Indian Journal of Information Sources and Services
ISSN: 2231-6094 Vol. 9 No.1, 2019, pp. 96-100

Application of Information Communication Technology in Libraries of Research and Development Organizations in Chennai, Tamil Nadu

A. Janakiraman[1] and N. Subramanian[2]
[1]Librarian, M. S. Swaminathan Research Foundation, Chennai, Tamil Nadu, India
[2]University Librarian, Periyar University, Salem, Tamil Nadu, India
E-Mail: janakiraman@mssrf.res.in, nsmaniyan@rediffmail.com

Abstract **- Information and communication technology (ICT) is a top priority in building the new global economy and construct swift changes in society. The effective application of ICT in research development libraries and information centres has improved the ways and techniques of research information controlling. The main objective of Research and Development Institutions (R&D) libraries is to appropriate process and retrieve the information and to make available the much-required information to the research community. This study reveal the implementation and utilisation of Information Communication and Technology (ICT) methods in R&D libraries in Chennai, and the level of the extent of ICT in these libraries and also suggested the modern techniques to be implemented. Knowledge can be divided in to two categories namely explicit and tacit. This paper prospects how ICT and related systems can maintain libraries aspire towards excel administration of ICT management system. The results show that ICT could play an important role in the library system, to be used broadly in the R&D libraries. Government and semi-government institutions standards can improve drastically through this ICT enabled libraries, so that the researchers can use this research information retrieval through ICT tools. As per the surveyed librarians, this paper suggests that more modern technology can be used in the R&D libraries which can contribute more successful ICT application use to the research community. This technology has made extensive changes in each and every one, discipline and knowledge. In that scenario nowadays the library and information science is also demanding automatically in that operations. Even nowadays ICT proficiency and competences needed for the implementation of the information and knowledge based library user society in the region of Chennai. The ICT tools have nowadays become an important technology in R&D libraries as it plays a very significant role in meeting information requirements of the research communities and institution as a whole. This study has identified the ICT structure and implementation in R&D libraries across Chennai.**

Keywords: **Information, Communication, Technology, R&D Libraries, Chennai**

I. INTRODUCTION

The Information and Communication Technologies (ICTs) have great role in all areas of research and development libraries. Users are given as prime importance in the entire library activities; especially R&D library depends upon the availability of right contact between the right user and the right book at the right time. The librarians have to adopt all modern tools of ICT based on their user's expectation & future needs.The success of good research and development in R & D institutions largely depend upon the information sources available and their usage in Libraries. The important developments in the area of ICT have created innovative changes in all areas of information. Libraries are reservoirs of knowledge and no exception to this is ICT development. The ICT tools have nowadays become an important technology in R&D libraries as they play a very significant role in meeting information requirements of the research communities and institution as a whole.

II. APPLICATION OF ICT IN RESEARCH AND DEVELOPMENT LIBRARIES

Information and communication technology, which is popularly, refers to as ICT in short have made considerable impact on all spheres of human environment. The impact has been rather well-known in case of service activities such as banking, health, transportation, education and libraries. According to Patel (2012) in library case, ICT has massively changed the management of databases or housekeeping operations as well as the way services are delivered. He further stated that ICT has brought extraordinary changes and reconstruction to library and information services, user's services.

Tam and Robertson (2002) described different tasks faced by university of Hong Kong libraries. The libraries and information services faced many challenges from changes in the information environment, most of which had occurred as a result of developments in ICT resources and the evolution of the "Web 3.0 age. In another dimension, Islam & Islam (2006), compared ICT and Information Technology (IT) as a parallel concept that denotes not only a single unit of technology but an assemble of technologies like communication equipment, data processing equipment, semi conductors, consumer electronics etc.

The emergence of ICT has brought tremendous changes in library and information science. Application of information technology (IT) to library and information work has metamorphosed the traditional concept of libraries from a store house' of books to an 'intellectual information centre' connoting the concept of digital library. In no doubt, it has opened up a new chapter in library communication and facilitated global access to information crossing the geographical limitations.

