

**Emerging Technological Tools And Services to Building World Class Paper Less Library Information & Management System [LIMS]**

[Concept of comprehensive Library Automation and impact of Emerging Technology & Services in Universities/College Libraries in INDIA]

Dr. Chandrashekhar Uppin

HOD, Department of Computer Science
Faculty of Computing and Applied Sciences
Baze University, Jabi Abuja (Nigeria)
cv.uppin@bazeuniversity.edu.ng
cvuppin@gmail.com

Abstract :

Library automation is just not a book inventory where hold, issue and receiving of books by using technological tools and services. Our applied research was found that most of the library administrative functionalities such as 'Acquisition and Accessioning', 'auto Indexing & Classification' and auto Cataloging (Books & Non books materials)', inventory with real-time OPAC facilities and many more library science concepts are still missing constructs in Universities/College libraries across the country.

In this modern era the concept of eLibrary is more popular because availability and accessibility of digitized content sharing through IT/ICT infrastructure is huge. During our research we found that cognizance of Library automation was completely ignored and focused on only talking and establishment of eLibrary. As we all know that "Physical Library" is not a substitute for "eLibrary". In fact *eLibrary is part of a Physical Library to share authenticated digitized content through IT/ICT infrastructure*. After a decade of our applied research in the area of Library science, eventually we recorded a lot of findings based on our survey and discussion with senior researchers and Librarians. Our serious and consistent effort makes to succeed in designing comprehensively effective and efficient operational strategies to build a "world class Library Automation and Paper less Library Management System" for Universities/College libraries.

This paper emphasizes about the comprehensive real-time architecture and operational modules and their effectiveness to achieve the user's satisfaction (flow of functionalities as per the exact need of the Library Management system). This dealt with how emerging technological tools and services are effectively integrated for designing new strategies in the area of library science includes various automation process and security concepts (using Barcode/Rfid). Eventually, our dream comes true in building *Use of Emerging Technological Tools and Services to building world class Paper less Library Information & Management System [LIMS]*, presently deployed and use of this software product in more than 300 satisfied and client locations in INDIA, this product popularly named as "eLib" by AarGees Business Solution, Hubli, India. Though, our research is still on and continuing for further development to build "Global knowledge sharing Centre".

Index Terms: Library Automation, Indexing & Classification, cataloging, OPAC & WEB OPAC, RFID, BarCode, Acquisition Process, eLibrary, Technological Tools.

Research Type : Applied Research accomplish and on Author Concepts

I. Introduction

It is the smart move in the current era to apply and enjoy the uses of Contemporary Technology and Services to strengthen the universities/college libraries to maintain their day-to-day housekeeping

routine and quality services to its stakeholders. Further developments in library science concept at information resource centers; the rapid growth in the area of Contemporary Technologies and Services have completely changed the library scenario and had a tremendous impact on academia environment. However, in the current era concept of library automation is not a new in libraries. It is noted that comprehensive services such as 'Acquisition and Accessioning', 'auto Indexing & Classification' and 'auto Cataloging (Books & Non books materials)', inventory with real-time OPAC facilities with customized auto report generation and many more library science concepts are still missing constructs in Universities/College libraries.

This paper discusses our research outcome, design & development strategies for entire library operations by integrating the comprehensive technological tools and services in academia libraries to strengthen the quality, fast and accurate services on fingertip so as to achieve to build world class "Library Automation and Paper less Library Management System". Eventually, after a decade of our research we have achieved comprehensive flow of operational module functionalities and their effectiveness as per the exact need of the Library Management system in academia libraries to have the user's satisfaction.

Why library automation & automation priorities in libraries?

It seems to be very fundamental and is essential to emphasize this aspect as the library automation and yet to take-off in majority of the Indian Universities/College libraries to justify the need for library automation more than cost-effectiveness, benefits/services derived by the library users. Subsequently library does not happen to be an economic entity and such benefits need to be looked in a different perspective. Libraries are the key knowledge sharing point in academia environment for students, staffs and researchers.

