it could be easily destroyed or corrupted by computer crash or virus.

3.2 Related work

Therefore, in order to address the requirements of IGNCA with regard to controlled access, archival formats, online availability and digital preservation, C-DAC studied similar international initiatives. British Library[3] and National Library having over 280 terabytes of collection or over 11,500,000 million items are planning to preserve to make the content accessible for future users. Analysis done by NDIIPP[11] gives various policies/ strategies published by different institutes like Archives, Libraries and Museums. Digital Preservation of cultural tangible heritage in Indonesia 'eCultural Heritage[10] and Natural History (eCHNH) Framework'[7] facilitate multi-channel access. Context capturing in terms of metadata is very important while preserving the cultural digital objects[1]. As part of the project, the system is designed to support intranet based collaborative framework for enrichment of the metadata by curators, Indologists and scholars. It also supports OCR and metadata description using large variety of parameters provided by MARC21 in order to capture the context of the cultural digital object. There is also much discussion on

participatory model for heritage organizations wherein the expertise available in different organizations can be used[5]. C-DAC is exploring the collaborative framework over internet for incorporating the expertise available across India and abroad in virtual museums project[8]; however, in the present scope of digital preservation project it is yet to be included. A Digital Archives Framework for the Preservation of Artistic Works[2] provides coherent framework approach that is quiet similar to C-DAC work.

2.3   Challenges of cultural digital heritage as perceived by IGNCA

Over the years IGNCA has enriched its collections[4] with the help of various individuals and institutions from India and Abroad in terms of broad categories of rare books, personal collection, cultural archives collection, manuscripts collections in microfilm/microfiche form, slide collection, national audio visual. Most of the above collections available at IGNCA are already digitized or being digitized. The challenges faced[5] in managing and accessing these digital collections are as under -

- Open access verses restricted access is a debate going on at IGNCA since long. Still no decision has been taken about access to cultural heritage at IGNCA under open access environment.
- More than 80% of non-print material at IGNCA has been digitized. However, there is no centralized archiving system or online digital library in plan. Many of these materials are available in either CD/ DVDs or digital in form of TIFF and JPEG files. Millions of pages of digital material have been stored in form of different files.
- Lack of comprehensive Metadata for all digitized material is also a big hurdle in access to digitized material.
- IGNCA also not having any well-drafted digital preservation policy for long term preservation of digitized material.
- IGNCA is leader in digitization of cultural heritage, however it does not have all well placed IT infrastructure in place. Lack of trained IT manpower also affects the various digital Library initiatives.

The digital preservation R & D team at C-DAC, Pune has analyzed the challenges as under-

3.3.1 Handling CD/DVDs

C-DAC have observed that IGNCA or other similar cultural heritage organizations and museums are producing enormous amounts of digital data that they are primarily storing in CDs and DVDs. As we know, the average capacity of CD and DVD for storing data is approx. 700 MB and 4.7 GB respectively, which results in hundreds and thousands of CD/DVDs to store such data. Regular audit to ensure that the CDs or DVDs are in working condition, maintaining duplicate copies, refreshing, migrating, cataloging tasks are unmanageable due to shortage of human resource and lack of technical expertise. In this approach it is not possible to store the metadata of the digital objects and facilitate search & retrieval due to offline storage media. Therefore, in spite of the digitization efforts, accessibility of this data is questionable. The external storage media is also subjected to

physical decay or degradation, damages caused due to mishandling and variations in temperature and weather conditions.

3.3.2   Obsolete file formats

Proprietary, copyrighted, patented and closed source file formats and obsolete formats pose major threats for the cultural digital data e.g. it has lot of data stored in Kodak PCD format which is not supported by Kodak anymore. Large volume of cultural digital content in many organizations is like to be stored in such unsupported or obsolete formats which must be migrated quickly otherwise such data will be lost permanently.

3.3.3   Proprietary software solutions

It is observed that organizations have relied upon proprietary software solutions for maintaining the catalogues. Such software solutions often store the information in their own proprietary format and do not permit exporting or migrating the cataloging metadata into open format. It becomes a major handicap for the data owners as they have to always depend on the vendor. The data owners can lose entire data if the software license is not upgraded/ renewed or the software is discontinued in future. In such situation, C-DAC's digital preservation technology development team has rescued the data by migrating it into open source and standardized formats.

3.3.4   Lack of manpower and infrastructurep

Most of the cultural heritage institutions and museums do not have adequate computing infrastructure and the manpower with required technical skills to manage the activities like digital data, preservation, backup, etc. C-DAC is presently supporting the pilot digital repository at IGNCA within the scope of this project. However, long term support systems and human resource provisions are necessary for sustaining these efforts.
In order to address the digital preservation requirements at IGNCA, the team at C-DAC, Pune is developing the following digital archival solutions as under-

4. Digital Archival System

Therefore, the digital preservation technology development team at C-DAC Pune has initiated the development of e-Rupāntar and Sanskriti Digitālaya systems based on the study of workflow, metadata requirements, file formats, current digital storage practices available in the cultural heritage organizations. The functional prototypes of these systems are already deployed at Indira Gandhi National Centre for the Arts, New Delhi for testing, feedback and continuous development as part of the pilot project. The solution will be productized and given a generic form to make it suitable for all the cultural heritage organizations. e-Rupāntar and Sanskriti Digitālaya systems are developed using open source technologies and allow collaborative participation of the staff through local area network(LAN).
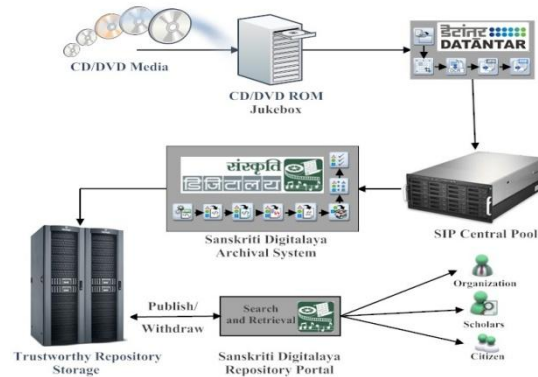
Figure 1. Architecture of Digital Preservation Process

4.1 e- Rupāntar System

The word "Rupāntar" is a fusion of two words of Hindi languages. 'Rupa' means picture, consisting of a graphic image of a person or thing and 'antar' means transformation. Therefore, 'Rupāntar means to convey transforming the data in order to make it preservable. e-Rupāntar software provides a set of best practices such as content organization, watermarking, OCR, naming conventions, tagging, structuring, production of low resolution copy for dissemination, etc for image, audio and video formats. It delivers the valid Submission Information Package (SIP) as per the requirements of Open Archival Information System(OAIS)[9].
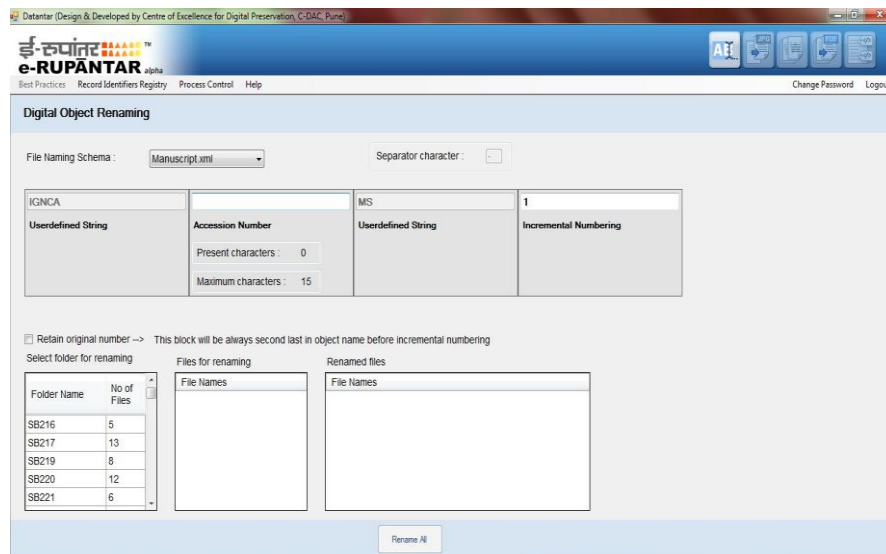
Figure 2. e-Rupanter System

4.2 Sanskriti Digitālaya System

Before processing digital data through Sanskriti Digitālaya Archival System, data is required to be organized in the form of Submission Information Package (SIP) using e-Rupāntar system. These SIPs are generated by producers and sent to the Archival system. Producers or participating institutions having cultural digital data deliver SIPs to the archival system.

Sanskriti Digitālaya Archival System fully complies with ISO standard on Open Archival Information System (OAIS) reference model. If any digital content is need to be preserved then it should follow the guidelines of OAIS model. Under the OAIS model, digital content is transmitted to the Archival system in a form called a Submission Information Package (SIP). The system's ingest process validate, accepts and analyze the SIP and archives its contents according to a specific preservation plan for long-term preservation. Our system produces the Archival Information Package (AIP) and manages to ensure its integrity, security and future accessibility. When a user requests for a particular digital object or a group of objects from the Sanskriti Digitālaya Repository Portal, then Dissemination Information Package (DIP) is configured comprising the object and relevant metadata, as per the assigned rights and privileges of the user. Sanskriti Digitālaya system is aimed at supporting all the file formats used in the cultural heritage domain such as images, audio, video, slides and manuscripts and metadata schemas like MARC21, MODS, Dublin Core, METS, etc.
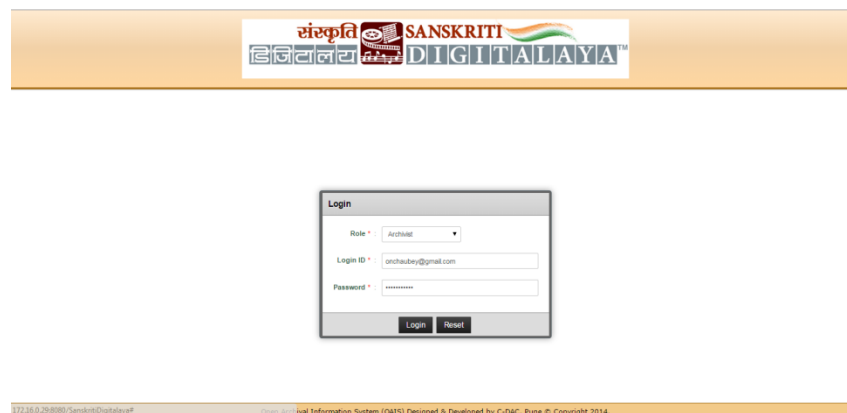
Figure 3.1 Sanskriti Digitālaya Archival System
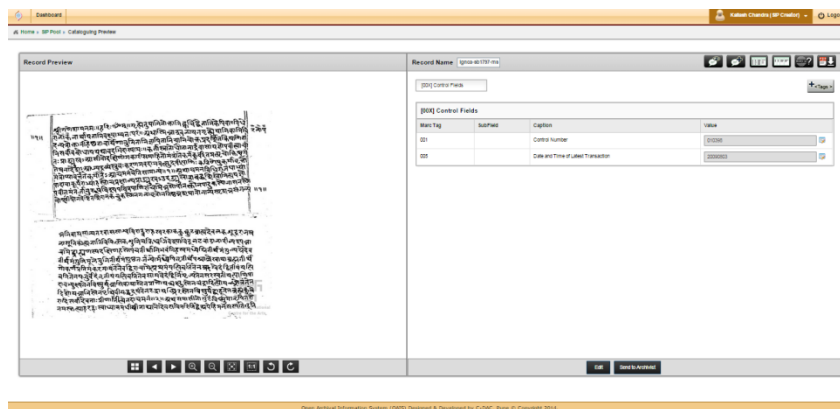
Figure 3.2 Sanskriti Digitālaya Archival System

When SIPs are coming to the Archival system for processing, they are to be validated first because some SIPs will have insufficient representation information or preservation description information to meet stringent AIP requirements. Validation is a process that ensures that the files which are being accepted into the Archival system comply with the standards. After successful validation of SIP metadata enrichment stage comes, so that SIP Creator can enrich descriptive metadata of SIP for better access. Collaborative framework is adopted in the system so that Archivist can check and approve the SIP sent by SIP Creator and after approval, SIP Creator can ingest that SIP. The ingest process of SIP includes various steps such as XML parsing, technical metadata extraction, fixity calculation, XML generation, indexing, packaging, etc. The system also allows defining preservation policies based on various technical parameters, administering the user accounts and accessing control for the material published on the repository portal.

4.3   Access through Repository Portal

Sanskriti Digitālaya Repository Portal is for accessing records present in repository through internet. In this system user can search records through basic search and advanced search. Fuzzy logic is used for searching, so that it find matches even when users misspell words or enter in only partial words for the search. If user wants to perform specific searching within required fields then Advanced Search and Command Search features can be used. In these all sorts of combinations of fields through logical operators like AND, OR & NOT can be made and appropriate results can be fetched. Search results can be filtered with fields like author, publisher etc. and appropriate result list will be displayed. User can select any record from result list and view its content with metadata. The repository portal facilitates the DIP with proper access controls.

Figure 4.1 Sanskriti Digitālaya™ Repository Portal (Result Preview)
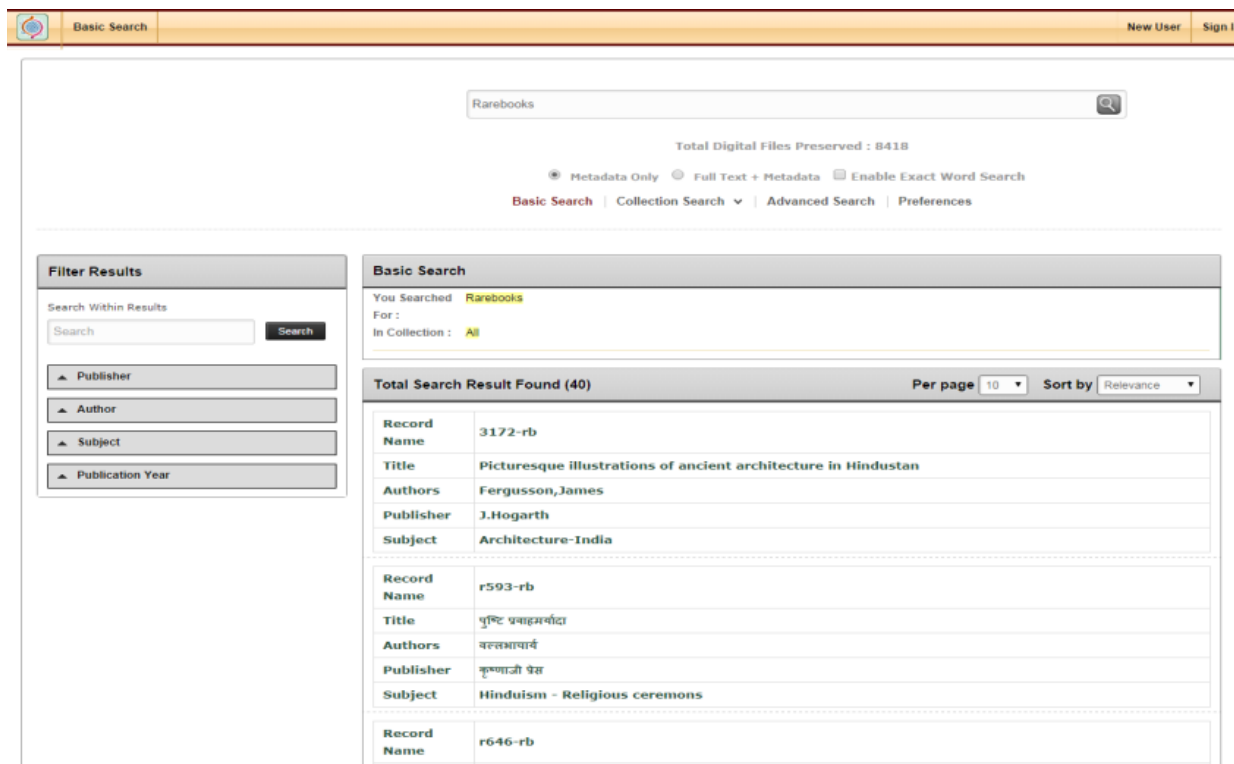
Figure 4.2 Sanskriti Digitālaya™ Repository Portal (Result Preview)

Figure 4.3 Sanskriti Digitālaya™ Repository Portal (Result Preview)

Figure 4.4 Sanskriti Digitālaya™ Repository Portal (Result Preview)

5. Opinion and Result

The emergence of electronic technology in general, and digital library technology in particular, has opened up exciting new possibilities for digital preservation of heritage material. Digital media have several advantages, which make them particularly suitable for heritage preservation. They are durable and reproducible, and provide unprecedented flexibility while accessing the preserved content. However, there are several issues that need to be addressed and continuous R&D is necessitated to resolve existing issues of

concern, refine & fine tune the systems and evolve new techniques and tools that could be teamed as the best practices.

In India, Ministry of Information and Communication Technology is supporting digitization of Indian cultural heritage. National Digital Preservation programme (NDPP) is a good beginning to have a National Digital Preservation Policy for India. Like other countries, India will also be needing legislation for legal deposit of digital material. In such a Scenario proposed National Mission on Libraries under consideration of Ministry of Culture, Government of India seems to be the best choice to work on a comprehensive legislation in relation to safeguarding, access and preservation of Indian cultural heritage resources.

Design and development of Digital Preservation System for Indian cultural heritage is a massive effort involving active participation and collaboration of various cultural institutions of India. This paper tries to establish a benchmark in the domain of national digital preservation infrastructure and will also guide and give directions to all the future initiatives in digital preservation landscapes. Draft National Rules and policy in this regard requires to be finalized on high priority. Indian National digital preservation policy and digital preservation rules under the 2000/2008 Act should be revised and finalized.

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Print Books Vs Digital Book: Challenge for Change Management in Libraries.

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1. Introduction

In this digital age, the library resources are being reformed based on the readers needs and they demand for digital version of print books. The library professionals understand the aspiration of digital savvy reader and are well acquainted with digital books and understand the value of both digital as well as print books. This paper will try to understand more aspects of change management from print to digital books which needs to be focused and considered before proposing any decision in the interest of the reader and organisation.

A comprehensive and systematic assessment needs to be conducted to get a fair picture of what a library professional must know and develop a system to analysis the facts related to digital books and print books.

2. Objectives:

The objectives of the study are to support to achieve the organisational objectives, what information resources are available within the organisation, and which resources are actually being used for various courses, groups and specializations. The study findings will be useful to understand where there is a match between information needs and available resources, where there are redundancies, and where information gaps—unmet information needs, exist. This will also help to provide the basis for evaluating strengths and weaknesses in how the organisation currently acquires, handles, stores, uses, reuses, and disseminates information.