With the invention of ICT, libraries now use various types of technologies to aid the service been rendered. Every day, new technological advance affects the way information is handled in libraries and information centres. ICT has impacted on every area of library science especially in the form of library database improvement strategies, library structure and consortium. ICT present an opportunity to provide value added information services and access to a wide variety of digital based information resources to their clients.

In their study on survey of the use and application of information and communication technology in research and development libraries in Tamil Nadu, Murugesan & Balasubramani (2011), suggested that the research and development institutions should give priority to consortia based subscription and boost the funds and recruit ment ofinformation technology trained staff for better ICT based services and product to their library users. Anasi *et al* (2014) investigated the frequency of usage of ICT enabled policy for information-sharing by academic librarians in south-west Nigeria. The researcher pointed over the possible issues as well as strategies that will further systematic usage of these programmes.

Krubu & Osawaru (2011) had in their own study tried to ascertain the impact of ICT on Nigerian academic libraries. The researcher arrived at a conclusion that ICT has fulfilled edits promise in academic libraries, that there is remarkable rise in the use of ICT. This has led to the speed on library operations. ICT has also help to cub the problem of information explosion in this information era. Quadri (2012) also opined that today libraries are shifting their role from the custodian of traditional information resources to the provider of service oriented digital information resources.

Widespread use of computers, increased reliance on computer networks, rapid growth of the internet and explosion in the quality and quantity of information has compelled libraries to adopt new means and methods for the storage, retrieval and dissemination of information.

Sivakumaren *et al*. (2011) evaluated the application of ICTs in academic libraries, especially in the university environment. Users' needs have increased due to the developments in ICTs.

III. OBJECTIVES OF THE STUDY

The main objective of the study is to explore the use and application of ICT in Research and Development libraries of Chennai. In order to fulfil this aim, the following specific objectives were identified.

1. To know the various areas of applications of information communication technologies in Research and development libraries.
2. To understand the use of modern information communication technologies in Research and development libraries.
3. Identify the constraints in acquiring information and communication technology (ICT) skills by library professionals working in Research and Development Libraries in Chennai.
4. To assess the current state-of-the-art ICT Infrastructure and physical facilities within the research and development libraries in Chennai.

IV. NATURE OF LIBRARIES IN R&D INSTITUTIONS

From the table I, it has been inferred that in engineering, 56.25% of the libraries belong to central government sector whereas 31.25% belong to private sector. In medicine, 64.28 % of the libraries from private sectors and 21.42% of the libraries from state government sectors whereas 14.28% of the libraries from central government sectors. In science, 87.5% of the libraries belong to central government sector whereas 12.5% of the libraries belong to private sector. In social science and economics 71.42% of the libraries belong to private sector and both 14.28% of the libraries belong to state and central governments sector. In agriculture, 66.66% of the libraries belong to private sector whereas 33.33% of the libraries belong to state government sector.

TABLE I MAJOR RESEARCH AREA WISE NATURE OF LIBRARIES IN R&D INSTITUTIONS OF CHENNAI

S. No.	Major Research Areas	Nature of Libraries			
		Central.Gov	State.Gov	Private	Total
1.	Engineering	9 (56.25)	2 (12.5)	5 (31.25)	16 (100)
2.	Medicine	2 (14.28)	3(21.42)	9 (64.28)	14 (100)
3.	Science	7 (87.5)	-	1(12.5)	8 (100)
4.	Social Science & Economics	1(14.28)	1 (14.28)	5 (71.42)	7 (100)
5.	Agriculture	-	1 (33.33)	2 (66.66)	3 (100)
	Total	19 (39.58)	7(14.58)	22(45.83)	48 (100)

