# Original Research Paper

## Library Science

# ATTITUDE OF LIBRARY PROFESSIONALS TOWARDS ADOPTION OF CLOUD COMPUTING TECHNOLOGY IN VTU AFFILIATED ENGINEERING COLLEGE LIBRARIES

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**ABSTRACT** Cloud computing technology has significant role in academic libraries. Most of the library services are available on cloud platform and library software vendors developed their Library Management Software on cloud platform. It is the right time for library professionals to upgrade their technical skills to provide good services to the library stakeholders. This study shows the library services and facilities available on cloud. It is the right time to migrate to cloud.

## INTRODUCTION

Since the beginning of civilization, India was renowned for its remarkable and highly intellectual education system. In ancient days, the educational system was structured into 'Gurukals' and this system have undergone several changes and modifications since then(Bhatt, 2009).The educational society is rigorously changing every day and new and advanced methods of learning are coming into existences. Libraries are integrated part of all educational institutions and they play significant roles in higher education in India. Libraries of today are not store houses of knowledge, they are intermediaries between the resources and users. Since two decades, the libraries are undergoing transition from traditional libraries to digital libraries. Earlier libraries are limited to store traditional books and journals to cater the needs of users. Libraries concentrated on improving their collection development by using their limited budget. Today's libraries have witnessed the big shift from print documents to online journals/databases and e-books. This subscription of online journals/databases and perpetual access of e-books helped the librarians to cater excellent services to the library users.

During 1970's Information Communication Technology (ICT) has been developed as a result of new products emerged in people's everyday lives (Dahlbom, 1996). Later libraries have adopted ICT in their in-house activities and access to online resources directly from the publishers. This kind of services awaken the library users to utilize the libraries in effective way(Manjunatha & Patil, 2017). Libraries become centre of attraction to research scholars and academic fraternity. The invasion of Information Communication Technology (ICT) and easy accessibility of internethas inevitably pushed libraries to procure more e-books and e-journals. Shrinking library budgets and ever-growing need of electronic resources from library patrons and the instructions from All India Council for Technical Education (AICTE) to the institutes to procure more e-resources has intensified the libraries to adopt the latest as well as trending technology in the market, like Cloud Computing Technology (Manjunatha & Ramadevi, 2014) etc.

Visvesvaraya Technological University (VTU) is one of the distinguished technical universities in India. Totally 218 technical and management institutes affiliated to VTU. More than 4 lakh students pursuing their Under Graduate, Post Graduate and Research in VTU. Libraries come under the purview of VTU are well equipped with resources, facilities and infrastructures. All libraries are the member of VTU Consortium have access to online resources subscribed under the consortium.

## CLOUD COMPUTING TECHNOLOGY (CCT):

The term cloud looks new and unknown to everyone except technocrats. Even common person using cloud computing services without being aware of it. Gmail, Yahoo mail, Hotmail, WhatsApp, Facebook, Instagram, Twitter etc. are running on cloud platform provided by Google, Yahoo, Microsoft, etc. Microsoft and Google are providing free cloud services to faculty and students at educational institutes. This cloud services include email. document sharing, calendar, contacts, storage, etc. (Ercan, 2010). Cloud computing is a

transformation from own computers to cloud computing. In the process of cloud computing users do not own computers, but have access to computer hardware and software maintained by provider. Users can use the facilities they need by using a browser running on a cloud access device and pay only for what they use.

The National Institute of Standards and Technology defines "cloud computing as a model for enabling ubiquitous, convenient, on demand network access to a shared pool of configurable computing resources that can be rapidly provisioned and released with minimal management effort or with services provider interaction. Cloud computing is a method of availing computer resources from a provider, on demand by a customer using a computer connected to a network" (Mell & Grance, 2011).

## CLOUD COMPUTING TECHNOLOGY IN LIBRARIES

Like all other Cloud computing initiatives, few vendors started providing cloud services to libraries. Goals and policies of organizations pushes the libraries to adopt the cloud computing services. Libraries are using Cloud computing technology in the areas like library automation, digital libraries, Institutional repositories, website hosting, etc.

### 1. LIBRARY AUTOMATION:

Library automation is an essential task in current library scenario. Dozens of commercial library management software are available in the market. Few open source/free library management software are also available on internet. Many Library management software vendors are offering cloud based library services to automate the libraries. It reduce the librarians' work tension of taking backup every day, updating software and maintaining the server, etc.

Eg:Libsys, Libsoft, Cybrarian, Koha, NewGenLib, etc.

### 2. INSTITUTIONAL REPOSITORIES (IRS):

Institutional repositories are the integral part of academic libraries. Every academic library needs an IR to collect, organize and store the Faculty publications, thesis, conference papers, project reports, previous year question papers, etc. Now-a-days most of the institutes are using cloud based IRs to store digital resources. Library software vendors are offering cloud based IRs under software as a service (SaaS).