The prime objective of this study is based on prescribed textbooks in respect...

To select, maintain and develop systems that are fit for purpose and represent best value;

To identify opportunities to exploit our current investment and to upgrade consolidate systems;
To analysis the study results for transformational change to apply the proposed concept.

3. The Application of ICT and Change Management

The big transformation

Computer to Mobiles

Books to e-books

"Sage on stage to Mentor on side"

4. Challenges for Change Management
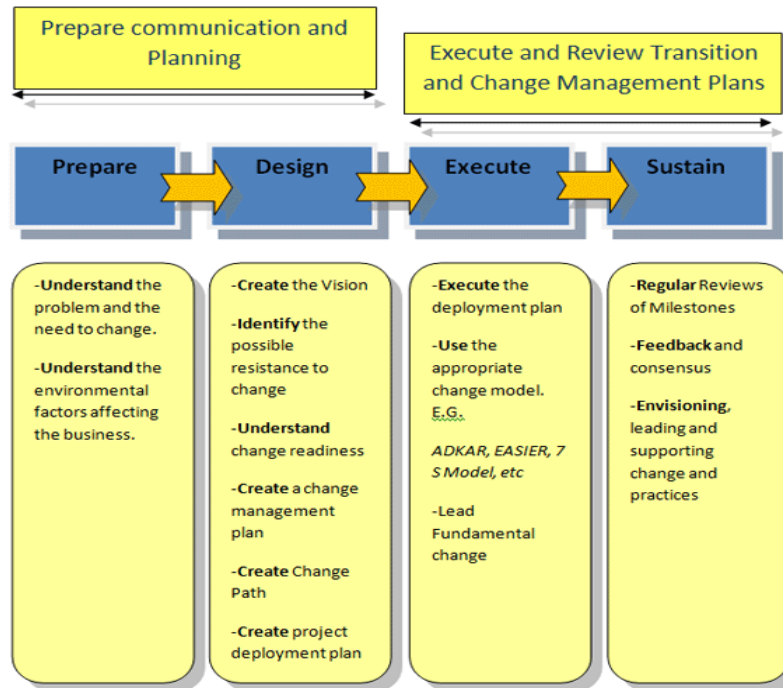
Deploying digital textbooks and challenges

- Students expect a "great experience"
- Difficult to do this consistently because:
  - Mobile technologies are nascent & evolving'
  - Multiple content formats exist across publishers
  - User expectations itself are quite high

Challenges: Sources textbooks

- Multiple publishers need to be approached
- Publishers have content encryption & DRM concerns – these need to be addressed
- Different standards need to be addressed (ePUB3 vs PDF)

Challenges: Teacher delivering experiences

Teachers themselves create a lot of content and would like to deliver this to the students – PPTs, notes, videos etc.
- This experience needs to be integrated to text-books
- Integration to LMS

The student gets a complete solution with the software platform.

Hardware	Software Platform	Content Bundle
Andoid tablet	• Suite of applications that convert a generic Android Tablet to a Learning Device suitable for the classroom • Developed over 2 years by the team at Edutor • Deployed in multiple ways to deliver the solution most appropriate to the institution	Digital Content •Multiple formats (ePub, PDF. multimedia etc) •Multiple publishers (Multimedia, Text-book publishers, Test-prep players)

Analysis of financial figures, software and hardware.

Component	Details	LIST PRICE	Pricing to your institute*
PART A IGNITOR Tablet Learning Platform	Mobile Learning Environment application loaded onto the Device, with ongoing support & upgrades	Rs 450/- per device (ONE-TIME)	Rs 1200 per device (ONE-TIME)
	Content & Application Security Solution – loaded onto the device	Rs 500/ per device (ONE-TIME)	
	Mobile Device Manager – loaded onto the device	Rs 460/ per device (ONE-TIME)	
	Content & Application Security Solution – PowerChip component loaded onto each MicroSD card	Rs 50 per SD card	FREE
	Cloud Solution: Course Delivery Engine – Content & Test Uploads, Downloads, Upgrades, Scores, Reports, Forums etc	Rs 100/- per user per month	Rs 600 per user per year

Component	Details	LIST PRICE	Indicative Pricing to your institute*
PART B Digital Courseware	Digital versions of Text-books (Refer Annexure 2)	List price – as per MRP	Rs 5900 for 1st year (including SD card)

Component	Details	LIST PRICE per Unit	Pricing to your institute – per Unit
PART C: Hardware	Intel Education Series Tablet (10 inch WiFi only) - Annexure 1	Rs 14500/-	Rs 13950/-

The costing comparison of major textbooks.

Semester	Course	Subject	Book	Author	Publisher	Print List Price	Digital Price	Discount	Quote Price
1	MB13101	Thinking and Communication skills	Soft Skills for Everyone	Butterfield	Cengage	425	383	30%	268
1	MB13102	Accounting for Decision Making	Accounting for Managers	M Y Khank & P K Jain	TMH	595	595	20%	476
1	MB13103	Philosophy for management	New Era of Management	Rrichard L Daft	Cengage	550	495	30%	347
1	MB13104	Economics for managers	Principles of Economics - 8th Edition	Karl E. Case, Ray C. Fair	Pearson	Only e Edition available	850	25%	638
1	MB13105	Managerial Statistics	Statistics for Managers using Microsoft Excel	Levine, Stephan, Krehbiel, Berensoc	PHI	750	750	25%	563
1	MB13106	Managerial Skills (Practical)	Personality Development	Wallace and Masters	Cengage	450	405	30%	284
2	MB13201	Financial Management	Financial Management	Prasanna Chander	TMH	695	695	20%	556
2	MB13202	Management Information System	Management Information System	Kenneth C. Lauden & Jane P. Lauden	Pearson	775	775	25%	581
2	MB13203	Marketing	A framework for marketing management 5e	Philip Kotler, Kevin Lane Keller	Pearson	590	590	25%	443
2	MB13203	Marketing	MKTG - A South Asian perspective	Charles W. Lamb, Joseph F. Hair, Sharma	Cengage	675	610	30%	427
2	MB13204	Human Resource Management	Principles of Human Resource Management	Bohlander and Snell	Cengage	595	535	30%	375
2	MB13205	Production and Operation Management	Production and Operation Management	Shailendra Kale	TMH	420	420	20%	336
2	MB13206	Legal Aspects of Business	Legal Aspects of Business	Ravinder Kumar	Cengage	495	450	30%	315

The advantages of Print and Digital Books

Sr.	Print Book	Digital Book
1	It is a traditional way of learning & teaching	Trend of e-books : Text-books are increasingly being digitised
2	Once it is purchased, it become the property of buyer	Rich learning material – videos, animations etc
3	It can be read any time without any application, equipment & internet	Personal learning device – can learn anytime, anywhere
4	No licenses is required	Intuitive & easy to use
5	No fear of IPR violation	Engage multiple senses & help students interact with concepts: see, hear & touch
6		Empowers the teacher who has a window into each student
6		Enables differentiated instruction & learning
7		Teacher gains rich insights to student learning
8		Increases productivity and eases administrative load
9		Compatible with desktop, laptop, tablet & mobile technologies
10		Sharing in multiple content formats, i.e. , word, pdf, xls, images, voice, video, etc.

The disadvantages of Print and Digital Books

Sr.	Print Book	Digital Book
1	Carrying of books is not a easy task	Teachers / Students experience needs to be integrated to text-books
2	One book can be read by one user at a time	Publishers have content encryption & DRM concerns – these need to be addressed
3	It can not have multiple options, i.e., copy, print, email, etc.	Different standards need to be addressed (ePUB3 vs PDF)
4	No added value features, i.e., comments, sharing, discussions with teaching learning platform, etc.	Different sets of students requiring different book bundles
5	It can be brunt, spoiled by water, stolen , defaced, damaged , etc & there is no way of recovery	Managing various licenses. No accessibility after expiry of license. Multiple publishers need to be approached
6		Simultaneous access of internet to access content can cause crashes
6		Integration to LMS
7		Always need equipment, application or / and Internet connectivity and renewals
8		Cost of e-books, application, equipment & internet is very high.
9		Uncertainty and Technology failure

The overall costing of print and digital textbooks

Cost per student in Rupees	Print Book	Digital Book
Book Cost (in package for first year)	4636.00	5606.00
SD Card (one year cost)	-	50.00
Equipment cost (one time cost)	-	13950.00
Application Cost (one time cost)	-	1200.00
Cloud Solution (one year cost)	-	600.00
	4636.00	21406.00

There are following check points and marking system at the institutional level has been applied.

Sr.	Check points	Opinion	Marking
1	Is this objective or change is in the line of organisational vision?	Yes	95
2	Is there any clear and compelling reason for adopting this change?	No	-80
3	Does the institute feel the urgency to this change?	No	-90
4	Is this change a futuristic approach?	Yes	60
5	Do your organisation / library is competent to undertake this change?	Yes	80
6	Are all implementation plans in place to achieve the objectives?	Yes	50
7	Are remunerations, rewards and punishments aligned with this change?	Yes	-60
8	Do any risk factors carry this change?	Yes	-90
9	Does the library prestige on stake due to this change?	Yes	-70
10	Are the stakeholders, i.e., users and institute ready to adopt this change?	Yes	60
11	Are the decision makers practically agreed with this change?	No	-60
12	Is this change financial viable?	No	-90
	Total Score for Final Decision to this change	No	-195

Requirement Identified → Change Management Designed → Facts Analyzed

5. Conclusion

Therefore the 4636 < 21406, the cost of Print book is less then Digital book and decision taken based on the above study that the proposed initiative is not feasible. Overall costing factors and other facts studied during this paper have indicated that the proposal of shifting digital books from print books is not acceptable as on date. There are many factors needs to be considered, i.e., reducing the cost of digital books, reducing the cost of instrument and delivery of content. The major point considered that the authors of the books needs to come forward and deliver their content directly to the reader and such mechanism to be develop which may assure the win – win position for both students and authors. The role of the facilitators, i.e., libraries and organisations also needs to be addressed which play a pivotal role in dissemination of services.

About Author

Dr. Bhardwaj has more than twenty five year's professional experiences, out of which nine years rich experience with Delhi Technological University, more than two years as Librarian with TERI. He has been the Keynote Speaker in HUC (Himalayan University Consortium) Librarian's Seminar organized by ICIMOD, 2010. He possesses degrees, i.e., MA, MBA, MLISc, MPhil, NET. He has more than fifteen publications in his account.

Theme VI: Capacity Building

Capacity Building of Library Professionals

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Abstract: The paper deals with the capacity building, that is, development of professional competencies in organizations including the libraries and information centres.The various aspects of enhancing the professional competencies have been dealt with. The process of continuous staff development has also been highlighted. The concepts of 'time management' and 'stress management' have been discussed. How time can be managed and the various jobs can be completed within the stipulated time has been dealt with in detail. The antecedents of stress and the ways of stress management have been emphasized.

Keywords: Capacity building, Professional competencies, Staff development, Time management, Stress management

1. Introduction

The purview of this paper encompasses one of the most vital areas of management of an organization, which is, human resource management or HRM. The two most important factors of an organization are human and non-human factors. The optimum utilization of the non-human factors, such as the physical resources of an organization very much depends on how the human resources or the personnel of an organization are managed. In cases of libraries or the information centres also, the same concept holds good. The optimum utilization of the information resources depends to a large extent on how efficient are the library personnel in satisfying the user needs.

2. Professional Competencies of the Personnel

With the question of professional competencies is very much related the importance of human resource management or HRM. The competent personnel can help an organization achieve its goal quickly, effectively and efficiently. The organization requires to provide a healthy working environment so that the personnel can contribute their best to the organization. The successs of an organization largely depends on the knowledge, skills and ability (KSAs) of employees which help to set core competencies, that is, the activities an organization performs well when compared to its competitors and through which the organization adds value to its products and services over a long period of time Effective human resource management helps to develop the potential of the employees to rise. F. W. Taylor advocated scientific management for increasing the efficiency and speed of employees. The concept of scientific management indicates the breaking down of a particular job into smallest units and assigning each task to the employee who is perfectly matched to it. In other words, it is the process of job analysis. This helps to increase the competency of an individual worker in performing a particular task. On the other hand, the 'Competency Approach to Job Analysis' enables the workers to develop role-based competencies, that is, the knowledge, skills and abilities required to play various roles instead of being boxed into a particular job. The

professional competency can also be enhanced by the application of behavioural science techniques. It was proved by Hawthorne experiments conducted by Elton Mayo in 1930s and 1940s that the employee productivity was affected by certain social and psychological factors besides the manner in which a certain job is designed and how an employee is economically rewarded. The previous experience in the same capacity in any other organization also adds to the enhancement of professional competency. The professional attitude is another factor for gaining professional competency. One should have a clear understanding of one's own job responsibilities and duties. The TQM, that is, the total quality management approach can also contribute to the enhancement of professional competency. The ideas of TQM to be customer-oriented and to work for the continuous improvement of quality of service or product compels an employee to take initiative to enhance his professional capacity since it is directly related with serving the customer efficiently and with improving the quality of product or service.

Now, a library or information centre is a non-profit making organization which differs in many aspects from a profit-making organization. But, the question of professional competency of employees is of utmost importance. The libraries and information centres consists of several sections, such as, acquisition, technical, circulation, periodicals, reference, etc. Thus, the concept of job analysis is applied in the libraries and the entire library-work process is divided into these sections. As a result, the employees of each section becomes competent in the work of their respective sections. But many libraries, in the present era have taken up the process of automation. Although, majority of the libraries in our country, are still lagging behind in this respect. In this automated environment, a library personnel may have to perform the multifarious tasks, such as, acquisition, circulation, online information retrieval and the like. So, the competency approach to job analysis has become very relevant in these days of library automation. The TQM approach is also applicable in the libraries for enhancing professional competencies. The idea of being user-oriented and to work for the continuous improvement of the quality of service urges an employee to make effort continuously to satisfy the information needs of the users more effectively and efficiently. This, continuous endeavour, in turn, contributes towards the competency of the employee. In a library, there should be close interaction between the superior and the subordinate staff members regarding the various problems and working environment. In this way, the solution of various job-related problems of the library would become possible which will help in augmenting the competency of the professionals. Thus, it is evident that the application of behavioural science techniques is also possible in a library in developing the professional competency.

3. Continuous Staff Development Programme

The staff development programmme of an organization is closely related with the professional competencies. It is necessary to prepare the employees for higher-level jobs or promotion. The employees require refresher training to keep themselves abreast of the latest developments in their fields of work. This is essential in the face of rapid technological changed. Development programme helps one to improve his or her performance level and achieve career goals easily. The employees become versatile and can be employed in varied tasks on the basis of organizational needs. The development programme helps the employees to gain acceptance from peers due to the enhancement of their efficiency. The development programme imparts knowledge which enables

the employees to gain proficiency in decision-making and problem-solving. The development programme which is an ongoing process aims at improving the total personality of the employees. Development is aimed at the future needs of the job and the individual. It is future oriented training and emphasizing the personal growth of the employee. The executive development programme falls within the purview of the continuous staff development meant for managers. This process helps to develop their conceptual and analytical powers to manage.

In case of the libraries also, there are various means of staff development programme. Various training and orientation programmes, refresher courses, seminars, conferences and the like are organized by various institutes, organizations and professional bodies in the field of library and information science with the aim of professionally upgrading the library professionals. It is necessary for the professionals to participate in these programmes for their promotion and other upgradations.

4. Time Management

Now, the world is changing very fast. To keep pace with this fast changing world, time management is gaining importance day by day. One of the best ways of time management is to resort to team work. When a group of people work together with the target of achieving an organizational goal, the goal is reached much more quickly. Whereas, when the employees keep on working individually towards achieving the goal, each one performing a specialized task, time consumption increases. Some of the helpful guidelines for time management may be as follows:

- At the beginning of a working day, a list of 'to-do' for that day is to be prepared to keep track of the work progress.

- The minor works should be delegated to the subordinates.

- The most difficult assignment should be scheduled for the time period when one does a work best-morning or afternoon.

- The telephone calls should be made between 4:30 and 5:00 p. m. since during this time period, people tend to keep their conversations brief since they are in the hurry of going home.

- One should not feel guilty about those things that have not been accomplished. They should be kept at the top of 'to-do' list for the next day.

In the libraries, the information needs of the users are increasing day by day in this information age as well as they are getting more complex. These information needs are to be met expeditiously. So, the concept of team work is very much demanding nowadays to manage the time of satisfying the information needs of the users effectively and efficiently. Again, since the libraries have entered the age of automation, the technical works and the information retrieval tasks have expedited decreasing the time consumption. Thus, taking resort to automation is an effective way of time management in the libraries and information centres.

5. Stress Management

The concept of 'stress' is directly related to time management. One of the major causes of stress comes from time pressures. Even though the individuals in an organization perform their tasks as fast as possible, they are not able to complete their work. This situation ultimately results in stress.

Ivancevich and Matteson define stress as "an adaptive response, mediated by individual differences and/or psychological process, that is a consequence of any external (environmental) action, situation, or event that places excessive psychological and/or physical demands an a person". Again Beehr and Newman define job stress as "a condition arising from the interaction of people and their jobs and characterized by changes within people that force them to deviate from their normal functioning".

There can be two broad categories of stressors -   organizational stressors and life stressors. Organizational stressors are the factors that cause stress in an organization. The sets of organizational stressors are:

- task demands
- physical demands
- role demands

- **Task demands**: are stressors related to a specific job a person performs. Some jobs are more stressful than the others. ii) Besides, specific task-related pressures, some other aspects of a job may pose physical threats to a person's health. Unhealthy conditions exist in jobs like coal mining and toxic waste handling. iii) Security is another task demand that can cause stress. If one always has the fear of losing jobs, it may cause tremendous stress. iv) A final task demand stressor is overload. The overload may be quantitative, that is, one can think that he or she has too many task to perform or too little time to perform the tasks. Again, it can be qualitative, that is, a person may think that he or she lacks the ability to perform a certain job. The following figure shows that very low task demand can result in boredom and apathy just as high level of stress can cause tension and anxiety. The optimal or moderate level of workload – related stress leads to high energy and motivation.

- **Physical demands** of a job are the physical requirements on the worker. If one works outdoor in extreme temperatures or in an improperly heated or cooled office, it can lead to stress. The other factors which may lead to stress are poorly designed office, inadequate lighting, etc. The poorly designed office may affect privacy or social interaction. Too much social interaction may distract a people from his or her work. Again too little interaction may cause boredom or loneliness, causing stress.