Table II provides gender wise distribution of librarians in different research organizations as included in the study. Out of total 48 librarians, 36 (75%) were males and 12 (25%) were females. The proportion of librarians from Engineering discipline was maximum i.e. 16 (33.3%), followed by 14 (29.2%) in Medicine, 8 (16.7%) in Science, 7 (14.6%) in Social Science and Economics and 3 (6.3%) in Agriculture. Out of total 48 individuals, the proportion of males in Engineering was highest (29.2%), followed by Medicine with both male and female proportions of 14.6%

each. In Science and Social Science discipline, the proportion of males was equal i.e. 12.5%. Overall, the male proportion was higher across disciplines; however, the difference in the gender wise distribution across disciplines was statistically insignificant as indicated by P-value of 0.115 ($\chi 2=7.429$).

TABLE II DISTRIBUTION OF LIBRARIANS ACCORDING TO GENDER AND RESEARCH ORGANIZATIONS

		Research organization											
		Agriculture		Engineering		Medicine		Science		Social Science and Economics		Total	
		n	%	n	%	n	%	n	%	n	%	n	%
Gender	Female	0	0.0%	2	4.2%	7	14.6%	2	4.2%	1	2.1%	12	25.0%
	Male	3	6.3%	14	29.2%	7	14.6%	6	12.5%	6	12.5%	36	75.0%
	Total	3	6.3%	16	33.3%	14	29.2%	8	16.7%	7	14.6%	48	100.0%

$\chi 2=7.429$; DF=4; P-value=0.115 (NS)

TABLE III DESCRIPTIVE STATISTICS FOR AGE OF LIBRARIANS ACCORDING TO NATURE OF INSTITUTES

	Nature of institute								
	Central Govt			Private			State Govt		
	n	Mean	SD	n	Mean	SD	n	Mean	SD
Age in years	19	46	7	22	40	12	7	44	4

P-value: 0.0879 using one-way ANOVA

The descriptive statistics like mean and standard deviation of age of librarians according to nature of institutes is given in Table III. The highest mean age was observed in Central government (46 ± 7 years), followed by State government (44 ± 4 years), followed by 40 ± 12 years in Private sector. The difference in the means was statistically insignificant with P-value of 0.0879 as obtained using one-way ANOVA.

TABLE IV GENDER WISE DISTRIBUTION OF RESPONDENTS IN EACH SPECIALIZED AREA

Gender	Area of Specialization										
	Agriculture		Engineering		Medicine		Science		Social Science		Total
	N	%	N	%	N	%	N	%	N	%	N (%)
Male	52	52.52	94	66.67	58	51.32	38	70.37	44	65.67	286 (60.34)
Female	47	47.48	47	33.33	55	48.68	16	29.63	23	34.33	188 (39.66)
Total	99	100	141	100	113	100	54	100	67	100	474 (100)

Chi-square: 11.786; P-value: 0.019 *significantat0.05%level

Table IV provides the distribution of users according to gender in each specialized area who participated in the study. The gender distribution was statistically significantly different in the areas as indicated by P-value of 0.019. In the science stream, the female proportion was significantly smaller as compared to other streams.

Table V describes among the 12 dependent factors relating to level of ICT exposures dimension, the factors such as Digital Library, Library consortium , Library networking , Institutional repositories , e-dissertations, RFID based library Functions and Barcode technology shows significant relationship with gender of the respondents, since their significance value is less than 'P' value (0.05%). Hence the null hypothesis is rejected. In the above cases, the above Hypothesis is accepted. The other 5 factors are such as Open access journals, Databases, Android based apps for using library functions through mobile phones, Web 2.0 tools and Smart card technology are do not show a significant relationship between the gender of the respondents.