Library automation may be defined as the application of ICT in the day to day operations of the library. Jayaprakash and Balasubramani, (2011) most of the academia libraries are in initial stage of their computerization, priorities on automating library house-keeping activities. These are most rudimentary and depending on the type and size of the libraries to make the automation process stronger and the success for providing better services to its stakeholders. Circulation control may be given first priority in a public library while serials control may be given a top priority in a special library. Similarly, acquisition and accessioning may be computerized first in a academia library to control the fund flow and management. However Indexing, Classification and cataloguing activities are important for any library and its computerization is one of the high priority. Amekuede (2005) argues that the cataloguing operation is the first library housekeeping operations to be automated when a library decides to automate. Saffady (1989), Sahu, et al. (2005).

In the current IT era, many researchers have discussed about availability and integration of various technological tools and services to build Library automation system and is more easier also cost effective. Mainly in terms of content/information repository system, fast searching & retrieval, information sharing by using IT/ICT (Information Technology/ Information and communication Technology) with adequate network infrastructure planning. It reduces the work stress of library staff and helps in getting the information immediately (International Journal of Library and Information Science Vol. 2(7), pp. 143-147, October 2010)

Justification for library automation:

1. Increases the processing efficiency than a manual system.
2. Financial savings or continuing cost in certain cases where cost saving has been realized through automation.
3. Improve the library facilities and services.
4. Make library administration and management more efficient and productive.
5. Avoid duplication of the work.
6. Facilitate resource sharing and increase technical processing efficiency over a manual system.
7. Improved monitoring and controlling system.

Eventually, based on our applied research it becomes necessary to highlight the advantages of library automation at different levels that are visualized at:

i. Library housekeeping operations :

1. Auto Acquisition and Accessioning
2. Auto Indexing & Classification
3. Auto Cataloguing (Books & Non books materials)
4. Physical Stock Verification with Barcode /RFID facilities
5. Book inventory and Auto Statistical report Generation
6. Members Record Keeping
7. Auto Circulation
8. Periodicals

ii. Information services

1. OPAC/WEB-OPAC
2. Intra, Internet and cloud Services
3. SMS and E-mail Services (Auto due reminders)
4. Digital library services

iii. Library networking

1. Inter Library Networking (WAN)
2. Intra Library Networking (LAN)
3. Cloud technology

II. Objectives of Research

Based on our applied research, discussions with senior researchers and librarians we focused on the following areas to build proposed system architecture (discussed further in this paper).

- ✓ Tracking & Monitoring of the Current Library Stock Value
- ✓ Tracking of the Budget (Budget allocation, distribution, Planning & Monitoring)
- ✓ Tracking of Books, Journals & Non Book materials
- ✓ Tracking of Library unitization status for each member
- ✓ Tracking and accessing library items by any member
- ✓ Faster and easy to search books, Journals & Non book materials (online and offline)
- ✓ Eliminate human intervention completely for all types of Library operations and Transactions (Issue/Receive, reservation and physical stock verification etc.,)
- ✓ Enormous control on missing of Books, Journals & Non Book Materials
- ✓ Security and quick search aid by integrating new technology (e.g. Barcode/RFID Security and enabling web access facilities etc.,)

III. Research Methodology

In our research study we used applied research methodology based on live supervision, constant discussion with senior researchers and senior librarians at various levels and their feedbacks and suggestions. Applied questionnaire-based survey for distance mode to ascertain status of selected library computerization and collected formal and informal sources from different selected institutional libraries. On our detailed research data and information gathered we have designed new frame of strategies to build the 'new library automation modules and services'. During research process we investigated that 90% of libraries in Karnataka state, India were identified having basic infrastructure problems to start the library automation process. Gradually and consistently, we found that based on our new research strategies and our further discussion with librarians personally, they understood the

needs for the library automation and its automation services.(ISSN 2141 – 2537 ©2010 Academic Journals). Eventually our constant effort in doing research and interaction with various institutional librarians we finally understand their exact needs for library housekeeping modules and operations.

IV. Empirical Analysis

During our recent analysis we clearly defined the merits and demerits of pre and post library automation and its services. Our recent (2014) survey analysis study has demonstrated that 27.5% of the libraries in north Karnataka-INDIA are deployed and using our product (E-lib) and services, 27.5% of the libraries are using different products and 35% libraries are still needed to automate their library services. According to the analysis 65% of the libraries are automated shown in graph Figure-1 and Frequency Table -1.

Pragmatically our analytical study shows the critical causes for not deploying the library automation in their libraries demonstrated in graph Figure-2 and Frequency Table -2.