- **Role demands**: can also be the cause of stress in an organization. A role is a set of expected behaviours related to a particular position in an organization. Different people perceive role expectations with varying accuracy. While executing the roles, errors can creep in, thereby resulting in stress inducing problems.

Many strategies are there for managing stress in an organization. Some are for individuals and the others are organizational. The individual stress coping strategies are as follows:

- Exercise: The people who exercise regularly tend to become less stressful, have more self-confidence and are optimistic.

- Relaxation: It is another effective way of managing stress. One can relax by taking regular vacations. After vacations one's efficiency tends to become more.

- Time Management: Time management can help in reducing stress since one would be able to complete one's work effectively within the stipulated period of time.

- Role Management: In this strategy, one should avoid overload, ambiguity and conflict. For example if one does not know what his or her role is, he or she should not sit quietly but ask for clarification from his or her boss.

- Support Groups: It is a very helpful strategy for managing stress. It is a group of family member or friends with whom a person can share problems during his or her crisis and relieve stress.

The organizations are also coming forward in relieving the stress of their employees since they are at least partly responsible for creating the stress.The two strategies of the organizations are:

- Institutional Programmmes: In this strategy, initiatives are taken through organized mechanisms, such as, properly designed jobs and work schedules for the purpose of reducing stress.

- Collateral Programmes: These programmes are specifically designed to help employees deal with stress.Organizations have adopted health promotion programmes and other kinds of programmes. For example, many organizations today have employee fitness programmes which encourage the employees to exercise which is effective in reducing stress.

In the libraries also, the concept of stress management is becoming relevant. Day by day many libraries are opting for automation and as a consequence the employees, especially, the employees who are on the verge of retirement, may feel overburdened in their attempt to cope up with the automated environment. This situation can give rise to a stressful working environment for them. The library authorities should design the jobs in such a way so that the employees can feel comfortable in the new working environment. The authority can also arrange some sort of counseling programme for the employees so that they can be psychologically motivated for their new type of job. These steps would ultimately help in reducing stress.

6. Conclusion

The capacity building of the employees of an organization, be it profit-making or non-profit making, has gained utmost importance nowadays. Various means of staff development programmes are prevalent for continuous enhancement of professional competencies. With this concept of 'capacity building', the notions of time and stress management have become embedded. In a nutshell, the

time and the stress, both are to be handled effectively in order to retain the professional competencies of the employees in an organization.

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Growth and Development of Teachers Education Colleges in India, With Special Reference Karnataka: *A Study*

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Abstract: This paper presents the brief summary of several stages in growth and development of teacher education in India in general Karnataka State in particular. Various commissions and committees appointed by the pre- and post independence periods in India. These commissions starting from the Sadler's Calcutta University Commission appointed in 1917 up to the National Policy on Education-1986 have stated about the teacher education as well. They also covered library and laboratory facilities and in particular emphasised on the role of the Libraries in higher education. The chapter also made a brief mention on the Department of Secondary Education Research and Training (DSERT) in Karnataka and also highlights the importance given to teacher education.

Key words: teachers education system, national policy on education

1. Introduction

The teacher education system formally began in India during British rule. In order to train the primary teachers, British rulers established many training centres in the country known as Normal Schools. In 1802, the Danish Mission established a formal training centre at Serampur (West Bengal). It is known to be the first step in formal training of teachers in India. After this, some teacher training institutes were established at Madras, Bombay, Calcutta, Pune and Surat. With the increase in number of primary schools, to meet the demand for teachers, normal schools were established for training of teachers at Agra (1852), Meerut (1856), and Varanasi (1857). Woods Despatch of 1854 recommended establishing teacher-training institutions and adopting teacher training system of England, to suit the Indian conditions. This led to the creation of teacher training schools in all presidencies of the nation. To improve the quality of teaching, the Stanley's Despatch of 1859 provided considerable

2. Development of Teacher Education Before Independence

After the development of training facilities for primary teachers, need was felt to prepare secondary teachers. To achieve these objectives, classes were added to Govt. Normal School, Madras and Central Training School, Lahore (Now in Pakistan). In the beginning, classes were added to the existing normal schools, but later on separate colleges were also created to train secondary teachers. To prepare secondary teachers, first training college was set up at Saidapet in Madras in 1886, followed by the opening of a secondary department in Nagpur Training School in 1889. In 1904, Lord Curzon emphasized on the need to educate teachers in the art of teaching. The Government of India's Resolution on Education Policy provided that a teacher shall not be allowed to teach unless he has a certificate that he has qualified for it. As a result of this, the number of teacher training

colleges was increased in the institutions, having no concern with universities. The University Education Commission Report (1950) states that "A Secondary Training College in Bombay was founded in 1906 and prepared secondary teachers for its own diploma, known as Secondary Training College Diploma (S.T.C.D.), until it was affiliated to the University in 1922 for Teaching courses leading to the B.T. degree." Based on the recommendations of Hartog Committee of 1929, education system was revised and a new degree of B.Ed. was started by Andhra University in 1932. In 1936, Bombay University was the first to start master's degree in education.

3. Post-independence Scenario

Arora and Panda give a narrative account of Teacher Education in Post-independent India (Arora & Panda). After independence, Government of India appointed two important commissions – the University Education Commission in 1948 and the Secondary Education Commission in 1952. The two commissions were headed by eminent educationists, Dr. S. Radhakrishan and Dr. A. Lakshmanswami Mudaliar.

The University Education Commission pointed out lacunas and different aspects of teacher education. It suggested to increase the number of professional colleges in the country and also recommended to make B.Ed. course adaptable to local conditions. The Secondary Education Commission on the other hand suggested improvements in secondary education. In order to design new syllabus for secondary teacher training, Pires Committee was appointed in 1956. Both of the aforesaid commissions and committees made many recommendations to raise the standard of teacher training. The Kothari Education Commission (1966) considered teacher education as the most crucial sector for development of our nation. It emphasized that, "A sound programme of professional education of teachers is essential for the qualitative improvement of education." The commission recommended having agencies, both at centre and state levels in order to maintain high standards in teacher education. While suggesting for other facilities in good libraries and one of the important facilities supporting teaching, learning and practice.

4. Establishment of National Council of Educational Research and Training (NCERT)

The National Council of Educational Research and Training (NCERT) New Delhi was established in 1961 to do research and create support facilities like production of textbooks school education. It is also intended to assist and advise the central and state governments on academic matters related to school education. Among its many objectives it also emphasised on Production of teaching-learning experience and Improvement in teacher education. The NCERT is conducting All India survey in which it also looks into the need for teacher education and library facilities and also appointment of Librarians. The work of NCERT was more on academic and research matters in school education and therefore there was need for a special body to look after the Teacher education and this was accomplished with the establishment of National Council on Teacher Education in 1973.

5. Establishment of National Council for Teacher Education (NCTE)

The National Council for Teacher Education (NCTE) came into existence in 1973 as an advisory body to the Centre and State Governments on all matters concerning teacher education. The National Education Policy 1986 provided to give NCTE a statutory status. In pursuance to the recommendation of National Policy on Education, 1986, The National Council for Teacher Education Act, came into effect in 1993, and the NCTE became a statutory body on 17 August 1995. It lays down the Norms and Standards for teacher training institutions in order to ensure quality education. Each college of education in India is required to get recognition from NCTE to run teacher education programmes.

5.1. Objectives of NCTE

The main objective of the NCTE is to achieve planned and coordinated development of the teacher education system throughout the country, the regulation and proper maintenance of Norms and Standards in the teacher education system and for matters connected therewith. The mandate given to the NCTE is very broad and covers the whole gamut of teacher education programmes including research and training of persons for equipping them to teach at pre primary, primary, secondary and senior secondary stages in schools, and non-formal education, part-time education, adult education and distance (correspondence) education courses.

5.2. Organisational Structure of NCTE

NCTE has its headquarter at New Delhi and four Regional Committees at Bangalore, Bhopal, Bhubaneshwar and Jaipur to look after its statutory responsibilities. In order to enable the NCTE to perform the assigned functions including planned and co-ordinated development and initiating innovations in teacher education, the NCTE in Delhi as well as its four Reginal Committees have administrative and academic wings to deal respectively with finance, establishment and legal matters and with research, policy planning, monitoring, curriculum, innovations, co-ordination, library and documentation, in-service programmes. The NCTE Headquarters is headed by the Chairperson, while each Regional Committee is headed by a Regional Director.

6. Education and Teachers Education in Karnataka:

As it is well known the state of Karnataka before reorganisation in 1956 was in part attached to; Bombay, Madras and Hyderabad provincial rules. The Mysore and some neighbouring districts like Bangalore were the part of the Princely state. The beginning of school education is profiled for these areas under different provincial rules. The beginning of modern education in Karnataka could be traced to the establishment of Free English School at Mysore in 1833. The two Marathi Vernacular schools were started at Dharwad and Hubli in 1826 in the Bombay region. The schools in Mangalore, Udupi and Bellary started in 1838, and the Darul Uloom at Gulbarga in 1853 by Sir Salaarjung; the two Anglo-Vernacular Schools at Madikeri and Virajpet and a Kannada School at Ponnampet by the Government in 1834. Christian Missionaries played a major role in starting schools and

imparting English education during the 19th century. After Independence and after state reorganisation the status of education in the state like in other parts of the country also changed significantly. Let us now begin with the Teacher education in Karnataka.

6.1.   Teachers Education in Karnataka

Teacher Education has a long history in Karnataka. The first training college was started in Dharwad in the year 1857, in order to train school teachers. In the erstwhile State of Mysore, steps were initiated as early as 1860 for the training of teachers with the establishment of a training school at Mysore. A normal school was also started at Darwad in 1867 which later became a post-matric training college. With the introduction of Hobli School System in the erstwhile Mysore State, these institutions were at that time shifted from place to place after completion of training of teachers of that place. These institutions were later converted into Vernacular Normal schools. Two Normal Schools were opened in 1897 at Kolar and Tumkur, followed by three more at Bangalore, Hassan and Chitradurga. The Wesleyan Mission started a private school at Tumkur. Teacher's training classes were started for women at Maharani's College, Mysore in 1888. The Zanana Normal School for Urdu Teachers was begun at Mysore in 1916. The first course for training Middle School men teachers was started in Mysore in 1913 and a similar one for women was started in 1928 at Maharani's Women Training College. By 1931-32 there were eleven training institutions in the state of which nine were government ones, one aided and the other unaided. Of these 8 were for men and three for women. These institutions imparted four kinds of training courses;

- Upper Graduate training course ii) Upper Secondary Training course iii) Lower Secondary Training Course (all three of one year duration) and the revised iv) Vernacular Training Course of two years duration.

- The last three courses were revised in 1933 and a single course of Vernacular training extending over a period of three years was begun. It was reduced to two years duration in 1950 and was re-named as Teachers Certificate Lower Course (T.C.L.). The Nomenclature of Under-graduate training course was changed to Teacher's Certificate Higher course (T.C.H.) of one year duration.

Both TCL for teachers with Class 8 qualification and TCH for teachers with SSLC qualification with one year duration - courses were existing prior to the reorganization of states in 1956. The duration of TCH course was increased to 2 years and curriculum was revised in 1966. P U C (XII class) qualification was made a pre requisite qualification for the entrance for TCH course in the year 1987 - 1988. Before 1914, there was no provision in the state for the training of graduate teachers. They had to go to the teacher's College at Saidapet, Madras for L.T. course. A training course for graduate teachers was started in the Normal School, Mysore in 1914. The Mysore University which was started in 1916 introduced the B.T. degree in 1925. In 1947, a Teacher's college with practicing schools was started by the Government in Mysore. The faculty of education was begun in the University of Mysore in 1952 and in 1956 M.Ed. course was also introduced. By the time of re-organisation of the state (1956) there were seven colleges of education in the state, one each at Mangalore and Mysore.

6.2. Growth of Teacher Training Institutions in Karnataka

The Year wise growth of these teacher training institutions is reproduced here:

Year	1890 1952	1911 1961	1912 1962	1921 1971	1922 1972	1931 1981	1932 1982	1941 1991	1942 1992	1951 2000
Nos.	03	04	06	06	17	39	58	77	134	134

The Government lifted the ban on establishment of new training institutions in 2003 - 04. This led to the establishment of a large number of new institutions in the subsequent years. The importance for secondary education and the relatively to the teacher education was achieved with the establishment of a separate Department of State Educational Research and Training (DSERT) on the lines of NCERT at the Centre. The profile of DSERT with some indications on its objectives of teacher education is presented below.

7. Department of State Educational Research and Training (DSERT)

The Department of State Educational Research and Training, (DSERT) is the academic wing of the Department of Public Instruction. It aims at providing academic leadership in school education as well as improving the quality of education provided in primary and secondary schools in the state.

The DSERT was formed as a small academic unit of the Department of Public Instruction. It was then known as the State Institute of Education (SIE), and it originally started functioning from the northern district town of Dharwar in 1964. This unit was later shifted to Bangalore and the other academic units of the department of public instruction — State Institute of Science (SIS), State Educational Evaluation Unit (SEEU) and Educational Vocational Guidance Bureau (EVGB), were merged in 1975 to form a single monolithic Department of State Educational Research and Training. The Directorate of Text Books was attached to DSERT in 1983. Later the Teacher Education administrative Unit was detached from the office of the Commissioner of Public Instruction and attached to DSERT.

The National Policy of Education 1986 gave special importance to teacher education with special emphasis on giving quality training to primary teachers. In 1993 eight District Institutes of Education and Training (known as DIETs) were set up in the state. Subsequently DIETs were set up in all the 20 revenue districts of the state. In 2006 seven more DIETs started functioning in the state. Similarly to improve the quality of secondary teacher education, 6 Government Colleges of Education in the state were upgraded to the status of Colleges of Teacher Education (CTE) to provide both pre service and in service education in the secondary education sector. In 2006, the CTE at Gulbarga was upgraded as Institute for Advanced Studies in Education (IASE). In the private teacher education sector, R V teachers' College, Bangalore was upgraded to the status of Institute for Advanced Studies in Education (IASE) with a mandate to provide adequate and qualitative resource support to teacher educators and train teacher educators to take up education research. Four private teachers' colleges (MES teachers' College and Vijaya Teachers' College,

l3angalore, Kotturswamy Teachers' College, Bellary and MLMN Teachers' College, Chikkamagalore.) were also upgraded as Colleges of teacher Education.

8. Conclusion

Indian society, from the time immemorial, has regarded knowledge as the highest virtue of man. Since the dawn of civilization, great saints and seers have shown to the entire world the path of enlightenment leading to the ultimate truth. During the Vedic and Upanishadlc periods, India was bestowed with some prominent institutions of higher learning which attracted scholars from distant places and from different parts of the world came to India in pursuit of knowledge. It is well known fact that Nalanda Vallabhi, Vikramshila, Taxila Ujjain and Kanchi were often quoted as the centres of learning in India and also featured as having good libraries too. The past was a glorious era that made the process of learning and teaching a noble profession. Due to foreign invasion and colonial rule till the middle of 20th Century the state of higher education in India shows a very deflected situation except from mid-19th Century as British rulers made some efforts to start colleges and universities.

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Evaluating the Employee's Performance Appraisal System in College Libraries of Mahendergarh District in Haryana

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Abstracts: This paper focus to appraise the performance appraisal system in college libraries of Mahendergarh District of Haryana; identify the effectiveness of the appraisal process and identify challenges facing the existing appraisal systems in college libraries employee's motivating to perform to develop personal capabilities, and advantage and disadvantage of performance appraisal and to improve future performance is influenced by feedback of past performance.

Keywords: Performance Appraisal Systems; College Libraries; Appraisal Process; Challenges facing.

1. Introduction

Mahendergarh is equipped with good number of educational and technical institutions like 05 Engineering Institutions , 18 degree colleges , 12 polytechnic institutions,27 Teacher Training college and one Central university as well as institutions of repute such as RPS Group of Institutions (Engineering ,Management, Degree and Education), Balana . There are also numbers of government and private organizations along with library and information centers where all the knowledge resources are kept for its utilization. The study covers the attempts of college libraries and the survey covers the Librarians, Assistant Librarians, Library Assistants and others. Performance appraisal (PA) has remained an important topic of investigation among organization researchers (Poon,2004:322) performance appraisal also called performance review, performance evaluation ,performance assessment, performance measurement, employee's evaluation , Staff assessment, services rating, etc. Performance appraisal is an assessment of an employee in performing his job. Performance appraisal provides an opportunity to communicate to employees the mission, strategy, vision, values and objectives of the libraries. Performance appraisal is an important managerial tool to clarify performance criteria and to enhance future individual performance. Performance appraisal or Performance management is one of the oldest and most universal practices of management .Effective performance appraisal should also recognize the legitimate desire of employees for progress in their professions. Performance appraisal is an important basis for changing performance plan, including performance criteria. It involves the following:-

- Setting new expectations to improve performance during the years.
- Establishing performance plans for next years.

2. What Is Performance Appraisal?

Performance appraisal defined:-

- Performance appraisal is a process of systematically evaluating performance and providing feedback upon which performance adjustment can be made. (Schermerhorm et.al. 2004).

- Performance appraisal may be defined as any procedure that involves (I) setting work standards ;(II) assessing the employee's actual performance relative to these standards; and (III) providing feedback to the employee with the aim of motivating that person to eliminate performance deficiencies or to continue to perform above par. (Dessier 2002).

- Performance appraisal is the system whereby an organization assigns some score to indicate the level of performance of a target person or group. (DeNiSi 2000).

- Performance assessment is the process that measures employees' performance. It involves deciding (I) what to assess,(II)Who should make the assessment,(III)which assessment procedure to use, and (IV)how to communicate assessment results.(Milkovich and Boudreau 1998).

- Performance appraisal is the process of evaluating the performance and qualification of the employees in term of requirement of the job for which he is employed, for purposes of administration including placement, selection for promotion, providing financial rewards, and other actions which require differential treatment among the member of a group as distinguished from actions, affecting all members equally. (Heigel 1973).

3. Review of Literature

Some relevant studies conducted earlier includes Lamptey,Richard Bruce and Agyen – Gyas,Kwaku (2012) conducted a study on Performance Appraisal as an Effective Management Tool in the State owned University in Ghana. This study discussed the impact of performance appraisal on libraries in six state owned university library in Ghana. In particular, it explains the concept of performance appraisal, methods used in appraising employees and how far it is being implemented in the state owned university libraries in the country. The challenges facing these institutions in implementing effective performance appraisal strategy are highlighted.

