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Introduction

Rapid developments in information and communication technologies (ICT) and their wide application in all aspects of life have led to dramatic changes. These changes are so revolutionary that is not realistic to expect stability in their wake[1]. Information technology (IT) entered into libraries, especially academic and research libraries, during the 1960s. Libraries employed IT to speed up their daily activities and reduce their operating costs. Many repetitive activities were upgraded using IT[2]. IT allows integration of library activities and increases efficiency and enables users to have remote access to information and around the clock access. New technologies provide unlimited information from different sources and facilitate reformatting data from different sources [3].

Definition

Ebijuwa and ToAnyakoha (2005) [4-5] define ICT as "tools and as well as means used for collection, capture, process, storage, transmission and dissemination of information". The American Library Association (1983)[5] defines IT as "the application of computers and other technologies to the acquisition, organization,

storage, retrieval and dissemination of information. The computers are used to process and store data, while telecommunications technology provides information communication tools, which make it possible for users to access databases and link them other computer networks at different locations." IT and ICT (Information and Communication Technologies) are used somewhat interchangeably.

Objectives of the Study

The major objectives of this study are

1. To identify the ICT infrastructure facilities available in the university libraries.
2. To identify the ICT based software implemented in the university libraries.
3. To find out the various types of electronic resources available in the university libraries.

Methodology

The study is based on the primary data collected from the government university libraries and deemed university libraries given in table 1.

Table 1. List of University Libraries

S.No	Name of the University	Type of university
1.	Anna University,Chennai	Government Universities
2.	University of Madras, Chennai	
3.	The Tamil Nadu.Dr.Ambedkar Law University,Chennai	
4.	Tamil Nadu Dr.M.G.R Medical University,Chennai	
5.	M.G.R .Educational and Research Institute, Chennai	
6.	SRM University,Kattankulathur	Deemed universities
7.	Saveetha Institute of Medical and Technical Sciences,Chennai	
8.	B.S.Abdur Rahman University,Chennai	
9.	Bharath University,Chennai	
10.	Sri Ramachandra University,Chennai	

A structured questionnaire was designed to obtain data. The questionnaire was divided into four sections: Hardware, Software, Technologies, and Electronic Resources. Sixteen questionnaires were distributed among university librarians, of which 10 university librarians were responded (62.5%).

Review of Literature

Walmiki and Ramakrishnegowda (2009)[7] studied ICT infrastructures in university libraries of Karnataka and found that most of the libraries were u“lack sufficient hardware, software facilities and do not have adequate internet nodes and bandwidth”. The campus LANs were not fully extended to exploit the benefits of digital information environment. Ahmad and Fatima (2009) [8] found that researchers use a variety of ICT products and services for research and further remarked that ICT products help “to find information, access information, manage, integrate, evaluate, create, and communicate information more easily”. It was recommended that training be organized to increase the use of ICT-based products and services. Adeleke and Olorunsola (2010) [9] studied ICT and library operations found that ICT facilities were the major constraints facing libraries in the use of tools. Shafi-Ullah and Roberts (2010)[10] found that ICT infrastructure is necessary to make provide a research culture in higher education institutions and recommended allocating funds for ICT infrastructure. Etebu (2010)[11] studied ICT availability and found a situation that is not encouraging. Patil (2010)[12] found that users were not trained to use ICT- based products and services and further recommended an ICT training programme to increase the use of ICT products and services.

Data Analysis

The study was carried out in ten university libraries. The demographic information related to these respondents is shown in table 2.

Table 2. Demographic Information about Respondents

S.No	Description	Total	Percentage
1.	Government University	4	40%
2.	Deemed University	6	60%
	Total	10	100%

Five ICT infrastructures such as computers, printers, laptops, scanners and photocopiers were identified for this study and same is shown in table 3.

Table 3. ICT infrastructure vs. University Libraries

S.No	Description	ICT Infrastructure						
		1-10	11-20	21-30	31& above	Total	WAM	Rank
1.	Computers	1 (10)	4 (40)	2 (20)	3 (30)	10 (100)	3.2	1
2.	Printers	9 (90)	1 (10)	0 (0)	0 (0)	10 (100)	2.1	2
3.	Laptops	9 (90)	0 (0)	0 (0)	1 (10)	10 (100)	1.5	5

4.	Scanners	9 (90)	1 (10)	0 (0)	0 (0)	10 (100)	2.1	2
5.	Photocopiers	9 (90)	1 (10)	0 (0)	0 (0)	10 (100)	2.1	2

It can be seen from table 3 that 4 (40% ,WAM 3.2, rank 1) libraries were between 11 and 20 computers, followed by printers, scanners, and photocopiers ranging between 1 and 10.