Eg:DSpace, Eprints, Greenstone, etc.

### 3. OFFICE APPLICATIONS:

The cloud computing technology has changed the concept of office automation. Many office automation applications are available on cloud. These applications are available through the devices like desktops, laptops, smartphones connected to internet. Now many office applications are available freely/paid. Libraries can access these free/paid applications for office operations. They are compatible with all operating systems.

Eg: Microsoft Office 365, Google G Suite, Zoho Docs, OnlyOffice, etc.

## 4. STORAGE:
Advancement in the cloud computing has given a lot of opportunity to store the data in cloud without paying a single rupee. Few applications have given options to store upto 15 GB of data. If anybody needs more storage, can purchase more storage by paying extra amount. Documents stored in the cloud, can be accessed anywhere in the world.

Eg: Sky Drive, Drop Box, Google Drive, etc.

## 5. WEB HOSTING:
Organizations including libraries prefer to host their website. Usually this website hosting work given to third party. They used to take care of all server maintenance, network, internet bandwidth, etc. Now availability of cloud storage, anybody with minimum knowledge of website design, networking can host the website.

Eg: Microsoft Azure, Google Cloud, Amazon Web Services (AWS), etc.

## 6. CLOUD BASED SEARCH ENGINES:
Libraries are already using federated and pre-indexed search engines on the cloud. Many vendors are providing cloud based services to access to IP authenticated, subscribed contents outside the campus. Library users can access the subscribed contents off campus using these facilities.

Eg:Knimbus, EZproxy, etc.

## REVIEW OF LITERATURE
The 21st century has witnessed tremendous developments in the field of Information Communication Technology (ICT). The evolution of the World Wide Web (WWW) enabled the people to use the internet for many reasons like communication, for entertainment, for education, and so forth. With the Internet charges, plummeting to an all-time low, accessing and transforming data has become much easier. Because of this, gaining access to information has become easier and the dependency on books for information is reducing at a steady pace. This in turn has pressurized the libraries to implement and adopt new technological methods like; digital monitor screens, online journals, e-books etc.

Originally the concept of cloud computing is proposed by a computer Scientist John McCarthy in Massachusetts Institute of Technology (MIT) Centennial in 1961. He is also called as "Fore father of Cloud Computing" (McCarthy, 1992). John McCarthy in his speech stated that "Computing utility will be on par with telephone utility as quite common for everyone – with simple yet useful benefits" (Pruger, 2018).It started during the cold war between the United States of America (USA) and the Union of Soviet Socialist Republics (USSR) during the 1960's. During the cold war they had to protect their communication devices from the serious attacks of their enemies. America developed ARPANET (Advanced Research Projects Agency Network) for its military purposes in 1969. Group of computer scientists headed by J.C.R. Licklider developed the global computer network ARPANET (Hauben, 1962).

Prof. Ramnath Chellappa, a Professor in Management department at the Texas University coined the term "Cloud computing" in modern context in his talk titled "Intermediaries in Cloud computing", presented at the INFORMS meeting in Dallas in 1997. He defined cloud computing as "computing paradigm where the boundaries of computing will be determined by economic rationale rather than technical limits alone" ("Ramnath K Chellappa | Emory University's Goizueta Business S," n.d.).

The word "Cloud computing" was used by Eric Schmidt, then CEO of Google in 2006 in an industry conference. Then the word "Cloud computing" gain popularity (Rajaraman, 2014). Amazon started its cloud services called Amazon Web Services (AWS) in 2006, it provides its services to computing and cloud storage. Now Amazon gives more than 70 services like analytics, mobile services, software, etc.

Technology did not spare even the libraries. Libraries are always in the front row in adopting new technologies and transformations. Libraries are the main beneficiaries of the information technology as they utilize the technology in a bigger extent and try to adopt the good features of information technology as and when technology arrives. Cloud computing technology is a boon for libraries. Most of the western libraries have adopted cloud technology for their in-house activities to provide good services to library stakeholders. When we look at Indian libraries it is a different scenario altogether.

## OBJECTIVES OF THE STUDY
- To study the awareness of the library professionals regarding cloud computing technology.
- To find-out the perceptions of library professionals in adopting cloud computing in providing library services.
- To find-out the barriers / difficulties faced by the library professionals in implementing the cloud computing technology in libraries.