Okpe I. John, (2012) in their study "Annual performance appraisal of practicing librarians: A case study of academic Institutions in Nigeria". This paper investigated annual performance appraisal questionnaire administered by individual academic institutions in Nigeria, examined professional job specifications for academic librarians serving in these institutions studied to establish the annual performance appraisal style adopted by the academic institutions. Survey method was adopted using self structured questionnaire to personally collect data from the respondents, comprising fifty-one academic institutions across Nigeria. The result shows that, different department in the studied institutions was changed with the responsibility of carrying out Annual Performance Assessment, discuss performance evaluation purpose and values, higher number of the respondents suggested that Librarians should be evaluated on the bases of their job specifications and that the

planning and execution could be done centrally or within the Library system. Finally, conclusion and recommendations were provided on how best Annual Performance Assessment practice could be improved upon by organizational leaders to enhance productivity.

Edwards, Ronald G and Williams, Calvin, J (1998) " Performance appraisal in academic libraries: Minor changes or major renovation" and found performance appraisals generally occur to provide documentation generally occur to provide documentation for current and future personnel decision such as promotions, salary increases, staff development, and disciplinary reasons. After surveying library literature, it is apparent that most academic library administration implement some type of performance appraisal, but a disparity exists regarding the process itself, the ultimate goals sought and those actually achieved. This situation emanates from the lack of objectives adhered to in conducting performance appraisal. This article will address the diversity existent in the performance appraisal process and the reasons for these differences.

OWUSU-ANSAH, Samuel and GOGO ASHIRIFIA, (2014). "Effect of performance appraisal system on staff performance in Ghanaian academic libraries". This study adopted the survey approach to gather data from library staff located in the University of Cape Coast Library. Using the descriptive statistics, it was found out that library staff (76.8%) affirmed the existence of a performance appraisal system in the library. From the participants view, performance appraisal system was necessary to assist in determining the input of staff, bring motivation to workers and ensure effective work by the staff. The majority of the library staff (70.2%) stressed that their immediate boss was responsible for appraising their work output in the UCC library.

Jiezhu Nie 1, a, Qiuwen Huang 2, b, Ganghua Zhang 3, c (2013). "Performance Appraisal of Human Resources in University Libraries --Taking the Library in Jiangxi University of Science and Technology as an Example". This paper has analyzed performance appraisal (PA) principles of human resources (HR) in universities, listed out PA indices and their significance, and structuralized PA model in theory. This model has been employed perfectly in evaluating the year 2011 annual performances of the HR in the library of Jiangxi University of Science and Technology (JUST) in China, which has greatly enhanced the PA quality and satisfied the staff in the school library.

The paper of Akua, Asantewaa Aforo and Kodjio - Asafo-Adjei Antwi (2012) shows that academic libraries a performance appraisal system comprising setting of goals, feedback, participation and incentives for performance. This study aimed at evaluating the performance in the KNUST and GIMPA libraries in Ghana and give recommendations on improving the system. The article of Javed Igbal, Samina Naz, Mahnaz Aslam, Saba Arshad (2012), offers a survey of selected literature on performance management. It is found that performance management processes, evaluation, its impact and factor are key themes.

4. Objectives/Purposes of Performance Appraisal

They serve several purposes (Kumar, 2005:02; Millmore et al., 2007: 527). These Purposes include:-

- To let subordinates know formally how their current performance is being rated.
- To identify subordinates who deserve merit raises.
- To locate individual who need additional training.
- To identify candidates for promotion.
- To identify the scope for performance improvement and means to achieve it.
- To serve as a source of information for management to make decisions about promotions, Salaries, training needs, and training support.
- As a means of managerial control, through the setting objectives; and
- To facilitate personal improvement and development.

Broadly, performance appraisal serves four objectives- (i) developmental uses, (ii) administrative uses/decisions, (iii) organizational maintenance/objectives, and (iv) documentation purpose.

Hence, organizations need to rate their employees so that people can be identified to assume positions of leadership or be acknowledged for reward when appropriate (Gibbons and Kleiner,1994).However, Becker et al. (2001) emphasize that performance appraisal systems are incoherent in terms of what is measured and what is important.

5. Principal of Performance Appraisal:

Performance appraisal should be based on certain principles as stated below-

- Corporate goals are translated in to individual, team, departmental and division goals.
- It should not be linked with only financial rewards.
- Performance improvement is an ongoing process and improves over time.
- Consensus and co-operation needed, not control and coercion.
- Transparency is needed at every stage.
- It should cover all employees.
- It is a system and not a piece of work.
- Make it simple and easy.

6. Advantages and Disadvantages Performance Appraisal:

6.1. Advantages

- The employee whose performance is appraised may develop an increased motivation to perform effectively.

- The job of the employee being appraised may be clarified and better defined.

- Valuable Communication can taken place between the manager and the employee.

- Organizational objectives can be made clearer and they can be readily accepted.

- Rewards Such as compensation and promotion can be distributed on a fair and credible basis.

- Valuable appraisal information can allow the organization to do better human resource planning, test validation, and development of training programmes.

6.2. Disadvantages

- The self –esteem of the employee being appraised and manager doing the appraisal may damage.

- Large amount of time may be wasted.

- The relationship among individuals may be permanently worsened, thereby creating organizational conflicts.

- Performance may be lowered for many reasons; including the feeling that poor performance measurement means no rewards for performance, that is, biased evaluation including favoritism towards some employees.

- Money may be wasted on form, training, and a host of support services.
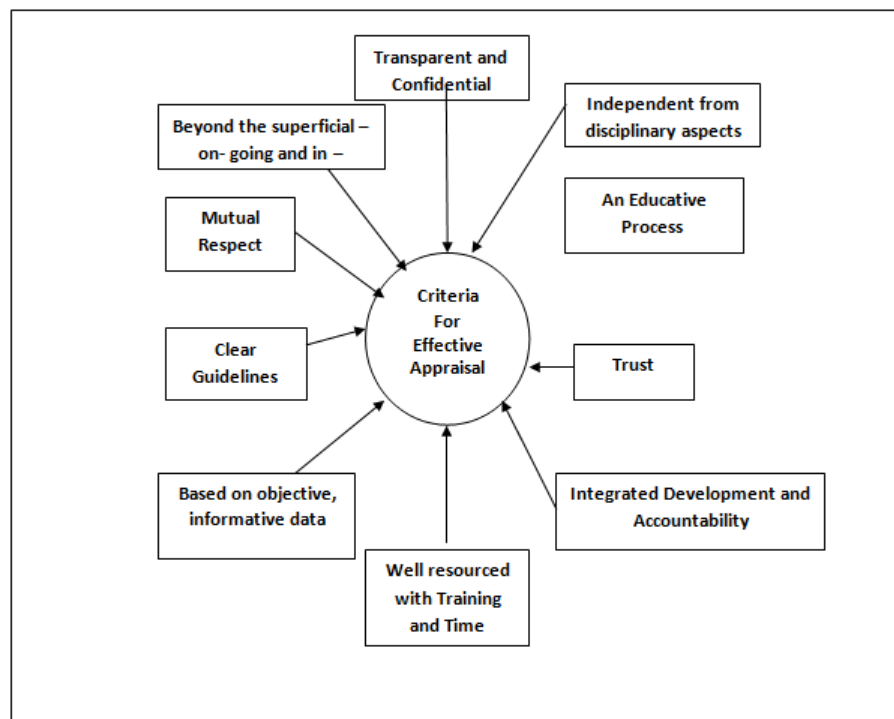
Figure 1 - Elements of Appraisal Effectiveness (Source: Eileen Piggot-Irvine (2003; 173)

7. Essential Features of an Effective Performance Appraisal System

Appraisal systems possess certain definitive useful functional and strategic information and results for the organization, its manager, and its employees. However, development of an effective appraisal system is not an easy chore (Boice and Kliener, 1997).According to Piggott-Irvine (2003) "Effectiveness occurs when the appraisal interactions are non-controlling and non-defensive, but are supportive, educative and yet confidential. Effective appraisal is underpinned by relationship of respect and has outcomes directly linked to improved learning and teaching. He narrates that effectiveness is also linked to appraisal process and information that has clarity, objectivity and high integrity, where deep development is a goal rather than a quick-fix expedience. "See figure 1.

8. Appraisal Process:

Figure outlines the performance appraisal process. Each step in the process is crucial and is arranged logically. The Process as shown in figure-is somewhat idealized many organizations make every effort to approximate the ideal process, resulting in first-rate appraisal systems. Unfortunately, many others fail to consider one or more of the step and, therefore, hiveless-effective appraisal systems.
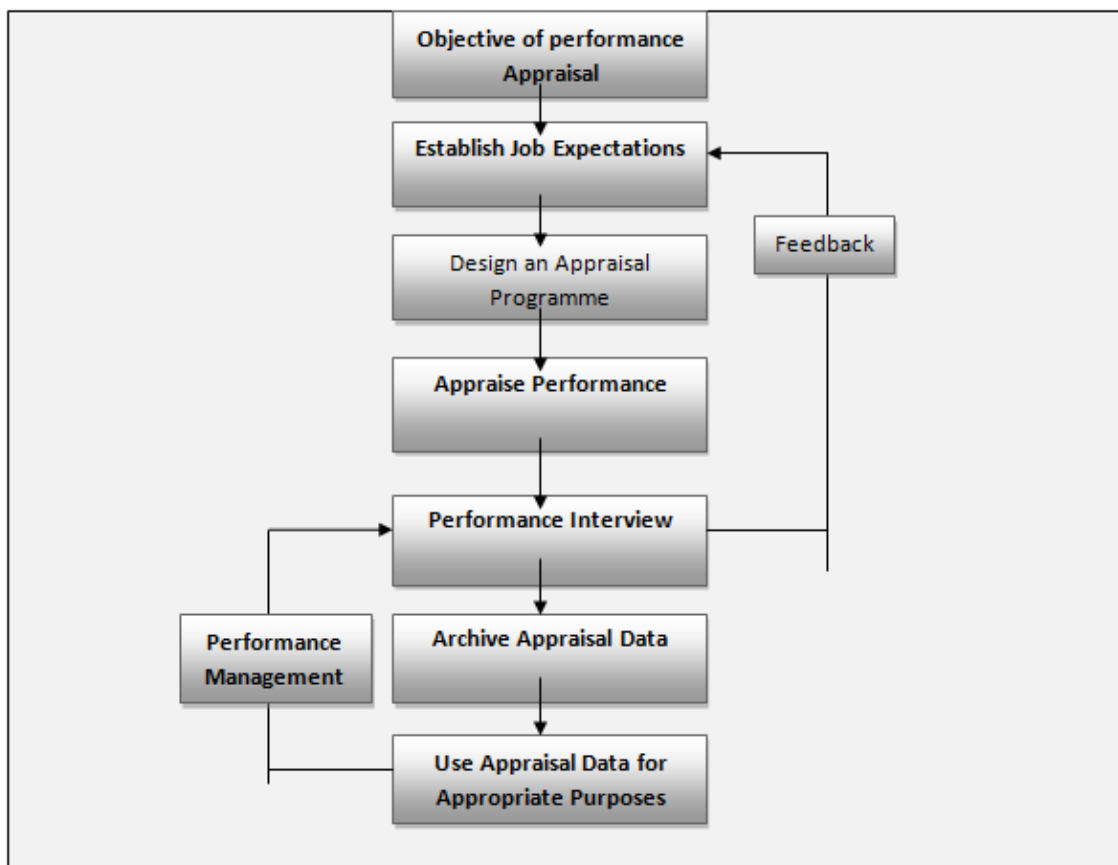
Figure -2 Performance Appraisal Process

(Source:-Human Resource Management: Text and Cases – Aswathappa (2014: 327)

9. Challenges of Performance Appraisal

With the increased significance of performance appraisal, Challenges confronting the system are mounting. One serious challenge facing the performance appraisal system relates to assessment of self- managed teams. Popularly- called empowered teams, these self –managed teams create special challenges for performance appraisal – empowered teams perform without supervisors. Historically, if one recalls, it is the supervisor who assesses the performance of his or her subordinates. Another challenges is that both, individual and team performance, need to be measured. A suitable device needs to be developed to assess the performance of empowered teams because more and firms use such teams to enhance productivity. Contains other challenges of performance appraisal:-

- Create a culture of excellence that inspires every employee to improve and lend himself or herself to be assessed

- Align organizational objectives to individual aspirations

- Clear growth paths for talented individuals

- Provide new challenges to rejuvenate careers that have reached the plateau stage

- Empower employees to make decisions without the fear of failing

- Embed teamwork in all operational processes

- Debureaucratise the organization structure for easy of flow of information

A Major and recurrent criticism of performance appraisal systems is their openness to subjectivity and discrimination, subjectivity is more likely to arise from the day to day behaviors and practices of those involved in the process of appraisal than the policies and procedures developed to guide that practices (Brown and Heywood, 2005).PAS is often judged subjectively because performance in many jobs is not amenable to objective assessment. Such subjectivity enables a rater's personal agenda to drive the appraisal rating process. (Ferris and Judge in Poon; 2004:323). Hence, the implementation of an effective performance Appraisal Programme is complicated by the difficult task of obtaining a truly fair and accurate appraisal of an employee (Poon, 2004:323, Gibbons and Kliner, 1994).Problems associated with the performance Appraisal (PAS) include the lack of agreement on appropriate appraisal criteria, concerns over the validity and reliability of evaluation methods, and the negative perception of employees towards the appraisal system (Peterson, 2000).

10. Procedures/Methods

A descriptive research design, cross-sectional in nature, was applied in the investigation. The approach was used because of need to obtain the employees' perception and experiences pertaining to the existing performance appraisal system (Creswell, 2007; 40)

A questionnaire was distributed to the random sample of 59 respondents from the 11 colleges. Stratified ensured that better representativeness of the employees.

Total No. of Libraries	Total Employees	Respondents
32(Thirty Two)	59	50

The survey questionnaire was chosen since it was found to be efficient and a tested means of assessing information about large employees of college libraries of Mahendergarh. The questionnaire had a combination of both open-ended and closed questions. A drop-off and pick –up method of questionnaire was adopted.

11. Response Rate

Total 59 questionnaire were distributed to participating employees but only 50 were received/returned completely, thus 84.7% response.

12. Demographics

The demographic information of the respondents included the academic qualification, work experiences, gender and age. The analysis of data on the purpose of performance appraisal revealed that the system was used to identify employees for promotion (61.25 %) and to decide on salary awards (92.75 %). Contrary to common belief, 79.2 % of the respondents indicate that the appraisal system was not used to weed out incompetent.

Effectiveness – on the effectiveness of the employees of college libraries' performance appraisal system, 49 % of the respondents indicated that appraisal based on work related and 32% of the respondent indicated unfair in the systems. 63 % of the participants indicate that performance rewards did not always show a positive reflection of the performance appraisal outcomes.

13. Distribution of Respondents

The gender demography showed that fifty thirty-three (33%) percent, of the library employee are female while sixty seven (67%) percent, are male gender. Majority of the library employees fell in the age group 31-50 (72.8%). Majority of the library employees acquired professional qualification Graduate and Post Graduate in Library and Information Science the result showed that eighty-two (82.9%) and respondents finding that shows seventeen (17.1 %), those who have joined before 1985-1990 not having professional qualification and seven (7 %) has first degree (BA, B.Lib.I.SC and M.Lib.I.Sc.).

14. Discussion

The response to the research question on what specific functions the appraisal process served in the college libraries received mixed result. Both librarians and their subordinates believed that the appraisal process served one or more of the following:

- Allowed employees of the libraries to provide input about their jobs.

- Informed employees of where they stand.

- Helped to Clarify the employees 'performance and objectives ; and

- Facilitate to discussion of the employees development.

Given employees needs for feedback, direction, role clarity, job involvement, and development, these were positive finding.Futher; the survey revealed that the system was used to decide on salary award (92.75 %) with 92.75% of respondents indicating that the system was not used when identifying employees for development. It also emerged that the system was not used to determing whether the libraries' policies were being implemented or to weed out incompetent employees (92.75%).

Therefore, the empirical results have shown that the respondent have a negative view regarding the performance based appraisal system. They view the system to be unfair and not transparent. Lastly, an assessment of the responses on the open ended questions revealed the following negative outcomes of appraisal that included the feeling that it had led to poor relationship between appraisers and that they found the prospect of appraisal threatening and subjective. Some employees claimed that appraisals had led to de-motivation and low morale in certain departments due to differential rewards based on budgetary allocations.

15. Results/Findings

Finding from the survey data were presented and analysis to construct an understanding of the existing appraisal systems in the college libraries. The empirical result covers the employees' demographic profile; purpose of performance appraisal; appraisal process, essentials of performance appraisal; challenges of performance appraisal and employee attitudes towards performance appraisal in the college libraries.

16. Conclusion

Based on the responses that performance appraisal systems are satisfactory in college libraries of Mahendergarh. Performance appraisals are essential for the effective management and evaluation of the staff. The appraisal process should aim at judging the performance of the employee rather than the employee himself. Lastly, organizations should have appraisal appeal procedures. An appeal process would seem to serve three purposes (1) It protects employees from unfair appraisals; (2) It protects the organization from potential charge of unfairness; and (3) It helps assure that appraisers to do a more conscientious job of evaluation. The study revealed that the college libraries employees felt that: "proper feed-back is important for performance improvement; appraisal encourages accountability; appraisal identifies areas of weakness and strengths and that appraisal motivated employees and increase awareness of the job requirements. Performance appraisal is in all organizations, especially in highly labor –Intensive organization like libraries.

Based on the result of the survey, the following recommendations have been suggested: (I) the libraries should consider adoption of new system of assessing performance such as multi-rather feedback. (II) To avoid inconsistency. (III)The libraries should provide training to both the evaluators and the employees on the pay-based appraisal system.

There is need for a comparative study with other similar Libraries (i.e. University Libraries/College Libraries).

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Techno-Stress Management among Library Personnel in Degree College Libraries of Uttar Pradesh (INDIA)

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Abstract: The present study highlights the concept of stress and techno-stress among library personnel. In the present study total 144 library personnel selected from 48 Degree College Libraries affiliated to Dr B. R. Ambedkar University Agra. Thus the framed questionnaire (with related questions) distributed and collected from three library personnel (48*3=144) from each Degree College library. The data analysis is made in tabular and graphic form. The researcher found after data analysis that library personnel are feeling techno-stress on them. At the last of study some recommendation and suggestion are suggested for management the techno-stress.