ICT infrastructure mentioned in table 3 were further distributed library-wise, shown in table 4.

Table 4. ICT Infrastructure vs. University Libraries

S.N	Description	Government University Libraries n=4					Total	Deemed University Libraries n=6					Total
		NA	1-10	11-20	21-30	31& above		NA	1-10	11-20	21-30	31& above	
1.	Computers	(0) (0)	1 (25)	1 (25)	0 (0)	2 (50)	4 (100)	(0) (0)	0 (0)	3 (50)	2 (33.33)	1 (16.67)	6 (100)
2.	Printers	0 (0)	3 (75)	1 (25)	0 (0)	0 (0)	4 (100)	0 (0)	6 (60)	0 (0)	0 (0)	0 (0)	6 (100)
3.	Laptops	3 (75)	1 (25)	0 (0)	0 (0)	0 (0)	4 (100)	0 (0)	5 (83.33)	0 (0)	0 (0)	0 (0)	6 (100)
4.	Scanners	0 (0)	4 (100)	0 (0)	0 (0)	0 (0)	4 (100)	0 (0)	5 (83.33)	1 (16.67)	0 (00	0 (0)	6 (100)
5.	Photocopiers	0 (0)	3 (75)	1 (25)	0 (0)	0 (0)	4 (100)	0 (0)	6 (100)	0 (0)	0 (0)	0 (0)	6 (100)

It can be seen from table 4 that 2 (50%) government university libraries had more than 31 computers and 3 (50%) deemed university libraries had from 11 to 20 computers. All libraries 4 (100%) from government universities and 5 of those from deemed university libraries had scanners. Three government university libraries and 6 deemed university libraries had between 1 and 10 photocopiers.

Four important software applications library automation, digital library, e-learning, and digitization were identified and further ascertained using an Objective Scaling System. The results are shown in table 5.

Table 5. ICT based Software in University Libraries

S.No	Description	ICT based Software		Total	WAM	Rank
		Yes	No			
1.	Library Automation Software	9 (90)	1 (10)	10 (100)	1.9	1
2.	Digital Library Software	1 (10)	9 (90)	10 (100)	1.9	1
3.	E-learning Software	1 (10)	9 (90)	10 (100)	1.1	3
4.	Digitization Software	0 (0)	10 (100)	10 (100)	1.0	4

(Yes=Available, No=Not Available)

Ninety percent of the libraries have implemented library automation and digital library software. Most of the libraries have yet to implement e-learning software and digitization software.

The software were further distributed library-wise and are shown in table 6.

Table 6. ICT based Software vs. University Libraries

S.No	Description	ICT based Software					
		Government Universities Libraries			Deemed Universities Libraries		
		Yes	No	Total	Yes	No	Total
1.	Library Automation Software	3 (75)	1 (25)	4 (100)	6 (100)	0 (0)	10 (100)
2.	Digital Library Software	0 (0)	4 (100)	4 (100)	1 (16.67)	5 (83.33)	10 (100)
3.	Digitization Software	0 (0)	0 (0)	4 (100)	0 (0)	6 (100)	10 (100)
4.	E-learning Software	1 (25)	3 (75)	4 (100)	0 (0)	6 (100)	10 (100)

(Yes=Available, No=Not Available)

Three-quarters of government university libraries and 6 (100%) deemed university libraries have implemented library automation , while one (25%) government university and one (16.67%) deemed university had implemented both e-learning and digital library software.

Technologies such as barcode, smart card, RFID, videoconferencing, and Internet technonologies were identified and are shown in table 7.

Table 7. ICT based Technologies vs. University Libraries

S.No	Description	ICT based Technologies		Total	WAM	Rank
		Yes	No			
1.	Barcode Technology	9 (90)	1 (10)	10 (100)	1.9	2
2.	Smart card Technology	3 (30)	7 (70)	10 (100)	1.3	3
3.	RFID Technology	3 (30)	7 (70)	10 (100)	1.3	3
4.	Video Conference Technology	0 (0)	10 (100)	10 (100)	1.00	5
5.	Internet Technology	10 (100)	0 (0)	10 (100)	2.00	1

(Yes=Available, No=Not Available)

All the libraries surveyed provide internet facilities, while 90% have implemented barcode technology. Three libraries have implemented smart card and RFID technologies. None of the libraries has implementing videoconferencing.