## METHODOLOGY
Survey method used to collect the data from library professionals working in engineering college libraries affiliated to VTU. To bring-out the necessary data, well-designed questionnaire was prepared in Jotform - an online survey tool. The questionnaire was prepared using five point Lickert scale. Out of 218 respondents, 170 respondents replied. The collected data was analyzed using Microsoft Excel.
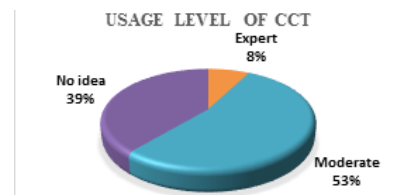
**Table 1: Library Professionals' Data**

| Sl. No. | Designation | Respondents | Response | Percent |
|---|---|---|---|---|
| 1 | Designation | Chief Librarian | 38 | 22.35 |
| | | Senior Librarian | 8 | 4.70 |
| | | Librarian | 108 | 63.52 |
| | | Asst. Librarian | 16 | 9.41 |
| 2 | Gender | Male | 131 | 77.05 |
| | | Female | 39 | 22.95 |
| 3 | Age Group | 21-30 | 7 | 4.117 |
| | | 31-40 | 69 | 40.590 |
| | | 41-50 | 70 | 41.176 |
| | | 51-60 | 20 | 11.764 |
| | | > 60 | 4 | 2.352 |
| 4 | Experience | 0-5 Years | 7 | 4.117 |
| | | 6 – 10 Years | 34 | 20.00 |
| | | 11-15 Years | 54 | 31.76 |
| | | 16-20 Years | 43 | 25.30 |
| | | > 20 Years | 32 | 18.82 |
| 5 | Qualification | B.L.I.Sc. | 5 | 2.94 |
| | | M.L.I.Sc. | 78 | 45.88 |
| | | M.Phil. | 57 | 33.52 |
| | | Ph.D | 30 | 17.64 |

Total 170 respondents, Librarian designated library professionals represent (63.52%, n=108) in the survey. In data analysis, male professionals represent (77.05%, n=131) and female represent (22.95%, n=39), Library professionals between 41-50 years (41.17%, n=70) dominates the age group. In experience, between 11-15 years (31.76%, n=54) comes in the top position. Few Library professionals working in engineering colleges acquired PGDCA (8.8%, n=15,), PGDHRM (1.8%, n=3), PGDLAN (8.2 %, n=14).

## USAGE LEVEL OF CCT

| Response | Respondents | Percent |
|---|---|---|
| Expert | 13 | 7.64 % |
| Moderate | 91 | 53.52 % |
| No idea | 66 | 38.82 % |



This table demonstrates the usage level of CCT in Library professionals. Most of the library professionals (53.52%, n=91) have moderate idea of CCT usage. Second highest number of professionals (38.82%, n=66) said no idea of using CCT. Only few librarians (7.64%, n=13) have indicated that they are expert in using the CCT.

**AWARENESS OF CLOUD BASED LMS:**

| Yes | 110 | 64.7 % |
|---|---|---|
| No | 60 | 35.3 % |

**AWARENESS OF CLOUD BASED LMS:**



AWARENESS OF CLOUD BASED LMS
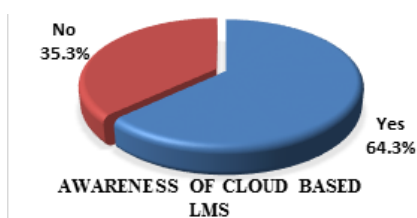
Library professionals (64.7%, n=110) working in Engineering college libraries are aware of the availability of cloud based Library Management Software (LMS). Most of the professionals (35.3%, n=60) are not aware of it.

**CLOUD BASED SERVER IN LIBRARIES:**

| Local server | 155 | 91 % |
|---|---|---|
| Cloud server | 15 | 9 % |



CLOUD BASED LIBRARY SERVER
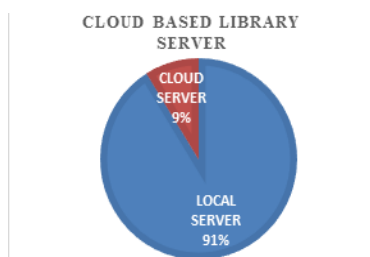
In the majority of libraries (91%, n=155) Library Management Software (LMS) were installed in local servers and only few libraries (8.82%, n=15) have been installed their library software in cloud storage.

**MOTIVATIONAL FACTORS TO IMPLEMENT CCT IN LIBRARIES**
**Table 2: Motivational Factors to implement CCT in Libraries**

| No need to maintain local server | 10 (5.9%) | 9 (5.3%) | 46 (27.1%) | 69 (40.6%) | 36 (21.2%) |
|---|---|---|---|---|---|
| No need to purchase server software | 6 (3.5%) | 16 (9.4%) | 40 (23.5%) | 83 (48.8%) | 25 (14.7%) |
| No upgradation of software & patches | 7 (4.1%) | 12 (7.1%) | 48 (28.2%) | 72 (42.4%) | 31 (18.2%) |
| No maintenance cost | 10 (5.9%) | 18 (10.6%) | 52 (30.6%) | 64 (37.6%) | 26 (15.3%) |
| No expertise is required for cloud based software | 5 (2.9%) | 19 (11.2%) | 55 (32.4%) | 59 (34.7%) | 32 (18.8%) |
| Users can access resources through internet | 7 (4.1%) | 5 (2.9%) | 43 (25.3%) | 77 (45.3%) | 38 (22.4%) |
| Customers have to pay only for the resources used | 9 (5.3%) | 10 (5.9%) | 53 (31.2%) | 60 (35.3%) | 38 (22.4%) |