Keywords: stress management, library personnel, techno stress,

1. Introduction

Now all ICT has entered in all subjects of knowledge to facilitate to its users and ICT make all jobs easy to perform. With this ICT has also entered in libraries in its full sworn. This makes all the functions and services of libraries very easy but also produce challenges to personnel of libraries. In Indian librarians the most of working personnel of libraries are not trained and some personnel not having any interest in ICT due to near their retirement or some other reasons. The most important thing is that technology hanging its face every second and coup these changes are not an easy job. These new technologies have created stress among library personnel. This stress (instinctive due to ICT) is called techno-stress. The present study is confined to the working personnel of college libraries. Uttar Pradesh is the largest state in Indian in population. There are 530 colleges (Degree, Engineering, Management and Medical etc) are affiliated to Dr B. R. Ambedkar University, Agra. Thus the college libraries caters to need of a large group of users. The academic library is the heart of any institute and it caters the needs of a very large groups of users. School, college, university libraries and library attached to an academic institution are the academic libraries. Now the all college libraries are moving toward automation, digitations and e-libraries to facilitate its users. The library personnel are facing new challenges in this ICT era and these personnel also feeling techno-stress on them.

Techno stress is a reaction to technology and unsettled due to influence of these technologies. The following are some definitions of techno stress:

"Techno stress is a feeling of anxiety or mental pressure from overexposure or involvement with (computer) technology". "Techno stress is the negative psychological link between people and the introduction of new technologies. Whereas ergonomics is the study of how humans react to and physically fit with machines in their environment, techno stress is a

result of altered habits of work and collaboration that are being brought about due to the use of modern information technologies at office and home situations."

2. Objectives of the Study

The following are the main objective of the study:

- To find out the ICT infrastructural development in College libraries.
- To find out the training development program for the personnel as well as for users.
- To find out the techno-stress level among library personnel.
- To find out the methods of management of techno stress.

3. Scope

The study is confined to degree college library personnel in Uttar Pradesh especially to personnel of Degree College libraries affiliated to Dr B. R Ambedkar University Agra. There are 507 Degree College (Govt. Aided and Private) affiliated to Dr B. R. Ambedkar university. In the present study library personnel of 48 Degree Colleges have been taken for the study.

4. Review of Related Literature

The review of literature has been made from various sources print and electronic like journals, e-journals, websites, search engines etc. and found that no study is same with this topic. Some reviews of literature are as follow:

Clute (1998) explore the roots of techno stress as unaware with computers, presentation anxiety, absence of training/inadequate training, organizational aspects, lack of staff, information explosion and overload, fast changing technologies. Clute also explain all these roots of technostress in details. She found that most of the crucial factor behind the technostress is lack of training of ICT and lack of funds. **Mahalakshmi and Sornam (2011)** say that ICT and computer application in libraries had been increased in current decayed and these technologies have increased health risks due to techno-stress. The study is conducted on library personnel of engineering college libraries affiliated to Ann University, Tamilnadu. The study found that roots behind due to technological changes and this physical discomforts. A questionnaires is distributed among library professional with demographic detail and ergonomics stress. In the last of the study authors make some recommendations for their problems. **Prabhakaran and Mishra (2012)** say that the advancement of technology have brought many changes at workplace. Author say that these technologies are faster moving and creating stress among employees and to coup these technologies are not so easy and the implementations result are not certain of these technologies. These new technologies are required new skills and training of personnel in an efficient way. Organizations like libraries are non-profit organization and need to require authority attention in training and development of library personal without any financial output. **Okebaram, Sunday Moses (2013)** in his study author regulate the foremost reasons, indications and effects of technology stress. For achieve the purpose of

the study a survey has been made among 27 respondents through distribution of a questionnaire and 21 responded retuned the filled questionnaire back. The data is analyzed in tabular form and graphic form in the study.

5. Data Analysis

In the present study total 144 library personnel selected from 48 Degree College Libraries affiliated to Dr B. R. Ambedkar University Agra. Thus the framed questionnaire (with related questions) distributed and collected from three library personnel (48*3=144) from each Degree College library. The data is analyzed as below in tabular and graphic form:

Table 5.1- Response

Response		
Govt. Aided College	Private College	Total Responses
24	120	144

The table no 5.1 reveals that total responded from Govt aided college is 24 and from private college is 120. Private college is more in comparison to Govt. Aided College.

Table 5.2 -Techno stress due to Institutional Factors

S.N.	Reasons	Level				
		100%	75%	50%	25%	Not at All
1	Lack of Computers	66	36	23	19	00
2	Lack of funds to purchase ICT infrastructure	71	48	15	10	00
3	Slow Internet Speed	32	36	72	04	00
4	Old Computer	35	78	30	01	00
5	Lack of Library Software	72	56	4	2	10
6	Indifferent attitude of Authority toward ICT	28	68	22	18	08
7	Lack of trained Staff to implement ICT	71	23	18	17	15
8	Lack of Proper Building for ICT environment	44	63	21	11	05
9	Lack of Suitable Physical Environment for ICT	41	76	17	10	00

66 (46.58%) library personnel say that they face technostress due to 'lack of computer' in their library up to 100%. **71 (49.30%)** library personnel say that they face technostress due to 'lack of funds to purchase ICT infrastructure' in their library up to 100%. **72 (50%)** library personnel say that they face technostress due to 'slow speed of internet' in their library up to 50%. **78 (54.16%)** library personnel say that they face technostress due to 'old computer' in their library up to 75%. **72 (50%)** library personnel say that they face technostress due to 'lack of library software' in their library up to 100%. **68 (47.22%)** library personnel say that they face technostress due to 'indifferent attitude of authority toward ICT' in their library up to 75%. **71 (49.30%)** library personnel say that they face

technostress due to 'lack of trained staff to implement ICT' in their library up to 100%. **63 (43.75%)** library personnel say that they face technostress due to 'lack of proper building for ICT environment' in their library up to 75%. **76 (52.77%)** library personnel say that they face technostress due to 'lack of suitable physical environment for ICT' in their library up to 75%.

Table 5.3 - Reasons of Techno stress among library personnel

S.N.	Reasons	Level				
		100%	75%	50%	25%	Not at All
1	Unawareness with computers	21	25	71	17	10
2	Fast and Frequent Change in Technology	74	42	16	12	00
3	Lack of Insufficient Training	69	41	21	11	02
4	Lack of Basic Knowledge of ICT	39	72	29	04	00
5	Information Explosion	26	62	52	02	02

71 (49.30%) library personnel say that 'unawareness with computers' is the reason of techno stress in their library up to 50%. **74 (51.38%)** library personnel say that 'fast and frequent change in technology' is the reason of techno stress up to 100%. **69 (47.91%)** library personnel say that 'lack of insufficient training' is the reason of techno stress up to 100%. **72 (50%)** library personnel say that 'lack of basic knowledge of ICT' is the reason of techno stress up to 75%. **62 (43.05%)** library personnel say that 'Information Explosion' is the reason of techno stress up to 75%.

Table 5.4 - Views regarding management Techno stress

S.N.	Manage Techno stress	Level				
		100%	75%	50%	25%	Not at All
1	Adequate Training in ICT and New Innovations	**82**	23	18	17	04
2	Adequate Funds for ICT	48	**65**	16	15	00
3	Meditation	31	**58**	48	07	00
4	Positive attitude of Authority	34	42	**62**	06	00
5	Adequate Staff	32	39	**69**	04	00
6	Appropriate Building	23	31	**44**	35	11
7	Appropriate Physical Environment	21	32	**51**	34	06
8	Proper Library Websites	23	36	**52**	21	12
9	Recurring Maintenance of ICT	29	**68**	41	06	00

82 (56.94%) library personnel say that technostress may be managed with 'adequate training in ICT and new innovations' up to 100%. **65 (45.13%)** library personnel say that technostress may be managed with 'adequate funds for ICT' up to 75%. **58 (40.27%)** library personnel say that technostress may be managed with 'proper library websites' up to 75%. **62 (43.05%)** library personnel say that technostress may be managed with 'positive attitude of authority' up to 50%. **69 (47.91%)** library personnel say that technostress may be managed with 'adequate staff' up to 50%. **44 (30.55%)** library personnel say that technostress may be managed with 'appropriate building' up to 50%. **51 (35.41%)** library personnel say that technostress may be managed with 'appropriate

physical environment' up to 50%. **52 (36.11%)** library personnel say that technostress may be managed with 'appropriate physical environment' up to 50%. **68 (47.22%)** library personnel say that technostress may be managed with 'recurring maintenance of ICT' up to 75%.

6. Recommendations

As table 5.2 shows that institutional resources of ICT is not proper in concerned libraries as computers, library software, slow internet speed, old computers and other ICT infrastructure are not up to satisfaction level. **It is recommended** here that libraries should improve and update this infrastructure level.   It is also evident form this table that attitude of library managing authority regarding the application of ICT is positive. **It is recommended here** that authority should keep positive attitude toward the application of ICT in libraries. There is lack of ICT trained staff in libraries. **It is recommended** here that library should appoint trained and skilled staff for improvement.

As per table no 5.3 library personnel feel technostress due to fast changing technologies as they have not any proper and recurring training to coup these fast changes. **It is recommended** here that there should be proper and recurring training for the working library personnel in these libraries. Libraries should organize workshop of new innovations in libraries.

It is also recommended on based on views of library personnel that there should be a proper and user friendly websites of concerned libraries. The fund position of the concerned libraries is not sound, it is true fund is like blood in a human body. **It is strongly recommended** here that managing authorities of libraries should arrange more funds to these libraries for purchase ICT infrastructure and e-resources. **It is also recommended** here that physical environment of libraries should be proper there should be air-conditioned environment in libraries for suitable working.

7. Conclusion

As ICT (Information Communication Technology) one side is more useful and provides accurate results in minimum time and other side it created challenges against library personnel. ICT is changing very fast (computers, network memories, media, format etc) and coup these fast changing technologies is required funds and adequate training. It is also true that new recruited (younger) employee know the use of information communication technologies in a better way in comparison to retired person re-employee in private colleges. In the present study most of the employees of college libraries required an adequate training of ICT. There is need of up-gradation of ICT infrastructure to facilitate user and decrease the technostress. Library managing authorities should also arranged yoga camp (meditation), workshops, conference and seminar on stress management in their premise. Library personnel should be motivated in participation in conference, workshop and refresher courses.

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Stress management by library and Information science professionals in University libraries of Bihar: *a Study*

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Abstract: Stress is the changes which our body experience as we adjust to our continually changing environment. Many aspects of the daily life and library profession in particular, can create feeling of stress, infact, is a normal experienced headaches, flu, chronic psychological tensions, drug abuse and personal or interpersonal problems. The study used survey method of research and selected samples from library and information science professional working in university libraries of Bihar.

1. Introduction

Generally stress is the changes, which our body experience as one, adjust to the continually changing environment. Stress has become the defining malaise of modernity until a few years ago, the term was used exclusively to refer to the "fight or flight" mechanism in a specific medical context. Stress is produced from lack of regards for physiological, psychosocial comfort and psychological from the equipment use in working, relationship and other considerations that can be found in the working environments. Comfort is achieved when a person neither feels nor show any sign of fatigue or Stress. Special library association (2008) identified the roles of libraries to include development and maintenance of a portfolio of cost effective, client valued information services that are aligned with the strategic directions of the organization and client groups.

Efforts to tackle job stress and other occupational related problems among Bihar University Library Professionals began since the last year. A survey report was cleared to develop of occupational health service, medical inspection of work places. It also recommended safety measures against occupational problems. Indeed, librarians have many roles to perform in the library and any of the roles could be stressful as every tasks in the library needs to be executed while considering the human factor in undertaking it. Therefore, any work conditions that do not recognizes the abilities, capabilities and needs of the worker could result in stress.

2. Nature of Stress

Stress is a pressure that is exerted on something, for example, a piece of metal, which causes the object to respond the metal, for instance, may bend. The events that cause stress are known as 'stressors' The term 'stress' is also used to describe the individual's response

to pressure. The response can be psychological and/or behavioural. Some stress is necessary in that it assists us in achieving both work and personal goals. However, too much stress can make those goals harder to achieve. People respond differently to stress. Some people function well under significant stress while others do not. A worker's ability to cope with increasing workplace stress is also affected by the amount of stress they are subjected to from stressors outside of the work place. Trouble at home may reduce their ability to cope with pressure at work.

3. Types of stress in Libraries

- **Technological stress**: The development and application of information technologies in libraries is the major stress for library professional. Due to rapid change in computer hardware & software obsolescence of existing hardware & software is a common phenomenon in almost all libraries. Besides the change in information storage media, from print or electronic, then digital medias have resulted in the storage space facilities.

- **Physical stress:** stress can manifest itself physically as the body tries to find a way to manage the emotional issues the person in feeling. Increases in blood pressure and heart rate can happen almost immediately. Due to this sitting in front of computers for a long hour, working in air conditioned environment etc have also resulted in the physical stress and illness.

- **Job stress**: Occupational stress has become a common problem throughout the industrial world. The application of Information Communication Technologies (ICS) has compelled the library professionals to acquire new knowledge along with the traditional library functions and services. On the contrary, there is limited scope for them to undergo in service training programme higher studies, refresher course etc, which has increased a considerable amount of stress among professional. Further, with the increasing instruction and appointment of IT/computer science people into the library profession have created fear among LIS professionals about their job security in future.

4. Objectives

- To study the stress management of LIS Professionals in University Libraries of Bihar.

- To find out the problems faced by LIS professionals to manage the stress.

- To identify the criteria of solving the problems.

- To identify the types of services used by the professionals in University Libraries of Bihar.

5. Methodology

The study surveyed LIS professionals in University libraries of Bihar determine the prevalence of stress in University libraries of Bihar. Library Professionals working in the

library were used as subjects. However, in order to ensure the selection of a representative sample, members of the sample were drawn only from the professionals cadre taking note of their geographical spread throughout the country. The instruments used for data collection in the study were questionnaire and interview. These are relevant in the survey study which normally involves large group or scattered population.

6. Analysis of the Data

The researcher distributed 200 copies of questionnaires in 09 University libraries of Bihar out of this number 140 (70%) were returned duly completed representing 70%.Which is considered adequate for meaningful analysis. it is difficult in a survey of this nature to obtain hundred percent (100%) return of questionnaire as not all the respondents may give their response. Therefore, it is the belief of the researcher that 70% response rate can give reasonable representation of data to reach conclusion in the study.

7. Common causes of stress among LIS professionals in University libraries

There are many causes of stress in Bihar University libraries as observed by the study. Some of the causes have been observed to be severe while others are not but both have been observed to be producing negative or uncomfortable feelings among the librarians. Some stresses have been observed to be linked directly to tasks librarians.

Table1: common causes of stress among librarians in University libraries of Bihar

CAUSE OF STRESS	FREQ	%
Attitude of users	19	13.57
Lack of promotion / advancement	13	9.28
Lack of adequate remuneration	11	7.85
Dual role of family responsibility vs. paid work	10	7.14
Work over load	10	7.14
Death of a spouse or loved one	9	6.42
Financial problem	9	6.42
Time pressure / deadline	6	4.28
Work under load	8	5.71
Illness	8	5.71
Pregnancy	8	5.71
Bad relation with colleagues	5	3.57
Bad relation with superiors	5	3.57
Marital problem	5	3.57
Leadership styles of the chief librarian	4	2.85
Lack of information sources to process	3	2.14
Lack of feedback as work is performed	2	1.42
Lack of control in work pattern	2	1.42
Lack of adequate working space	2	1.42
Lack of job satisfaction	1	0.72
Total	140	100

From table I below the most prevalent cause of stress is attitude of users which records 13.57% (19) response rates. The attitude of the users perhaps relates to the behaviour of the users towards the librarians as some users used foul and abusive language against the personality of the librarians. The work related causes relates to the problems encountered while performing the work and the personal causes relates to personals problems of the librarians which are all influencing the attitude of the librarians to work.

8. Periods and duration of stress occurrence among librarians in University Libraries of Bihar:

The period of stress occurrence refers to the time of the day in which stress occurs or happens. The duration of stress refers to the time taken to get out of stress. It has been observed that librarians working in Bihar University. Libraries work for 06 hours a day between 10: A.M. to 4: P.M. TABLE -2 below indicates the period and duration of stress occurrence among the librarians in   University Libraries of Bihar.

Table 2 – Period and duration of stress occurrence among librarians

TIME OF THE DAY	DURATION							
	10 - 19 mins.		20 - 29 mins		30 - 39 mins		Above 40 mins	
	Freq	%	Freq	%	Freq	%	Freq	%
12 – 2 pm	46	19	12	5	22	9	7	3
2 – 4 pm	26	11	65	27	50	21	12	5

- **Consequences of Stress on job performance of librarians in University Libraries of Bihar:**

Consequences refer to the effects being produced by stress on the librarians and which in causing harm to the librarians. Such consequences may include fatigue, headache, eye strain, muscle pain, hypertension, etc. The data presented from the responses of the librarians in table 03 below, Show that stress does not affect the job performance of the librarians. The data show that (85) 60.72% of the librarians indicated that they noticed no change in their task performance.

The implication of this finding is that through stress is not producing any noticeable effect on the libraries; it could be affecting the services of the library since it is present within the library environment. Auerbach and Gramling (2003) confirmed this finding where stated that stress influences mental health as well as physical health .That people who experienced high level of stress for librarians which will later their health. Any exposure to stress may affect the library staff to make them ineffective and inefficient in assigned roles. Any stress related disorder is suppose to be taken seriously and treated with urgency before it causes harm on the librarians.

Table 3: Consequences of stress on job performance of the librarians:-

CONSEQUENCES OF STRESS	FREQ	%
No change in performance	85	60.72
Unable to work	24	17.15
Absent from work	16	11.42
Late to work	8	5.71
Unable for full days work	5	3.57
Break work to rest	2	1.43
Total	**140**	**100**

Table 4 Methods Used by Librarians to cope with or handle stress

METHOD/TECHNIQUE	Freq.	%
Develop interest in clientele	16	11.42
Develop consideration for others	14	10.00
Develop interest in work	14	10.00
Direct attention away from source of stress	13	9.28
Maintain life within tolerable limits	11	7.85
Remove source of stress	11	7.85
Talk about the problem with others	10	7.14
Learn to do things one after the other	9	6.43
Cooperate with all in the library	8	5.71
Change to task that allow your mind to wonder	8	5.71
Build good relationship with superiors	6	4.28
Compartmentalize work and home life	6	4.28
Engage in hobbies or leisure activities	4	2.85
Engage in sports or physical exercise	4	2.85
Plan time	2	1.42
Rest to take a nap	2	1.42
Seek for counseling	1	0.71
Take vacation	1	0.71
Total	**140**	**100**

9. Methods of coping with stress among librarians in University libraries of Bihar:-

In this study various methods of techniques have been identified to be used by librarians working in university library in Bihar to cope with stress. The methods identified are presented in table 4 above. Form the above table tasks the study identified 18 methods used by librarians to cope with stress. The most common of the methods used by librarians is to develop interest in clienteles, with response rate of (16) 11.42: this corroborates with the earlier finding in the study that the common cause of stress is attitude of stress. The least method used by the librarians to cope with stress is taking a vacation with response rate of 0.71% (1) as indicated in the table.