TABLE V RATING OF DIMENSION TOWARDS ICT ACCORDING TO GENDER

S. No	Dimensions	Chi-square Value	df	Sig.
1.	DigitalLibrary	10.171	3	0.017*
2.	Open access journals	6.217	4	0.184
3.	Library consortium	13.182	3	0.004*
4.	Library networking	11.713	4	0.020*
5.	Institutional repositories	48.263	4	0.000*
6.	e-dissertations	37.614	4	0.000*
7.	Databases	2.853	3	0.415
8.	RFID based library Functions	10.754	4	0.029*
9.	Android based apps for using library functions through mobile phones	3.324	3	0.344
10.	Web 2.0 tools	7.433	4	0.115
11.	Barcode technology	26.065	4	0.000*
12.	Smart card technology	1.808	4	0.771

Hence the null hypothesis is accepted, which means that different gender group of the respondents are on average does not have the same level of opinion on level of ICT exposures variables in certain aspects.

TABLE VI RATING OF ATTITUDE OF USER TOWARDS ICT ACCORDING TO QUALIFICATION OF THE RESPONDENTS

User's Attitude		Sum of Squares	df	Mean Square	F	Sig.
Library should automate all its library housekeeping functions	Between Groups	6.987	4	2.329	3.398	.018*
	Within Groups	322.112	470	.685		
	Total	329.099	474			
Provide Web- OPAC access to library users	Between Groups	20.282	4	6.761	9.873	.000*
	Within Groups	321.830	470	.685		
	Total	342.112	474			
Provide facilities to access available journals (hard copy) in digital form	Between Groups	32.802	4	10.934	10.846	.000*
	Within Groups	473.824	470	1.008		
	Total	506.627	474			
Provide document delivery services to users	Between Groups	4.020	4	1.340	1.270	.284
	Within Groups	495.769	470	1.055		
	Total	499.789	474			
Provide electronic bulletin board service to users	Between Groups	3.661	4	1.220	1.091	.353
	Within Groups	525.900	470	1.119		
	Total	529.561	474			
Library staff should learn how to use online databases / offline databases themselves for guiding the users	Between Groups	2.177	4	.726	.722	.539
	Within Groups	472.348	470	1.005		
	Total	474.525	474			
Digitization of library materials in the library for sharing and improving usage	Between Groups	24.038	4	8.013	6.852	.000*
	Within Groups	549.658	470	1.169		
	Total	573.696	474			
Campus networking required for connecting all the department to library	Between Groups	1.606	4	.535	.551	.647
	Within Groups	456.328	470	.971		
	Total	457.935	474			
Provide appropriate linkages for resources available in the OPAC to access through LAN	Between Groups	12.201	4	4.067	2.965	.032*
	Within Groups	644.753	470	1.372		
	Total	656.954	474			
Library should have high speed internet connectivity	Between Groups	2.182	4	.727	.764	.514
	Within Groups	447.177	470	.951		
	Total	449.359	474			
Enhance the skills of ICT tools and techniques to the library staff members	Between Groups	7.237	4	2.412	2.372	.070
	Within Groups	477.919	470	1.017		
	Total	485.156	474			
Training should be provided to the end users for using ICT tools	Between Groups	8.425	4	2.808	2.913	.034*
	Within Groups	453.162	470	.964		
	Total	461.586	474			
Wifi-facilities should be available in the campus	Between Groups	15.824	4	5.275	5.247	.001*
	Within Groups	472.455	470	1.005		
	Total	488.278	474			
Remote access facilities available for research users	Between Groups	8.425	4	2.808	2.913	.034*
	Within Groups	453.162	470	.964		
	Total	461.586	474			

Table VI describes that to analyze the factors relating to the attitude of user towards use of ICT implementation dimension, out of 14 factors 8 factors such as Library automation, Web- OPAC access facilities to library users, facilities to access available journals in digital form, Digitization of materials in the library for sharing and improving usage, Provide appropriate linkages for resources available in the OPAC to access through LAN, Training should be provided to the end users for using ICT tools, Wi-Fi-facilities should be made available in the campus, Remote access facilities available for research users show a significant association with the qualification of the respondents, since the calculated value is less than the 'P' value(0.05%)., the null hypothesis is rejected. Hence the hypothesis is accepted. The other 6 factors such as provision of high speed internet connectivity, enhance the skills of ICT tools and techniques to the library staff members, provide document delivery services to users, electronic bulletin board service to users, Library staff should learn how to use online databases / offline databases themselves for guiding the users, campus networking required for connecting all the department to library are do not show a significant relation between the qualification of the respondents.