1- Strongly disagree
2- Disagree
3- Neutral
4- Agree
5- Strongly agree

The table a shows that library professionals (40.6%, n=69) feel if the server installed in cloud, they need not to maintain server system locally and (42.4%, n=72) expressed if the server is in the cloud they need not worry about software upgradation of server. Few Librarians (37.6%, n=64) said that total cost include all types of charges there is no extra maintenance cost, Most of them expressed (34.7%, n=59) that server in the cloud need not require any expertise in maintaining the server, because the vendor has to take care of it. More Librarians felt (45.3%, n=77) the resources are stored in the cloud could be accessed anywhere in the world. The main benefit of cloud is libraries should pay as per the usage (35.3%, n=60). The overall feedback of the library professionals is CCT is more beneficial to libraries.

**PROBLEMS IN IMPLEMENTING CCT IN LIBRARIES:**
**Table 3: Problems in implementing CCT in Libraries**

| Cloud computing is very expensive | 9 (5.3%) | 12 (7.1%) | 64 (37.6%) | 69 (40.6%) | 16 (9.4%) |
|---|---|---|---|---|---|
| Data in cloud is less secured | 10 (5.9%) | 17 (10.0%) | 43 (25.3%) | 79 (46.5%) | 21 (12.4%) |
| Not ready to share data with vendor | 6 (3.5%) | 18 (10.6%) | 66 (38.8%) | 52 (30.6%) | 28 (16.5%) |
| Management is not supportive | 3 (1.8%) | 19 (11.2%) | 63 (37.1%) | 69 (40.6%) | 16 (9.4%) |
| Vendor may demand more amount in subsequent years | 2 (1.2%) | 9 (5.3%) | 61 (35.9%) | 63 (37.1%) | 35 (20.6%) |
| Data shift from one cloud to another is not easy | 5 (2.9%) | 11 (6.5%) | 65 (38.2%) | 57 (33.5%) | 32 (18.8%) |

1- Strongly disagree
2- Disagree
3- Neutral
4- Agree
5- Strongly agree

Cloud computing is a new form of computing, most of the library professionals have not adopted this because they felt it is expensive (40.6%, n=69) and more number (46.50%, n=79) of them assumed that the data stored in the cloud is not secured. Library professionals (30.60%, n=52) are not ready to share the library data with the cloud vendors, they have fear that the data provided might be misused. More than 90% of the engineering colleges affiliated to VTU are under private management. College managements (40.60%, n=69) have to permit them to move to cloud environment. Most of the libraries are maintaining local servers, they are not ready to move to cloud environment because in the begging they CCT vendors may give the services in cheap amount, in later time they may demand (37.10%, n=63) more amount. Librarians felt that if they want to change the vendor in the subsequent years would create big problem (33.5%, n=57). The vendor may demand amount to give the stored data or refused to transfer the data from his cloud to another. All these points make the librarians to think twice before moving to cloud environment.

**SUGGESTIONS:**
Today's Library users are well versed in computers and internet search options. They want required information on their fingertips and they do not want to stay in the libraries for searching the books and journals. Libraries also change their information delivery systems as per the users' requirements. Library professional's involvement is essential to upgrade the library services.

- Cloud computing is a boon for information sharing and it is a cost saving and one time investment. Once the library server installed in the cloud the data can be stored and shared to library users through internet. This will help the library users to access to required information at their convenient time.
- Development of Library is in the hands of the librarians working in engineering college libraries. Library professionals should take advantages of the technology and try to convince their management to improve their library.
- As cloud computing is a new thing to librarians, they can upgrade their knowledge by attending conferences, workshops related to cloud computing technology.
- VTU having its own consortium, it can implement its own cloud and put all the resources in VTU cloud and that be pooled to all affiliated colleges. Similarly, Library Management Software and Institutional Repositories be installed in VTU cloud and the same can be pooled to all college libraries. This kind of initiatives may help the college libraries to adopt the cloud and provide good services to users.

**CONCLUSION:**
Most of the library users in the present days are all millennial, who are highly aware of specific information and expectations. They do not spend their time reading books and journals; they have adopted reading

books on laptops, tablets and smart phones. They prefer to read e-Books and e-Journals on their gadgets. Libraries of today should concentrate on providing the information in digital formats. To survive and to become user-friendly libraries, services should blended with both traditional and modern services. Librarians' role is very significant in adopting the cloud computing technology in libraries.

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