Indeed, there is no one single method the librarians could use to cope or counter stress and pressure of work. Every librarian can use the method he can handle it best, which is at his

disposal and is appropriate to the situation. However, in order to control stress effectively the library management needs to provide resources on training and education on stress management practices.

10. Conclusion

One reality of 21st century, stress in University Libraries relates to the difficulties encountered by the librarians in task performance. Stress comes from external sources such as the users who are the main beneficiary of the library. In this context the LIS Professional have two choices, either to manage and / or control the events that impact their work and produce stress, or to allow stress to manage them.   Librarian themselves could reduce stress in the library by adopting time management to reduce the pressure on them. Working life should also be separated from personal life to avoid conflict of interest and pressure. The period when librarians encounter stress should be identified so that they could adjust their time to cope with the stress when it occurs. Stress among the librarians in Bihar University Libraries is not causing any harm on their health and well being. But no matter how minute it exist it is not suppose to be left out. There is no fixed methods of cope but librarians could use any method depending on their ability to handled it and result it could produce.

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Stress Management and Library and Information Professionals: *Some Insights*

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Abstract: Stress is part of human and professional life. Professional stresses are different from personal, family and environment. Since LIS professional has to work in different environment and accountable for organization, users and society as a whole. In this context stress management is most important component for LIS professionals for smooth running of libraries, services and institutions as a whole. In this paper authors presented some overview on professional stress, causes for stress and how to overcome stress though proper mechanism.

1. Introduction

Stress is a self developed pain by thoughts. When a person expects more than what he actually deserves for his work, or when a person thinks it is beyond his capability, and still continues to do, he gets a mental illness. This illness could be stated as stress. There are chances for this stress to break a person, both, internally and externally, and so, it is wise to adapt the ways to handle it, at the right time. What is stress? Stress is said to be a physical, mental, or emotional response to events that causes physical or mental tension. In simple words, stress is an outer force that has a command over inner feelings. Stress is the changes which our bodies experience as we adjust to our continually changing environment. It has been an integral part of our daily life since prehistoric times and Library & Information science profession are not exception to this. LIS professionals have generally expected library administrators to experience high stress because administrators bear most of the burden for planning, procuring, preparing and budgeting. The Stress among the Librarians increased in frequency and duration, the sources of stress such as coworkers, patrons, workload, management, schedules, lack of positive feedback, lack of training, technology and equipment, physical facilities, bureaucracy, unchallenging work, uncertainty or feeling of failure and Lack of Budget or resources.

2. Objective of the paper

The objective of this paper is to identify the perceived area and causes of stress among the library and information professionals. And find out how these professionals are managing their stress and then identify the support system available.

3. The two main classifications of Stress

Dr. Lazarus suggested that there is a difference between eustress and distress.

- **Eustress** is a positive stress. It is caused by continuous success and when expectations become higher. This develops the sense of urgency and alertness needed for survival when confronting threatening situations. And stresses to hold their position becomes more.

- **Distress** is a negative stress. It is caused due to disappointments, failures, threats, embarrassment and other negative experiences. This can result is distrust, rejection, anger and depression which eventually may turn out to get headaches, stomach upsets, rashes, insomnia, ulcers, high blood pressures, etc. And this can have harmful effects over one's physical, mental and spiritual health.

4. Different events which are responsible for stress of Library and Information Professionals :

- **Technological Change**: The technostress causes are Information overload, Changing Technology, Rapid change in software/ programmers, ICT application Frequent updation need, Networking Problem, Vendor Products like databases, Updation of Institute/Library Website, Updation of Services over Net, New things to learn, Digital Delivery. It affects both staff and users of libraries.

- **Changing Library Environment**: Libraries are changing from older manual system to automated systems and more recently to newer more sophisticated digital library systems. Staff members must unlearn old habits and procedures and learn to understand the new system.

- **Change in Type of Document**: Most libraries are now acquiring some materials in alternative Electronic or digital formats. These materials, which were once handled on an ad hoc basis, must now be incorporated into the normal acquisitions workflow.

- **Change in Library Physical facility:** Changes in Library physical facilities have become a vital problem in today's libraries. With the increased use of electronic formats, the library authorities are reluctant to expand facilities to cope with increasing space requirements. Some libraries are actually moving into new facilities with less space or losing space to other functions. But the hybrid type of libraries having both print and non-print documents face much problems relating to change in physical facilities of the library.

- **Changing users demand:** In the age of information explosion, users attitude towards information have changed. Accordingly the acquisition, organization and retrieval of information in quickest possible time have given a tremendous amount of stress in the mind of library professionals.

5. Remedies for Stress

- LIS professional should be aware of their capability. They should analyze their skill level.

- Every LIS professional has to take up a SWOT analysis test to know his/her current level of capability.

- Taking up SWOT analysis test also helps to enhance the skills possessed in the current situation.

- Planning an effective time management surely helps through the stress. A well planned work is half done. Similarly, a very well managed time avoids most stress.

6. Conclusion

LIS professionals are faced with constant challenges in their working environments. This is particularly true for LIS professionals of digital Library Environment, not only because of the role they play inside their libraries but because users expectations always seems to exceed library's capacity in terms of documents, infrastructure facilities, finance, staff etc. In this context the LIS professionals have two choices, either to manage and/or control the events that impact their work and produce stress, or to allow stress to manage them. A certain level of stress is positive and can inspire and motivate. Also important is recognizing that stress and its sources are unique to the individual and his situation.

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EDI Library and Information Centre: *the Focal Point for Nascent Entrepreneurs*

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Abstract: This paper gives a brief overview on information sources available at EDI Library and Information Centre (EDILIC) This enables entrepreneurs, practitioners, academicians and researchers to access the EDILIC resources effectively. This paper serves as a how to guide to EDILIC uses on provides the information services offered.

Keywords: Entrepreneurship, EDI Library and Information Centre, Information Sources, Information Services.

1. Introduction

One of the critical roles of the Entrepreneurship Development Institute of India Library and Information Centre (EDILIC) is to disseminate information on the latest business opportunities to potential entrepreneurs. Most potential entrepreneurs suffer from several constraints, which prevent them from making the entrepreneurial move that leads to setting up of an enterprise. Lack of information and knowledge in identifying and selecting the right kind of business opportunity in keeping with the present day needs and trends is one of the major constraints faced. To identify an opportunity, an entrepreneur needs a lot of information. Young graduates, technical employees, less educated traders, etc. are generally entering business without basic know-how. Identifying the right kind of business opportunities, therefore, becomes a dilemma for them. It is also observed that sometimes evaluation of techno-economic viability of an already existing opportunity becomes difficult due to lack of adequate information.

An entrepreneur can harness information from personal and other sources such as printed literature on existing entrepreneurs, consultants and so on. A number of organizations and publications give valuable information about new business opportunities and products. There are primary and secondary sources of information. Primary sources include information collected directly from the market, whereas secondary sources are those which are published by government organizations, consultants, agencies, publishers, etc.

2. Objective

The main objective of EDILIC is to provide an entrepreneur, with a large number of information sources to enable identify business opportunities and scrutinize them.

3. About EDILIC

Entrepreneurship Development Institute of India is a national resource organization, committed to entrepreneurship development activities through education, training and research. In order to serve the diverse needs of EDI faculty, staff, students, entrepreneurs

and participants of various short term and long term programmes, EDILIC was set up way back in 1983. Enriched with updated information sources on Entrepreneurship and related subjects, it is an information resource centre of national and international repute.

The Library Advisory Committee (LAC) consisting of four faculty members play a key role in shaping the role and functioning of EDILIC. LAC develops policy documents & recommendations. Once the policies are approved by the Director of the Institute, the Librarian is responsible for implementation of same. The Library is managed by a professional Librarian with faculty status supported by five professional colleagues who are qualified in the library and information science field. In order to cater to the needs of its users, the library functions from 8.00 AM to 12.00 AM (midnight) i.e. 16 hours daily on all seven days of a week.

- **Library Automation**

EDILIC has been fully automated through LibSys Software. EDILIC uses Bar Code Technology for its housekeeping and lending service. Bibliographic information about Library holdings can be accessed through "Online Catalogue" through the institutes' websites (**www.ediindia.org** / **www.ediindia.ac.in**).

- **Library Collection**

EDI's library is equipped with a large number of text and reference books on entrepreneurship and related subjects. The EDILIC endeavors to support the teaching, research and academic needs of the faculty, students and participants of the programmes, through books, journals and other reading material. The total collection of EDILIC is more than 30000 which includes books, CDs, back volumes and other materials, selected after carefully scrutinized by the Library Advisory Committee.

4. Reference Material

EDILIC has fairly strong reference materials consisting of:

- Text Books
- Reference Books
- Research Reports
- Handbooks
- Directories
- Serial Publications
- Encyclopedias
- Dictionaries
- Working Papers

- Economic and Industrial Surveys
- Press Clippings
- Biographies of Entrepreneurs
- Project Profiles on Products
- Business Opportunities

5. Journals/Periodicals/Newspapers

EDILIC is subscribing 160 national and international journals in the field of entrepreneurship and related subjects. EDILIC also subscribes to 30 Newspapers published within the country.

6. Audio-Video Collection

EDILIC has a collection of 200 videocassettes produced by EDI and other organizations and 2500 CDs/DVDs/VCDs. The library offers the facility of in-house viewing of video cassettes and CDs/DVDs.

7. Online Databases

EDILIC is subscribing the following online journals/databases:

- **Crisil Research Services**: It provides a one-stop resource for data, information, analysis and outlook on the economy and across industries with an understanding of the macro-economy and extensive sector coverage. It provides unique insights on micro-macro and cross-sectoral linkages.

- **Prowess Database**: This database is provided by Centre for Monitoring Indian Economy and contains a highly normalized database on over 17000 companies. The database is complemented with powerful analytical software tools to enable extensive querying and research.

- **kompass.com:** This database is the world's leading Business-to-Business information in 76 countries. It helps to identify suppliers of products and services, potential partners, research competitors and analyze market sectors for potential opportunities.

- **Emerald Management First 120** is an online library featuring the latest ideas from some of the world's top companies and business schools. It brings a wealth of resources – including over 680 articles, 1,000 case studies, 360 interviews and over 250,000 article reviews. It covers 120 peer reviewed journal articles.

- **Gale Cengage Business & Company Resource Center (BCRC) and Business Insight Global (BiG) BCRC**: It is a journal database which includes brand and trade information, investment reports, stock prices, press releases, etc. BiG is an online

resource which provides business intelligence powered by statistical data. It contains case studies, interactive live charts, global company and country overviews, global industry research reports, academic journal articles, industry overviews, company histories and market share data.

- **J-Gate**: It is an electronic gateway to e-journal literature and it provides access to 6700 indexed and free full text 2000 articles.

- **Indiastat.com**: It provides an oceanic depth of India-specific socioeconomic statistical facts and figures.

- **Trims.com**: It helps to identify the suppliers of machine manufacturers.

- **OECD iLibrary Education:** It is the online library of the Organization for Economic Cooperation and Development (OECD) featuring its books, papers and statistics and is the gateway to OECD's analysis and data. Also, it contains content published by the International Energy Agency (IEA), the Nuclear Energy Agency (NEA), the OECD Development Centre, PISA (Programme for International Student Assessment), and the International Transport Forum (ITF).

8. Information Sources

EDILIC disseminates information through the following sources:

- Product Information Bank (PIB)
- New Product Information
- List of Directories
- Clipping Service on Business Opportunity
- Company Information, Overviews and General Industry Information
- Technology Related Information
- Market Information
- Statistical and Financial Information
- Online Information

All the bibliographic information is available on the Intranet. Members of EDILIC can freely access bibliographic information through LibSys, a user friendly software.

9. Library and Information Services

The Library regularly provides the following services to entrepreneurs:

- Lending Service – Books and Back volumes of Journals are issued to all library members.

- Article Database – Article database contains information on selected articles from core journals subscribed by EDILIC.

- Reference Service – All library members are helped in getting their information instantly.

- Product Information Database – This database contains information on about 6000 product profiles published by various organizations.

- Industrial Information Service – Specific information on product profiles, feasibility study reports, industrial and economic statistics, trade statistics, as also directory information on manufacturers and industrial organizations is provided to users.

- Information and Documentation Services – Information services such as Current Awareness Services (CAS) and Selective Dissemination Services (SDI) are also extended.

- Press Clippings Service – Latest news items pertaining to business and industry are scanned from 18 leading daily newspapers.

- Referral Services – As need be, Library users are directed to other libraries and information centres to get additional/specific information.

- Photocopying Service – EDILIC provides photocopying services to its users at nominal charges.

- Inter-Library Loan Service – Through this service, EDILIC borrows books from other libraries on request by users. Also EDILIC issues books to other libraries of mutual interest.

- **Institutional Membership**

EDILIC is an institutional member of Indian Library Association (ILA), Indian Association of Special Libraries and Information Centres (IASLIC), Management Libraries Network (MANLIBNET) and The British Library, Ahmedabad. Apart from this, EDILIC regularly uses the services of the Ahmedabad Library Network (ADINET) and Information and Library Network Centre (INFLIBNET).

- **Library Membership to External Users**

EDILIC membership is primarily given to the EDI faculty, staff members, students and programme participants of the Institute. In order to fulfill the demands, raised by several institutions and individuals, the EDILIC extends membership to outside users such as Academic Institutions / NGOs / Entrepreneurship Development Cells / outside faculty / entrepreneurs / corporate executives / students, EDI Alumni and OLPE Alumni on payment basis.

10. Conferences/Seminars Organized by EDILIC

- **MANLIBNET 2013:** EDI organized and hosted 15th MANLIBNET 2013: International Conference on Entrepreneurial Approaches to Librarianship jointly with Management Libraries Network (MANLIBNET), New Delhi during December 26-28, 2013. A volume containing 88 papers, published by Bookwell, New Delhi was released during the inaugural function of the conference. Besides papers received from academicians from across the country, seven papers were received from Nigeria, one paper each from Iran and USA. Overall, 200 delegates participated from IIMs, IITs, leading Business and Management Schools, Corporate Sectors, etc. at the conference. The conference aimed at documenting the current state of entrepreneurship in libraries, inspiring future entrepreneurial pursuits among the librarians and providing a roadmap and inspiration for future endeavors.
- **ADINET 2013:** Celebrating Librarian's Day Seminar in the month of August is a tradition followed by ADINET (Ahmedabad Library Network) since long, to salute the father of Library Science Dr. S.R. Ranganathan. During 2014 the Librarian's Day Seminar was organized by EDI jointly by Ahmedabad Library Network (ADINET) and Information Library Network (INFLIBNET) with the theme Redefining Libraries to Create Next Generation Libraries on 10th August, 2013. Eleven papers were presented during the seminar and more than 250 delegates from all over Gujarat benefited from this seminar.
- **MANLIBNET 2008:** EDI has organized the first roundtable conference of MANLIBNET on 17th May 2008. The theme of the roundtable conference was Management Librarians and Their Role in Promoting Research. Over 100 library professionals from across the Gujarat has participated in the conference. In addition to the above the Librarian is also looking after the institutes Biennial Conferences and Alumni Association. He is the Coordinator of the EDI's Biennial Conferences and successfully organized five conferences in 2005, 2007, 2009, 2011, 2013 and 2015.

The Librarian has also conducted various events for Alumni since its inception in 2007.

11. Future Plans

- The EDILIC is proposing to launch a one year Diploma Programme in Entrepreneurial Approaches to Librarianship jointly with MANLIBNET.
- To inculcate entrepreneurial competencies among LIS professionals, EDI Library and Information Centre (EDILIC) conducting the following training programmes for LIS professionals
    1. Entrepreneurial Marketing for Librarians
    2. Librarian Development Programme (LDP) under MANLIBNET
    3. Seminar on Library and Information Science and Knowledge Management

- Digitization of Institutional Repository materials

12. Conclusion

For an entrepreneur, identification of a single or multiple project ideas is crucial for the purpose of converting the entrepreneurial urge into a recognizable form. Search for ideas is a beginning, the first and most significant step in the actual entrepreneurial journey. The EDILIC facilitates entrepreneurs, trainers, teachers, industry officers, small business consultants and others to select and identify the right kind of business opportunities. Concerted efforts are also constantly directed towards updating all aspects of the Library so that it becomes a one-stop, state-of-the-art centre for complete information on the national and international world of business.

Note: The above paper is a revised version of the article entitled *EDI Library and Information Centre: the Focal Point for Budding Entrepreneurs* published in ADINET Newsletter, Vol. 12 No.1, 2005.

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Theme VII: TQM and TQP

Total Quality Management and Its Application in University Libraries of Andhra Pradesh: *A Study on User's Opinion*

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Abstract: This Paper aims to analyses and evaluate the TQM in University Libraries with a view of examining the exposure of facilities and services, quality collection development of library resources in different universities libraries of Andhra Pradesh. And also, examine the library organization and access. Finally it aims to know the user's opinion towards the library professional staff in university libraries. The authors investigate the users through a survey based on structure questionnaire. Various statistical methods have been used for data analysis. The study confirmed that user's are requesting the quality of library resources and services and qualified library professionals in the university libraries of Andhra Pradesh.

Keywords: Quality Libraries, Quality Management, Quality services and University Libraries

1. Introduction

A large number of contemporary organizations across the world have adopted Total Quality Management (TQM) to satisfy customers throughout quality products and responsive services in order to gain competitive advantages. TQM first took its roots in improving quality of physical products, as the measurement of quality performance of such products, but in organizational transformation specifically in bringing about a cultural change, in improving employees moral and in facilitating an empowering working environment for attaining excellent human performance. The philosophy of TQM, is as important to any organization profound growth and sustaining more consistently in the context of continuous changes and ever expanding competition have become overwhelming and all pervasive concerns for all types of enterprises. TQM focuses on the integration and coordination of all activities in a work process and aims at continuous improvement in quality.

2. Need for the study

A number of studies were carried out to assess and evaluate the effectiveness, efficiency, flexibility and competitiveness among the libraries. In this direction the University Libraries are not exception. At present the libraries are facing a lot of problems owing to benchmarking. The reputation and quality of the library services are evaluated with a number of performance indicators. In this direction, a study is carried out to apply the

various aspects to Total Quality Management (TQM libraries. Therefore this study made an attempt to find out how far TQM can be applied to University Libraries.

3. Objectives of the Study

- To evaluate the existing quality level of management;

- To know the availability of facilities and services in different universities libraries in Andhra Pradesh;

- To explore the expectations of library users (External library customers) on quality collection development of library resources;

- To examine the library organization and access; and

- To know the user's opinion towards the library professional staff.