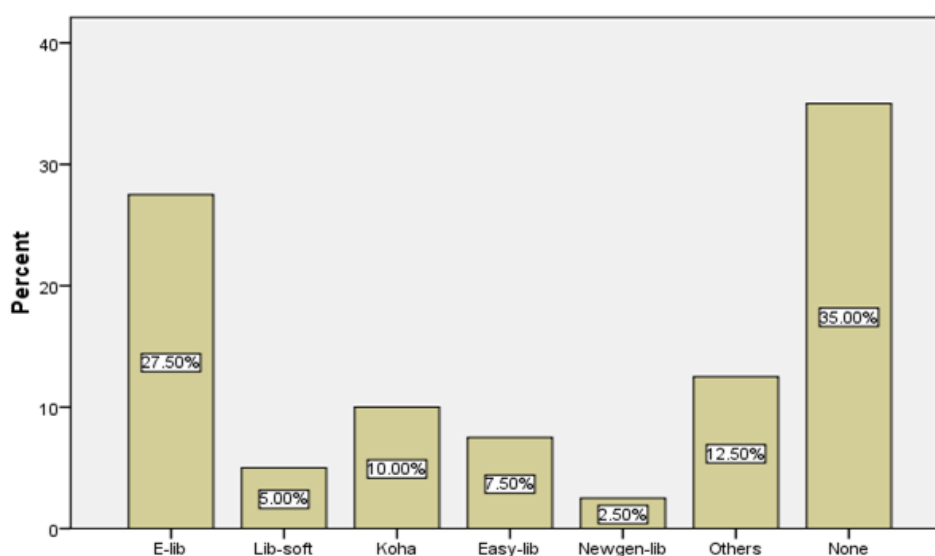


Figure-1. (Illustrated percentage of libraries are automated with different software products)

Frequency Table-1

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	E-lib	11	27.5	27.5	27.5
	Lib-soft	2	5.0	5.0	32.5
	Koha	4	10.0	10.0	42.5
	Easy-lib	3	7.5	7.5	50.0
	Newgen-lib	1	2.5	2.5	52.5
	Others	5	12.5	12.5	65.0
	None	14	35.0	35.0	100.0
	Total	40	100.0	100.0	

Note: According to the analysis 35% of the institutions are not using any software in their library.