V. FINDINGS OF THE STUDY

There are 60 R&D organisations in and around Chennai. Out of 60, only 51 R&D organisations were established library. Out of 51 institutions, only 48 librarians were responded. Majority (33.3%) of the research and development libraries are belongs to engineering discipline, followed (29.16%) by medicine discipline libraries. Nearly 75% librarians were male. Among the 25% of female librarians, 14.6% are working in medical R & D organisations. Majority of the (45.83%) of the research and development libraries is private, followed by central government (39.58%) research and development libraries. Most (56.3%) of the library professionals are post graduate. 31.3% of the professionals have acquired PhD after entering the library profession. Majority of the PhD holders are working in central government institution libraries. Majority (27.16%) of the librarians are having PGDCA qualification along with LIS. As regards E-journals, the high priority (22.9%) is observed in engineering discipline. Print books are the highest priority (16.7%) with medicine libraries. Out of the 474 respondents, 286 (60.3%) were male and 188 (39.7%) were female. Nearly 152 (32.1%) were UG qualification; 220 (46.4%) PG and 102 (21.5%) were Ph.D. holders. Among the 474 respondents, 291(61.4%) were Scientist; 39 (8.2%) were technical; 14 (3.0%) were students and 130 (27.4%) were other professionals.

VI. CONCLUSION

The rise of ICT has repositioned the frontiers of Library resources, process, and services as well as expectations of the users. And most of the Libraries have still not implemented the Open access repository of their own i.e. the trend is quickly approaching the developing countries. Application of ICT in libraries ensures library services round the clock, remote access to high –demand or restricted materials for multiple concurrent users. More efforts by the librarians are needed to educate users to effectively use the e-Resources to their institutions. And as per the research hypothesis its prove that the R & D librarians have excellent experience in using ICT tools and skills to apply in their libraries to provide more and new ICT based services.

REFERENCES

[1] Harsahd kumar J. Patel & Patel, M. G. (2012). Impact of information and communication technology on library and its services of S. U. PATEL University library. *Journal of Library and Information Studies. 2*(3), 1-9.

[2] Krubu, D., & Osawaru, K. (2010). The impact of information and communication technology (ICT) in Nigerian university libraries. Library Philosophy and Practice. *5*, 1-31.

[3] Quadri, G. Oluwaseyi. (2012). Impact of ICT skills on the use of E-resources by information professionals: A review of related literature. Library Philosophy and Practice. *6*, 1-9.

[4] Murugesan, N., & Balasubramani, P. (2011). Application of ICT based resources and services in R&D libraries in Tamil Nadu - An analytical study. *European Journal of Social Sciences. 23*(1), 157-164.

[5] SharifulIslam., & Nazmul Islam. (2007). Use of ICT in libraries: An empirical study of selected libraries in Bangladesh. Library Philosophy and Practice. *8*,1-10.

[6] Sivakumaren, K. S., Geetha, V. & Jeyaprakash, B. (2011). ICT facilities in university libraries: *A study. Library Philosophy and Practice. 10*, 1-9.

[7] Stella, N. I., Anasi , I. J.& Akpan, T. A. (2014). Information and communication technologies and knowledge sharing among academic librarians in south-west Nigeria: *Implications for professional development. Library Review. 63*(4/5), 352 – 369.

[8] Tam, L.W.H., & Robertson, A.C. (2002). Managing change: Libraries and information services in the digital age. Library Management. *23*(8), 369-377.