The technologies mentioned in table 7 were distributed library-wise and are shown in table 8.

Table 8. ICT-based Technologies Universities Libraries

S.No	Description	ICT based Technologies in University Libraries					
		Government Universities			Deemed Universities		
		Yes	No	Total	Yes	No	Total
1.	Barcode Technology	3 (75)	1 (25)	4 (100)	6 (100)	0 (0)	10 (100)

2.	Smart card Technology	2 (50)	2 (50)	4 (100)	1 (16.67)	5 (83.33)	10 (100)
3.	RFID Technology	2 (50)	2 (50)	4 (100)	1 (16.67)	5 (83.33)	10 (100)
4.	Internet Technology	4 (100)	0 (0)	4 (100)	6 (100)	0 (0)	10 (100)
5.	Video Conference Technology	0 (0)	4 (100)	4 (100)	0 (0)	6 (100)	10 (100)

(Yes=Available, No=Not Available)

All libraries in government and deemed universities provide Internet facilities. Seventy-five percent of government university libraries and 100% of deemed university libraries have implemented barcode technology.

Nine electronic resources were identified for this study and are shown in table 9.

Table 9. Electronic Resources vs. University Libraries

S.No	Description	E-Resources in University Libraries		Total	WAM	Rank
		Yes	No			
1.	E-Books	6 (60)	4 (40)	10 (100)	1.6	6
2	E-Journals	9 (90)	1 (10)	10 (100)	1.9	1
3.	Full text Databases	5 (50)	1 (10)	10 (100)	1.1	9
4.	Bibliographic databases	4 (40)	6 (60)	10 (100)	1.4	8
5.	CD-ROM databases	8 (80)	2 (20)	10 (100)	1.8	2
6.	E-Learning Resources	7 (70)	3 (30)	10 (100)	1.7	4
7.	ETD	4	6	10	1.4	7

		(40)	(60)	(100)		
8.	DVD	7 (70)	3 (30)	10 (100)	1.7	4
9.	Library Consortium	8 (80)	2 (20)	10 (100)	1.8	2

(Yes=Available, No=Not Available)

Nearly all the libraries subscribe to electronic journals, and an almost equal number belong to a library consortium.

Electronic resources mentioned in table 10 were further distributed library-wise and are shown in table 10.

Table 10. Electronic Resources vs. University Libraries

S.No	Description	Electronic Resources in University Libraries					
		Government Universities			Deemed Universities		
		Yes	No	Total	Yes	No	Total
1.	E-Books	2 (50)	2 (50)	4 (100)	4 (66.67)	2 (33.33)	6 (100)
2.	E-Journals	4 (100)	0 (0)	4 (100)	5 (83.33)	1 (16.67)	6 (100)
3.	Fulltextdatabases	1 (25)	3 (75)	4 (100)	3 (50)	3 (50)	6 (100)
4.	Bibliographic databases	2 (50)	2 (50)	4 (100)	2 (33.33)	4 (66.67	6 (1)
5.	CD-ROM databases	3 (75)	1 (25)	4 (100)	5 (83.33)	1 (16.67)	6 (100)
6.	E-Learning Resources	3 (75)	1 (25)	4 (100)	4 (66.67)	2 (33.33)	6 (100)
7.	ETD	1 (25)	3 (75)	4 (100)	3 (50)	3 (50)	6 (100)
8.	DVD	2	2	4	5	1	6

		(50)	(50)	(100)	(83.33)	(16.67)	(100)
9.	Library Consortium	4 (100)	0 (0)	4 (100)	4 (66.67)	2 (33.33)	6 (100)

(Yes=Available, No=Not Available)

All the libraries from government universities and a large number from deemed universities subscribe to e-journals. large number have acquired other electronic resources and belong to library consortia.

Conclusion and Recommendations

The application of ICTs are increasing in academic libraries, especially in the university environment. Users' expectations have increased due to developments in technologies. The study recommends the following

- The University Libraries must increase the numbers of computer available to enable the users to maximize the usage of ICT-based resources and services.
- The "Digital Library Service" is one of the most useful services in the university library. Users can access digital resources using a number of different open source digital library software packages.The libraries should implement digital library software.
- It is found that no library was implemented digitization software. It is very useful to digitize rare collections such as older and out of print editions.

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