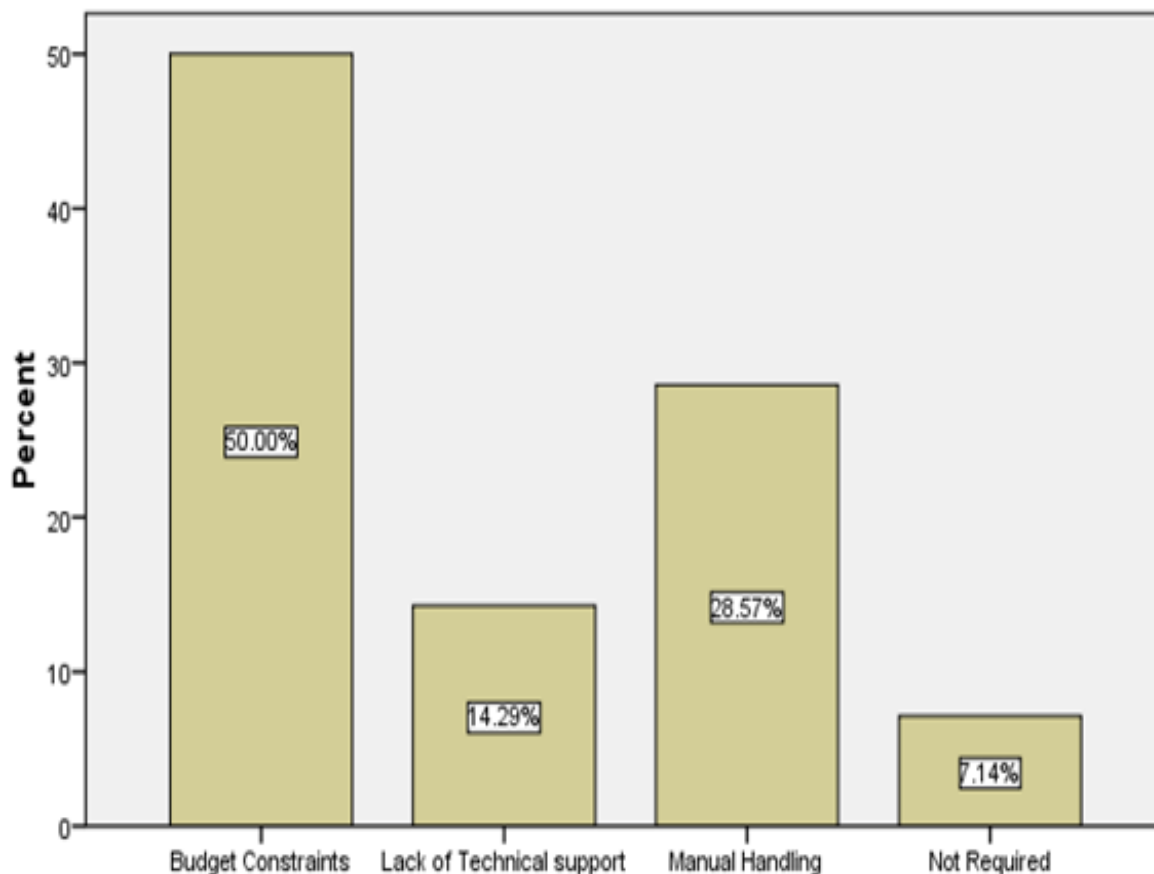


Figure-2 (Illustrated percentage of causes not deployed the Library automation)

Frequency Table - 2

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Budget Constraints	7	17.5	50.0	50.0
	Lack of Technical support	2	5.0	14.3	64.3
	Manual Handling	4	10.0	28.6	92.9
	Not Required	1	2.5	7.1	100.0
	Total	14	35.0	100.0	
Missing	0	26	65.0		
Total		40	100.0		

V. Research Outcome Module Design

On the basis of research methodology we came out with below mentioned modules for further research and accomplish with desired results. (Discussed in point VII).