4. Scope and Limitations of the Study

At present (May 2014) there are 43 universities are exists covering the various subjects, established from 1918 onwards. Owing the age and importance the following University Libraries were undertaken for this study, as they are deemed well established.

Table 1 - Category wise List of Universities in Andhra Pradesh under study

Category	S.No.	Name of the University	Year of Establishment
Old Universities	1	Osmania University	1918
	2	Andhra University	1927
	3	Sri Venkateswara University	1954
Young Universities	4	Kakatiya University	1976
	5	Nagarjuna University	1976
	6	Sri Krishnadevaraya University	1976
Special Universities	7	University of Hyderabad	1974
	8	Rasthriya Sanskrit Vidya Peetha	1961
	9	Acharya N.G. Ranga Agricultural University	1982
	10	Sri Padmavathi Mahila Viswavidyalayam	1983

5. Methodology

As stated earlier, the present study is confined only to ten universities of Andhra Pradesh, proportionate stratified random sampling method is adopted to collect data for the present study. A structured questionnaire were designed and distributed among Users in the university libraries.

6. Data Analysis

The data collected from the questionnaires has been analysed to fulfill the stated objectives. For this purpose, Statistical Package for the Social Science (SPSS) software package has been used for the analysis of data. Statistical analysis techniques such as Skewness and Chi-Square test, Likert-type Scale Analysis have been employed depending on the nature of the data collected from the respondents.

Table 2 - Status of User's in Universities

Status	Old Universities		Young Universities		Special Universities		Overall	
	No.	%	No.	%	No.	%	No.	%
Faculty	301	25.51	167	20.67	203	18.97	671	21.94
Research Scholar	343	29.07	271	33.54	308	28.79	922	30.15
PG Student	536	45.42	370	45.79	559	52.24	1465	47.91
Overall	1180	100.0	808	100.0	1070	100.0	3058	100.0

From the Table 2, it is found that the majority of the users 47.91% postgraduate students, 30.15% research scholars, and rest of the 21.94% teaching faculty members. On further analysis of the data, Old universities libraries has got highest i.e. 25.51% of the user faculty, young universities libraries has got highest i.e. 33.54% of the user group of research scholars and Special universities libraries has got highest i.e. 52.24% of the postgraduate student users respectively.

Table 3 - Category of Universities Users' opinion Vs Library Resources

Library Resources	Old Universities (N=1180)		Young Universities (N=808)		Special Universities (N=1070)		Overall (N=3058)	
	Skew ness	Chi-Square	Skew ness	Chi-Square	Skew ness	Chi-Square	Skew ness	Chi-Square
Books	-1.200	301.5	-0.769	153.4	-0.986	378.8	-0.993	113.3
Reference sources	-1.102	211.1	-0.358	257.0	-0.849	198.3	-0.955	518.6
Periodicals	-1.129	213.1	-0.398	61.9	-1.013	255.3	-0.850	218.9
Indexing & Abstracting journals	-0.817	151.9	-0.111	93.6	-0.363	332.4	-0.450	293.3
Thesis/ dissertations	-0.896	166.8	-0.260	98.2	-0.828	261.3	-0.716	198.3

Bibliographies	-0.820	264.6	-0.146	64.6	-0.719	382.5	-0.595	181.3
Manuscripts	-0.032	200.4	0.706	146.8	-0.011	330.9	0.170	234.5
Microfilms/ Microfiche	0.127	104.5	0.785	82.4	0.097	281.3	0.327	316.1
Audio/ Video Sources	0.116	221.0	0.887	199.1	0.177	319.2	0.311	225.7
CD ROM database	-0.181	226.4	0.536	130.4	-0.132	382.3	0.025	152.0
Internet	-1.173	213.1	-0.445	184.6	-1.059	389.2	-0.904	185.5

Table 3 shows the skewness values have been computed for each and every facet of Library and Information Resources in order to determine the relevance and usefulness of library collection for course and research activities of the users in the university libraries of Andhra Pradesh. The collection of books (-0.993), reference sources (-0.955), internet (-0.904) periodicals (-0.850) and thesis/dissertations (-0.716) are in the university libraries is expressed as fully satisfied by the users as they indicated relevant and useful for course and research activities. The users group has no specific opinion regarding the collection of ROM databases (0.025), manuscripts (0.170), audio/video sources (0.311) and microfilms/microfiche (0.327).

The computed Chi Square Test of Goodness Fit Test on all the observation of collection development of Library Resources found to be significant at 0.01 level of significance.

Table 4 - Category of Universities Users opinion Vs Library Organization and Access

Library organization and Access	Old Universities (N=1180)		Young Universities (N=808)		Special Universities (N=1070)		Overall (N=3058)	
	Skew ness	Chi-Square	Skew ness	Chi-Square	Skew ness	Chi-Square	Skew ness	Chi-Square
Directional signs/guides	-1.072	318.3	-0.446	233.4	-1.008	356.8	-0.903	195.4
Consonant of library classification & cataloguing	-1.122	214.0	-0.441	32.3	-0.899	463.1	-0.836	362.1
The printed catalogue is available	-1.332	431.1	-0.250	118.0	-1.299	370.7	-0.959	393.7
The OPAC is available	-0.136	150.0	-0.273	105.8	-0.133	257.2	-0.196	130.4
The OPAC is familiar and satisfactory	-0.490	217.9	-0.234	70.4	-0.374	376.2	-0.394	105.9
Difficult to get relevant information	-0.071	145.8	0.389	161.1	-0.080	303.6	0.046	97.5
Easy to locate the library collection	-0.644	142.1	-0.438	177.6	-0.599	205.9	-0.653	174.2
Library collection are properly shelved	-0.866	137.2	-0.544	170.7	-0.822	189.8	-0.776	88.3

Library materials are resheshed promptly	-0.909	248.3	-0.244	118.2	-0.863	329.0	-0.732	246.8
I am able to obtain the relevant information	-0.866	151.0	-0.182	152.6	-0.810	226.1	-0.637	189.7
Good condition of library materials	-1.167	6.0	-0.234	82.3	-1.163	328.9	-0.888	454.8
Mechanism to tell particular document is available at a given point of time	-0.885	356.1	-0.640	217.0	-0.803	300.4	-0.789	26.2

Table 4 shows majority of the users response on organization of reliability of printed catalogue (-0.959), the clear and meaningful directional signs and guides in the library (-0.903), Library collection and cataloguing (sk-0.840), library materials are in good conditioned (-0.888), classification and cataloguing of library materials are consonant (-0.836), The library collection/materials are properly shelved (-0.776), The library materials are resheshed promptly (-0.732) library materials are found to be consistent in university libraries of Andhra Pradesh expressing as fully satisfied by the users. However, the users of university libraries of Andhra Pradesh are not satisfied towards the search for not got their relevant information (0.046) and organization of library collection and access like OPAC availability for getting and searching reliable information (-0.196).

To substantiate the above statements, the data was computed with the Chi-Square Test of Goodness Fit Test, which reveals that all the facets in the above table found to be significant at 0.01 level of significance.

Table 5 - Category of Universities Users opinion Vs Library Services

Library Services	Old Universities (N=1180)		Young Universities (N=808)		Special Universities (N=1070)		Overall (N=3058)	
	Skew ness	Chi-Square	Skew ness	Chi-Square	Skew ness	Chi-Square	Skew ness	Chi-Square
Knew the library facilities & services	-0.656	120.6	-0.306	176.6	-0.746	148.4	-0.773	482.8
Circulation services	-1.178	235.9	-0.297	174.4	-1.071	358.3	-0.843	370.0
Indexing & Abstracting	-1.024	278.6	-0.418	165.7	-0.960	365.4	-0.858	187.8
Bibliographic	-1.081	280.3	-0.388	134.1	-0.410	220.2	-0.698	308.4
Newspaper Clipping	-0.083	160.6	0.716	173.7	-0.086	346.7	0.098	342.1
Current Content Services	-0.935	262.2	0.516	170.1	-0.340	359.1	-0.556	1209.6
SDI	-0.254	130.3	0.675	174.2	-0.165	387.2	0.016	246.2

Photocopying	-0.716	263	-0.453	99.4	-0.619	450.6	-0.622	133.2
Online Catalogue (OPAC)	-0.762	210.4	-0.110	89.8	-0.259	281.7	-0.597	728.3
CD-ROM services	-0.287	169.7	0.670	262.9	-0.320	407.4	-0.065	399.0
Internet	-1.187	332.1	-0.271	147.4	-1.168	458.1	-0.985	432.6
User Education/ Orientation	-0.774	166.5	0.397	124.6	-0.678	283.5	-0.387	652.6
Inter Library loan	-0.077	180.4	0.611	200.1	-0.082	351.7	0.084	278.6

Table 5 describes the response from the users on the university library services offered by the university libraries of Andhra Pradesh. The opinion from the users is well about the information services extended to the user community by the university libraries in Andhra Pradesh (-0.773). From the table, it is clear that, the users are fully satisfied with internet (-0.985), indexing and abstracting (-0.858), circulation services (-0.843), bibliographic service (-0.698), photocopying (-0.622). However, the users could not make demarcation about the satisfactory or dissatisfactory of library services viz. newspaper clipping (0.098) Selective Dissemination of Information (0.016) and inter library loan (0.084).

The computed Chi-Square values for the Library and Information Services are found to be significant at 0.01 level of significance.

Table 6 - Category of Universities Users opinion Vs Library Professional staff

Professional Staff	Old Universities (N=1180)		Young Universities (N=808)		Special Universities (N=1070)		Overall (N=3058)	
	Skew ness	Chi-Square	Skew ness	Chi-Square	Skew ness	Chi-Square	Skew ness	Chi-Square
Staff attend promptly	-1.052	165.7	-0.513	132.6	-0.592	323.6	-0.716	160.8
Staff are near to the readers	-0.943	206.3	-0.004	116.2	-0.862	272.8	-0.667	548.1
Staff take personnel interest	-0.650	249.1	-0.521	105.0	-0.551	395.2	-0.585	85.9
Staff are efficient skills	-0.916	217.1	-0.294	84.2	-0.638	426.4	-0.707	404.1
Staff available at reference desk	-1.040	273.2	-0.120	86.6	-0.982	366.6	-0.711	329.2
Ability of staff to providing services	-0.849	215.3	-0.235	79.0	-0.813	313.5	-0.740	344.4
Staff teach, use catalogue & etc.	-0.631	209.6	-0.297	79.0	-0.567	350.9	-0.527	266.6
Staff encourage me	-0.344	194.3	-0.324	113.3	-0.413	361.0	-0.363	25.3
Provide correct	-	132.2	-0.111	105.0	-	213.7	-0.476	305.6

answers to my queries	0.582				0.533			
Do not pass my query to other staff	-0.933	218.6	-0.153	107.9	-0.929	299.9	-0.795	570.4
Understand easily the information	-0.621	123.2	-0.384	140.0	-0.547	216.0	-0.580	176.0
Directing me to resourceful libraries	-0.489	229	0.015	120.9	-0.382	371.1	-0.306	172.7
Availability of knowledgeable staff	-1.064	233	-0.521	101.8	-1.127	310.6	-1.026	348.5

From the Table 6, it is found that, most of the users are fully satisfied with the all facets of library professional staff. Promptness of library staff (-0.716), strong communication ability (-0.740), efficiency of library professionals in providing relevant materials from the library collection (-0.707) shirking responsibility (-0.795), user orientation (sk-0.762) and who are always available at reference desk (sk-0.711).

The observations made on all the facets of university library professionals found to be significant at all 0.01 level of significance in Chi-Square Test.

Table 7 -Category of Universities Vs Library Infrastructure Facilities

Infrastructure Facilities	Old Universities (N=1180)		Young Universities (N=808)		Special Universities (N=1070)		Overall (N=3058)	
	Skew ness	Chi-Square	Skew ness	Chi-Square	Skew ness	Chi-Square	Skew ness	Chi-Square
Adequate staff	-1.123	246.5	-0.452	127.6	-1.086	391.3	-0.968	340.2
Sufficient: research cabins	-0.396	160.3	-0.083	125.8	-0.260	412.5	-0.252	68.4
Convenient furniture's	-1.023	225.6	-0.181	138.6	-1.067	347.1	-0.833	461.7
Lighting and ventilation	-0.988	205	-0.380	248.6	-0.963	394.5	-0.808	171.4
Suitable humidity/ temperature	-0.638	381.5	-0.335	95.8	-0.554	514.3	-0.485	250.4
Maintaining toilets	-0.764	177.6	0.344	179.5	-0.684	252.3	-0.444	451.8
Peaceful study halls	-1.072	269.7	-0.332	146.3	-1.029	445.6	-0.819	190.9
Good library building	-1.022	229.1	-0.464	171.2	-0.993	423.4	-0.837	124.6
Drinking water	-0.736	123.3	0.585	198.9	-0.702	189.0	-0.515	1057.7
Feedback mechanism	-0.457	148.5	-0.302	117.5	-0.332	436.1	-0.365	57.7

Attractive interiors	-0.816	147.8	-0.187	53.7	-0.759	204.3	-0.627	264.2
Grievance cell	-0.302	152.6	-0.289	125.4	-0.355	263.4	-0.339	81.2
Photocopier	-0.781	178.8	-0.330	226.5	-0.722	237.0	-0.633	89.4
Audiovisual aids	-0.082	149.3	0.446	140.7	-0.027	388.9	0.099	343.4
Computer systems	-0.344	225.4	0.224	165.1	-0.447	413.4	-0.243	219.0
Microfilm/Microfiche readers	-0.011	172.5	0.297	227.7	0.007	368.4	0.073	124.4
Printers	-0.343	80.9	0.253	298.1	-0.208	418.0	-0.121	188.0

From the table 7, it is found that the majority of the users in the university libraries of Andhra Pradesh expressed their fully satisfied with the library infrastructure facilities such as library opening/closing hours (-1.010), adequacy of staff (-0.968), safely library building (-0837), suitable furniture (-0.833), silent reading halls (-0.819), sufficient photocopiers machines (-0.815), lighting and ventilation (-0.808), good working conditions of photocopier (-0.633) and attractive interiors (-0.627). However, the users could not make demarcation about the satisfactory or dissatisfactory of library services viz. good conditions of Audiovisual aids (0.099), microfilm/microfiches (0.073), Printers (-0.121), computer systems (-0.243).

7. Major Findings

- The users in the older universities library system are satisfied with the relevance and usefulness of quality books, reference sources, periodicals and Internet access facilities. However, the users in the universities libraries of Andhra Pradesh are like microfilm/microfiche, audio/video sources, CD-ROM databases, bibliographies have been considered as least useful and relevant to their course related activities.

- The users in the universities libraries environment of Andhra Pradesh are satisfied with the library organizational tools like Printed catalogue, classification and cataloguing, directional signs and guides, reference collections, proper and prompt shelving of library collection and its god conditions and also retrieval tools.

- The facilities and services extended in the university library are known to the users. However they are satisfied towards the remaining information services extended to them in the older universities libraries of Andhra Pradesh.

- The users of the universities are fully satisfied with the library professionals inviting ability and attending the query promptly with their strong grasping power, making themselves available at all the service points of the library. As regards to the remaining features of the library professionals, the customers are passive.

- The users are highly satisfied with quality infrastructure facilities available in the older universities libraries of Andhra Pradesh. They are: library opening/closing

hours, adequacy of library staff, silently reading halls, suitable library furniture, sufficient lighting/ventilation, reading hall, safety/security in the library, Library building and photocopiers. However, they are dissatisfied with the conditions of Audio visual aids, microfilm/microfiche readers and also availability of computers.

8. Suggestions

- The university library has to develop a need-based and quality collection of information sources with latest editions, which are relevant and useful for course and research activities of the users. Further, provisions for multiple copies of text books are made.

- The information services especially reference service, documentation service and reprographic service has to be improved considerably in extending personalized quality based services to the users.

- As the customers in the university environment are not much aware about the significance of secondary tools like bibliographies, Indexing and Abstracting Sources, efforts should made by the library managers in imparting the importance of these information sources as a basic tool for pursuing research by conducting user orientation as a regular feature of the library.

- The library collection has to be properly organized and re-shelved promptly by making provision of directional signs and guides. The library materials should be maintained in good condition.

- The classification and cataloguing tools act as a mirror of the library and therefore, classification and cataloguing of library materials should be consistent and updated regularly for providing access to quality collection to the customers.

- The library staff should attend the customer problems very carefully by providing timely service and accurate answers to a query. They should be courteous, have good attitude with helping nature to treat the library customers with respect and smile; conformance to the customer's requirement is centrifugal for TQM. The university libraries that are caring the customer's perceptions and expectations will certainly move towards the service quality culture in the university library system.

- The library services processes and practices should be planned keeping in view of the customer needs and demands. The librarian should give an opportunity to the library professionals for developing work process of the library. A joint team effort has to be made in improving the work process, procedures and practices for quality culture.

- The infrastructure facilities like research cabins; lighting and ventilation, drinking water facility, toilet facility; gardening and generator facility has to be strengthening the quality dimension of Tangibility.

- Adequate financial provision should be made to procure books and periodicals and also up gradation of computer infrastructure and thereby meeting the nascent information needs of the customers.

9. Conclusion

The success and sustenance of libraries in future depends upon their capability to be more dynamic and continually to prove their value in academic and research endeavor. The only alternative left to the university libraries is to adopt TQM in all the integrated library activities and services and thereby contribute to the productivity and accomplishments of the customer expectations. The university library systems had a variety of reasons for implementing and promoting TQM, due to increase demands for quality service from the customers, impact of information technology and rising costs, resulting from inflation were becoming the standard for today's university systems. Greater efficiency, improved service and optimum utilization of resources are the reasons for undertaking TQM in the university library systems. The importance of quality has been in the past and this will march into the future and remain as key strategic importance to the librarianship. But the ultimate goal in obtaining highest quality products and services remain as an integral part of our library profession's ethos and no matter what modern management tools do we apply in search of "Quality".

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Assessing Library Service Quality (LSQ) at Rajiv Gandhi National Law University, Patiala

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Abstract: The present study aims to assess the library service quality (LSQ) and user satisfaction at Rajiv Gandhi National Law University (RGNLU), Patiala (Panjab), India. Survey method was used for collecting data. Library service quality was measured by using LibQUAL scale. A total of 116 questionnaires were analyzed. The findings of the study show that there is significant difference in the desired andperceived level of respondents about LSQ .Further significant difference was also noted in the perceived level of LSQ across the status of respondents. All the three LSQ dimensions i.e. Affect of service (AS), Information control (IC), and Library as a place (LP) were positively correlated with the degree of user satisfaction. Regression analysis reveals thatIC and LP significantly predict user satisfaction account for 47.1% of variance.