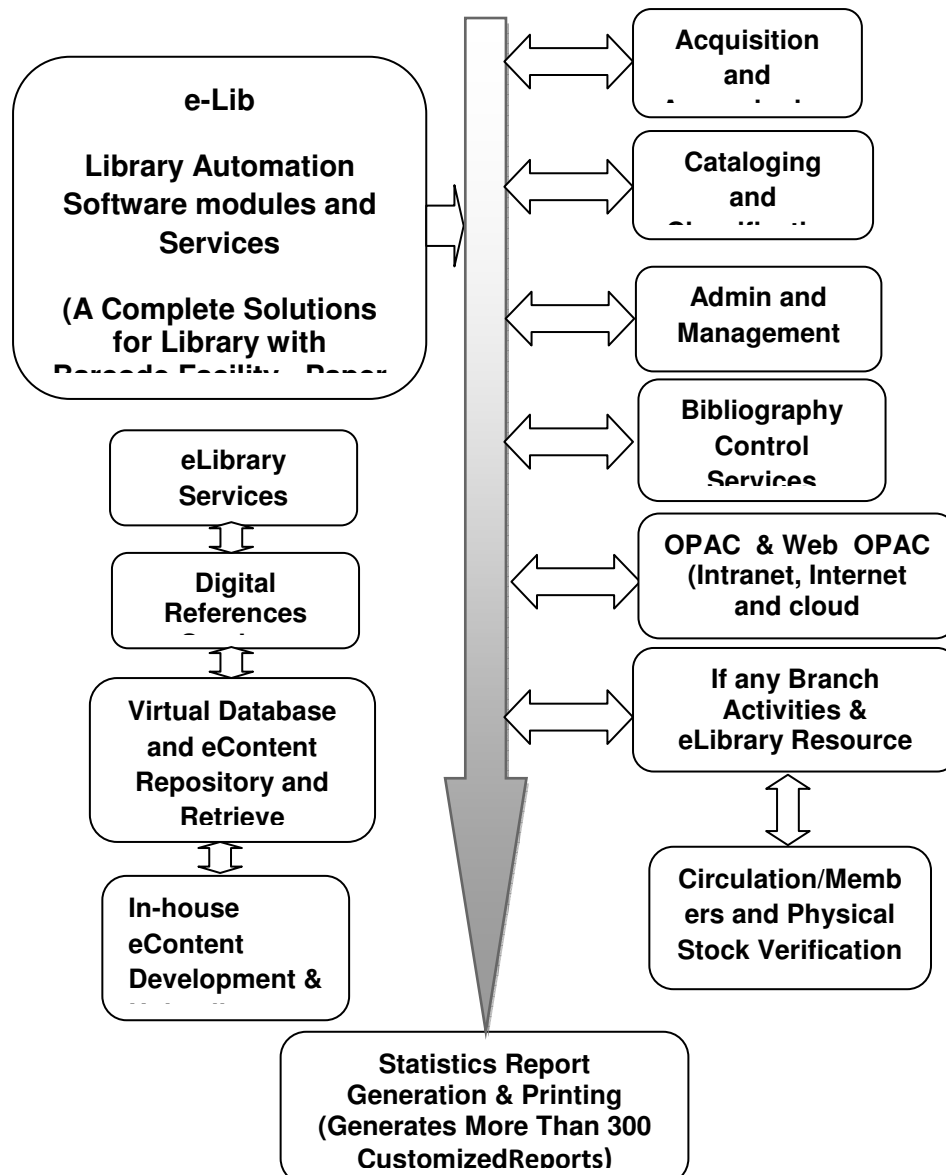


Figure-3 Research Module Design

VI. Process Of Library Automation Functional Modules

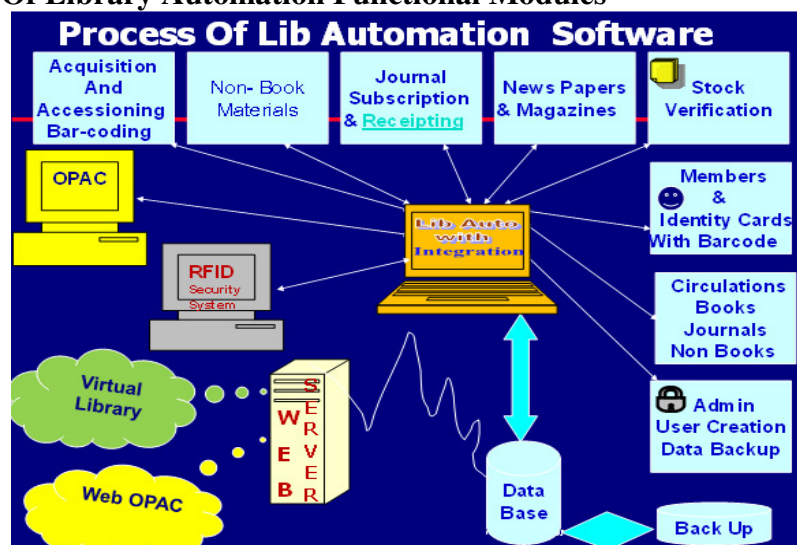


Figure-4

VII. Discussion Of Research Results

The core problem area of available open source library automation software's in these at various levels in the libraries are critical and area of concern. University/college libraries and their staffs are facing the challenges of handling the comprehensive need base (customized) automation process to carry out the house keeping activities for their day to day process in the library. We found in our research partial automated libraries having a lot of missing constructs in the area of personal staff capacity building (training), technical support and services, instability, security controls and other services in the library management system to accomplish the day to day activities and repository process in the libraries.

Our decade research indicates new strategies and designed module to achieve comprehensive Library Automation process to make paper less library management system and integrating the emerging technology tools & suggested additional library management services for academia (Universities/College) Libraries.

Research outcome discussed below:

- Designed and developed 100% customized need based comprehensive automated process to achieve entire Library management concepts.
- Our research suggests to build core and critical automated module of library management system for 'Budget monitoring, controlling and budget distribution & allocation'
- Well defined statistical models reports and operations for university/college management to monitor fund allocation, management and its utilization according to the category of budget and academic/financial yearly budget planning
- Optimal utilization of library resources in efficient and effective manner in terms of exact need of acquisition and appropriate fund allocation based on the user request or on demand.
- Our research suggested well-structured and organized storage architecture for library repository system.
- Our strategies support the bifurcating of the operational modules as suggested by the senior researcher and senior librarians such as *BOOKS, JOURNALS, PERIODICALS, NON- BOOK materials, MEMBERS, OPAC and WEB OPAC, ADMIN, HELP.*
- Our strategies to build GUI (Graphical User Interface) based on user friendly modules and operations which requires minimum computer literacy and capacity building for library staff.
- Look and feel concepts are used to build every module so user can emphasize more on the functionalities and its automated operation flow with ease.
- Taking care and benefits for integration of multilingual use and its operations independently using our product not depend on third party.
- Our strategies support for multi user and multi-tasking environment for library integration modules, internal and external libraries in Academia environment.
- Well-designed effective, efficient and productive operation modules for library transactions (circulation) such as issue of books, receive of books, books reservation, physical stock verification with integration of 'Barcode or RFID' technology on choice.
- Well-designed automated process for *Acquisition and Accessioning* with built-in book requisition.
- Well-designed automated process for *Cataloging and Classification.*
- Our research frames the new strategies for auto generation and autotyping modules for preprinted Catalog cards, Book Cards, Book tags and Barcode labels when required with ease and also to maintain the Accession register on request of the budget categories specified by Universities/Colleges.
- Eliminating 98% human/user interaction with the entire library management operations based on library interactive management concepts. So, Accuracy of the transaction and reports are confirmed.

- In addition designed and integrated member (student/staff) module functionality with statistical analysis use of library resources by the individual member tracking the member interest and effective use of library resources. Also member module providing the facility of validating the membership and auto printing customized member Identity Cards.
- Well defined and effective searching modules are integrated to achieve 100% need of the library staff and members of the library use. Such as offline and online based facilities by OPAC (Online Public Access Cataloging) system, web OPAC system (intranet/internet/cloud) which is bifurcated in to book search, loose and bound journals, non-book material search and member search, transaction search, content wise search and many more search facilities are incorporated.
- Our research module suggests to provide a facility for inter library resource searching and sharing (Inter Loan facility) across globally on membership/collaboration based.
- Our research designed more than 300 statistical / general well formatted (need based) auto generated reports at all levels of the library automation process as suggested by the senior researcher and senior librarians focusing on Budget, academia management, library management, members and resource controlling and monitoring.
Some critical areas and useful reports listed below table – 3 which helps in decision making process:

Table-3

Management Reports(at all levels)	Library Reports(at all levels)
Budget control and monitoring category wise	Accession register
Fund allocation and utilization category wise	Member due reminder daily
Investment summary on library resources	Loss of Library resources
Fund flow monitoring	Stock verification
Library resource monitoring	Members Statistics reports
Customized finance related statistical reports	Auto Printing of Catalog cards, Book Cards, Book tags and Barcode labels
Acquisition verification and approval	Auto Acquisition and Order generation
	Circulation statistics

- Technological supports and service are designed for ease and feasible operations
 - ❖ An extensive help module facility to the user/operators.
 - ❖ Backup and recovery facility
 - ❖ Content and Data security
 - ❖ Import and Export facility in MARC 21 Format.

VIII. Conclusion And Scope For Further Research

Libraries are knowledge sharing center in academia, our key research focus was on budget allocation, fund controlling and monitoring, library resource management and improved version of automated library house-keeping activities on high priority modules to operate automated system with appropriate verification and validation checks at all levels (on need based). In general library automation missing modules are comprehensively covered and fully automated such as 'Acquisition and Accessioning', 'auto Indexing & Classification' and auto Cataloging (Books & Non books materials)', inventory with real-time OPAC facilities with customized auto statistical report generation and many more library science concepts are incorporated to ensure the "world class Library Automation and Paper less Library Management System" in Universities/College libraries.

Scope of further research is continued on “Harnessing Cloud Computing Technology for building the Global Knowledge Sharing Center”. Libraries are oceans of knowledge and its ultimate aim is to provide knowledge and satisfactory services for all the stakeholders. So in the new era, library should be known as “Knowledge Sharing Center” to improve itself constantly by adopting emerging IT/ICT technologies. So, our further research attempted to improve current digital content user service model for centralized “Global Knowledge Sharing Center” by using Cloud Computing with the introduction of Cloud Computing to all libraries, services of libraries will have a new leap in the near future. Services provided by “Global Knowledge Sharing Center” will become more user-centric, cost effective, more professional and more effective, easy and fast content access globally. And we all believe that all libraries will integrate and centralized content and OPAC sharing point to create more knowledge benefits globally with the help of Cloud Computing technology infrastructure. Cloud environment is a highly developed and secured cost effective network environment; it ensure to the users of high-quality service and high security. It improves the utilization rate of resources to address the imbalance in development between regions, but also can make more extensive use of cloud computing to our work life.

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