Keywords: User Satisfaction, LibQUAL, Library Service Quality (LSQ), RGNLU, Patiala

1. Introduction

University Libraries play a vital role to achieve academic excellence and realize the overall mission of its parent organization by providing comprehensive resources and services to meet the research, teaching, and learning needs of the University community. The primary aim of an academic law library is to meet the academic and legal research requirements of their specific community of patrons. Since libraries are the service providing institutions therefore, it is essential to assess the expectations & perceptions of library users to determine the Library Service Quality (LSQ). Moreover, success of any library depends upon how well a service satisfies the demands placed upon by the users. Feedback form library users would help libraries to find the areas where improvement is required and hence ultimate goals can be achieved. Therefore, there are a number of reasons convincing libraries to evaluate quality of library services from user perspective.

2. Literature Review

A number of studies have been carried out to assess Library Service Quality and user satisfaction using SEVQUAL, SERPERV, LibQUALmodels etc. Selected studies have been reviewed here, which were carried out using LibQUAL+ survey. Asemi et al. (2010) conducted a comprehensive research study aims to urge the new culture of assessment of the quality of library services among Iran academic libraries and to measure the overall services quality of libraries from the users' perspectives based on the LibQUAL model.

Larijani and Sadat Hosseini (2010) assessed the quality of library services in the Governorate of Golestan province, as judged by the user perspective measured through the LibQUAL assessment tool. The population of study was members of County Library and includes internal and external corporate users, researchers, students,faculty and students.Mardani(2014) measured service quality at Tehran University of Medical Sciences libraries using LibQUAL+ model. The results show that the quality level of services in these libraries is lower as the services superiority gaps for all the services in the libraries were negative. Pedramnia et al. (2012) investigated the quality assessment of services provided by the MUMS libraries and determining user satisfaction and expectations of library services in the LibQUAL dimensions. On the basis of Gap analysis they found that the quality of libraries is lower than expected.In his study Kemp(2002) examined the service quality of Texas Tech University Libraries based on LibQUAL+ survey. Findings reveals that the service quality was below the minimum acceptable level.Rehman (2012) studied the expectations of Pakistani libraries users and reported that users level of expectations of service quality is very high. The highest expectations were found on LP dimension and lowest were related to AS dimension. Furthermore it was found that minimum expectations were significantly different from desired expectations. The present study is conducted to assess the library service quality at Rajiv Gandhi National Law University, Patiala.

3. Objectives of the Study

The main objective of this study was to evaluate the LSQ in RGNLU and to answer the following research objectives:

- To assess the desired and perceived level of LSQ.
- To explore the significant difference between desired and perceived level of LSQ.
- To examine the degree of users satisfaction.
- To identify the relationship between user satisfaction and perceived library service quality.

4. Hypotheses

- There is no significant difference in desired and perceived level of LSQ and its dimensions.
- There is no significant difference in the gap between desired and perceived LSQ and its dimension in respect of status of users.
- There is no significant difference in perceived level of LSQ and its dimensions in respect of users' status.
- The level of user satisfaction is not more than average level of satisfaction.
- There is no significant relationship between perceived level of LSQ and its dimension with degree of users' satisfaction.

- Perceived level of service quality have no significant impact on user satisfaction.

5. Methodology

Based on the objectives of the study, survey method was used for this study using LIbQUAL+ tool as data collection instrument. The questionnaire consists of three sections. The first section contains 22 items for three dimensions of Library service quality i.e. Affect of service (AS) – 9 items, Information control (IC) - 8 items and Library as place (LP) – 5 items. The second part consists of 5 local questions on library service provisions. The third sections covered 3 items on library outcome, 3 items on library satisfaction, 2 items on library use pattern and demographic information like gender, status of respondents and duration of stay in the university. Nine point Likert scale was used with "1" being "strongly disagree" and "9" being "strongly agree". The library users were invited to participate via an e-mail announcement that directed them to a link of web-based questionnaire. In addition125 the researchers also personally administered printed questionnaires. A total of 116 complete and valid questionnaires, were analyzed with the help of IBM-SPSS software, version-22.0.

Table 1 Demographic Profile of the respondents

Demography	Status	Frequency	%
Gender	Males	54	46.6%
	Females	62	53.4%
Status	UG	71	61.22%
	PG	25	21.55%
	RS	9	7.75%
	Faculty	11	9.48%
Duration of Library use	1st	35	30.1%
	2nd	21	18.1%
	3rd	22	19%
	4th	24	20.7%
	Above 5 Yrs	14	12.1%
Frequency of Library Visit	Daily	60	51.7%
	Weekly	37	31.9%
	Monthly	16	13.8%
	Quarterly	1	0.9%
	Rarely	2	1.7%
Frequency of access to the Library website	Daily	35	30.1%
	Weekly	59	50.9%
	Monthly	14	12.1%
	Quarterly	7	6%
	Rarely	1	0.9%
	Total	116	100%

6. Data Analysis

The analysis of data is presented in the tables as per the objectives of the paper.

Table 1 presents the socio-demographic details of 116 respondents. 53.4% of the respondents were females and 46.6% were males. Majority of respondents (61.22%) were undergraduates. 30.1% of respondents were using the library for past one year and only 12.1% were having more than 5 year experience of library use in the university. Two elements had been analyzed related to respondents' frequency of visits to the library and frequency of access to library website. A total of 97 (82.9%)respondents physically visit the library daily or weekly and more than half of the respondents i.e. 59 (50.9%)access the library website weekly.

|	
LP-1: Library space that inspires study…	8.18
LP-2: Quiet space for individual activities	8.07
IC-7: Making information easily…	8.07
IC-6: Easy-to-use access tools that…	8.05
IC-5: Modern equipment that lets me…	8.03
AS-3: Employees who are consistently…	8.03
LP-5: Community space for group…	7.97
AS-7: Employees who understand the…	7.97
AS-6: Employees who deal with users…	7.97
IC-3: Printed library materials I need for…	7.96
AS-5: Employees who have the…	7.94
AS-4: Readiness to respond to users'…	7.93
IC-1: Making electronic resources…	7.89
AS-8: Willingness to help users	7.87
LP-3: Comfortable and inviting location	7.86
LP-4: Getaway for study, learning, or…	7.85
IC-4: Electronic information resources I…	7.77
AS-9: Dependability in handling users'…	7.74
IC-8: Print and/or electronic journal…	7.58
IC-2: A library Web site enabling me to…	7.54
AS-1: Giving users individual attention	7.47
AS-2: Employees who instill confidence…	7.17

Figure 1 Mean scores of desired level of service

The Figure 1 shows mean scores of desired level of services by respondents given in the descending order. The respondents most desired item is library space that inspires study and learning (8.18) followed by quite space for individual activities (8.07), making information easily accessible available for independent use (8.07) and so on. However, the Employees who instill confidence in users is the least desired level of service (7.17).
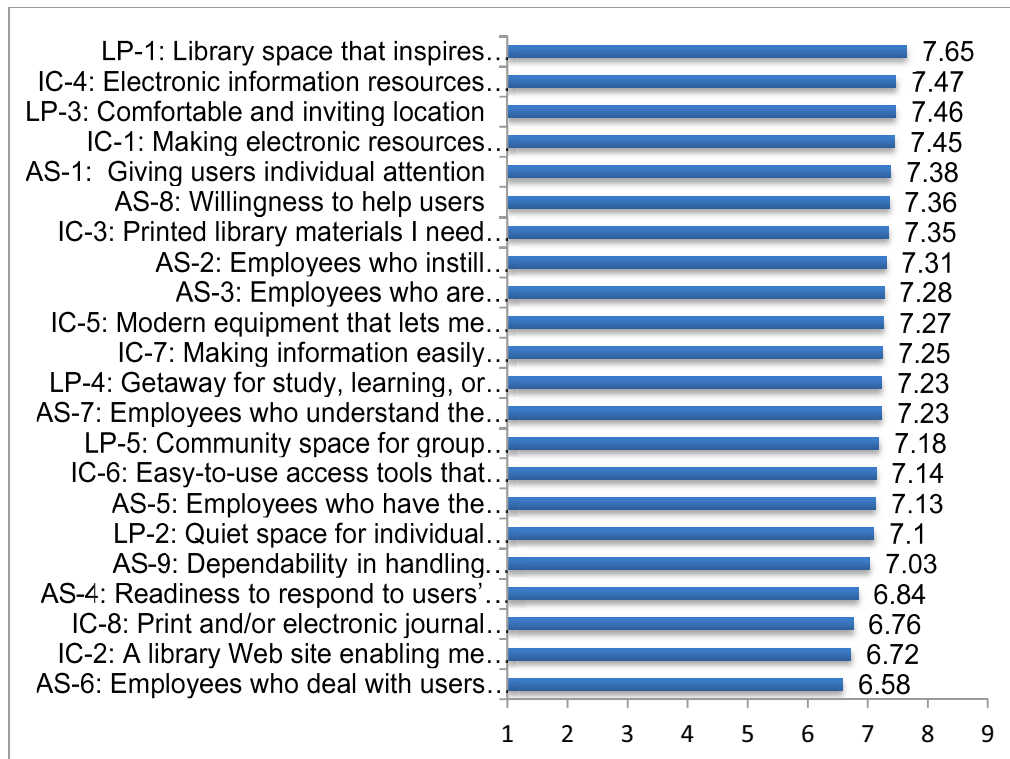
Figure 2 - Mean scores of perceived level of service

The Figure 2 shows mean scores of perceived level of services as experienced by respondents given in the descending order the respondents most perceived item is library space that inspires study and learning (7.65) followed by electronic information resources I need (7.47), Comfortable and inviting location (7.46) an so on. Whereas Employees who deal with users in a caring fashion the least perceived level of service (6.58).

Table 2 Paired sample t test for difference in mean scores

Items		N	Desired level Mean ± SD	Perceived level Mean ± SD	Mean Diff.	T Value	P value
AS-1	Giving users individual attention	105	7.54±1.611	7.25±1.674	1.770	1.770	.080
AS-2	Staff who instill confidence in users	108	7.47±1.537	7.03±1.531	3.188	**3.188**	**.002***
AS-3	Staff who are consistently courteous	110	7.74±1.690	7.46±1.668	1.665	1.665	.099
AS-4	Readiness to respond to users' questions	112	7.94±1.441	7.65±1.564	1.950	1.950	.054
AS-5	Staff who have the knowledge to answer user questions	111	7.93±1.326	7.38±1.402	3.829	3.829	**.001***
AS-6	Staff who deal with users in a caring fashion	111	7.85±1.316	7.36±1.560	3.237	3.237	.002
Staff	Employees who understand the needs of their users	109	7.86±1.548	7.31±1.507	3.880	3.880	**.001***

AS-8	Willingness to help users	113	7.97±1.430	7.45±1.535	4.091	4.091	**.001***
AS-9	Dependability in handling users' service problems	98	7.77±1.569	7.47±1.694	4.016	4.016	**.001***
IC-1	Making electronic resources accessible from my home/ office	107	7.96±1.566	6.84±1.683	5.659	5.659	**.001***
IC-2	A library Web site enabling me to locate information on my own	112	8.07±1.400	7.14±1.593	4.917	4.917	**.001***
IC-3	The printed library materials I need for my work	101	7.89±1.341	7.13±1.534	4.421	4.421	**.001***
IC-4	The electronic information resources I need	109	8.03±1.424	7.23±1.451	4.891	4.891	**.001***
IC-5	Modern equipment that lets me easily access needed info.	111	8.18±1.063	7.23±1.572	5.883	5.883	**.001***
IC-6	Easy-to-use access tools that allow me to find things myself	114	8.03±1.379	7.10±1.499	1.833	1.833	.070
IC-7:	Making information easily accessible for independent use	110	8.07±1.290	7.28±1.369	6.215	6.215	**.001***
IC-8:	Print and/or electronic journals, I require for my work	105	8.05±1.410	7.18±1.592	5.094	5.094	**.001***
LP-1	Library space that inspires study and learning	109	7.58±1.663	6.72±1.758	4.141	4.141	**.001***
LP-2	Quiet space for individual activities	112	7.87±1.436	6.76±1.856	5.359	5.359	**.001***
LP-3	A comfortable and inviting location	108	7.97±1.286	7.35±1.805	3.304	3.304	**.001***
LP-4	A getaway for study, learning, or research	112	7.97±1.545	7.27±1.835	3.932	3.932	**.001***
LP-5	Community space for group learning and group study	109	7.17±2.045	6.58±1.911	2.654	**2.654**	**.009***

Table 2 shows paired sample t-test between the desired and perceived level of service quality items. Paired sample t-test was done at the .05 level of confidence. The result shows that most of the items have significant difference in desired and perceived level of service quality as p values=<.05. This indicates to reject null hypotheses, which means that there was significant difference between perceptions and expectations of service quality.

Table 3 Paired sample t test for difference in mean scores of LSQ dimensions

Dimension	N	Desired level Mean ± SD	Perceived level Mean ± SD	Mean Diff.	T value	P value
AS	116	7.77±1.068	7.35±1.193	.428	**4.39**	**.001***
LP	116	7.71±1.113	6.94±1.472	.775	**5.32**	**.001***
IC	116	8.01±1.024	7.12±1.092	.891	**7.60**	**.001***
LSQ	116	7.84±0.934	7.18±1.063	.662	**6.91**	**.001***

Table 3 shows paired sample t-test between the dimensions of desired and perceived level of service quality rendered by the university. Significant difference in mean scores was detected in desired and perceived level of service quality as p values = 0.001, (<.05). This indicates to reject null hypotheses, and significant difference was noted between perceptions and expectations of all the dimensions of service quality. The maximum mean gap i.e..891 was observed in the IC dimension, whereas minimum gap i.e. .428 was found in affect of service dimension.

Table 4 Analysis of variance of perceived service level across users' status

Dimension	Status	N	Mean	SD	F value	P value
ASPER	UG	71	7.13	1.170		
	PG	25	8.10	.782		
	RS	9	7.12	1.024	**4.705**	**.004**[*]
	Faculty	11	7.19	1.628		
	Total	116	7.35	1.193		
LPPER	UG	71	6.59	1.575		
	PG	25	7.77	.879		
	RS	9	7.27	.889	**4.574**	**.005**[*]
	Faculty	11	7.05	1.534		
	Total	116	6.94	1.472		
ICPER	UG	71	6.88	1.053		
	PG	25	7.70	.990		
	RS	9	7.56	.705	**4.417**	**.006**[*]
	Faculty	11	7.00	1.326		
	Total	116	7.12	1.092		
PER	UG	71	6.93	1.035		
	PG	25	7.90	.742		
	RS	9	7.33	.750	**5.872**	**.001**[*]
	Faculty	11	7.09	1.398		
	Total	116	7.18	1.063		

Analysis of variance was applied in table 4 totest the significant difference in the perceived level of LSQ with respect to status of users if any. There was difference in the mean scoresof LSQ and its dimensions across status of respondents. Mean scores of postgraduate respondents was more than other respondents. This indicates to reject null hypotheses, and significant difference was noted between perceived level of LSQ and its dimensions as p value =<.05.

Table 5 One sample t – test for significant degree of users satisfaction

Items	Test Value = 5				
	N	Mean ± SD	Mean Difference	t	P value
In general, satisfied with the way I am treated at the library.	111	5.74±1.838	.74	4.236	**.001***
In general, satisfied with library support	11	5.75±1.828	.75	4.328	**.001***

for my learning, research.	0				
Rate overall quality of service provided by the library	11 1	5.84±1.671	.84	5.283	**.001***
Overall Satisfaction	11 6	5.76±1.457	.76	5.610	**.001***

In table 5, one sample t-test was to find out degree of user satisfaction with library service quality with a test value of 5. The analysis indicates that mean scores of all three questions to measure the degree of users satisfaction was more than 5 test value, which indicates that the respondents were moderately satisfied with library services rendered by the library.

Table 6 Correlation between Users satisfaction and LSQ dimensions

	ASPER	LPPER	ICPER	PER
Overall Satisfaction	.568**	.596**	.618**	.677**
	.000	.000	.000	.000
	116	116	116	116
**. Correlation is significant at the 0.01 level (2-tailed).				

Table 7 Regression Analysis

Model	R	R^2	Adjusted R^2	Std. Error of the Estimate	F Change	Sig. F Change
1	.618a	.382	.376	1.150	70.429	**.000***
2	.686b	.471	.461	1.069	18.996	**.000***
a. Predictors: (Constant), ICPER						
b. Predictors: (Constant), ICPER, LPPER						

Coefficientsa						
		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	-.110	.707		-.156	.877
	ICPER	.824	.098	.618	**8.392**	**.001***
2	(Constant)	-.649	.669		-.970	.334
	ICPER	.551	.111	.413	**4.978**	**.001***
	LPPER	.358	.082	.362	**4.358**	**.001***

The impact of independent variables (i.e.AS, LP and IC) ondependent variable (user satisfaction) was determined via multiple regression analysis in table 7.The adjusted R^2 = 0.471 accounted for 47.1% variance in dependent variable is explained by the independent variables. Significant value is set at 95% significance level. Hypotheses were investigated to check the impact on user satisfaction byLSQ dimensions. IC has highest standardized beta coefficient value i.e. 0.824 followed by LP with value i.e. 0.358 signifying that these two dimensions predict library user satisfaction. AS is not significantly effecting user satisfaction.

7. Findings and Conclusion

The study attempted to assess the LSQ at RGNLU, Patiala. The findings of the study revealed that 82.9% of the total respondents physically visit the library daily or weekly and more than half of the respondents i.e. 59 (50.9%) access the library website weekly. The most desired LSQ item was library space that inspires study and learning (8.18) followed by quite space for individual activities (8.07), making information easily accessible available for independent use (8.07) and so on, but perceived service level of LSQ items differ from the desired service level. Library space that inspires study and learning... (7.65) followed by electronic information resources I need... (7.47) and Comfortable and inviting location (7.46) were ranked high in the perceived service level. The significant difference in perceived and desired service level was noted among most of the LSQ items and all the three LibQUAL dimensions. Moreover the maximum gap was found in the IC dimension. Postgraduate respondents have the maximum perceived mean scores and significant difference was observed in the perceived LSQ level across status of respondents. The study also investigated that the respondents were moderately satisfied with services rendered by the library. Information control dimension, which represents the library collection and information resources determine the maximum degree of user satisfaction. Regression analysis also revealed that perceived level of IC and LP significantly predicts the degree of user satisfaction.

On the basis of findings, there is need to make efforts to improve the affect of service dimension which consists of item related to library staff and their interaction with respondents. The findings of LibQUAL survey can help the library to focus the areas, where improvement is required. The regular assessment of library service quality can serve the university administration to evolve a strategic planning for library services to meet the user needs effectively.

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