

Use of Information Technology in Central University Libraries of India

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Abstract

Central University (CU) Libraries in India are currently at various stages of advancement in the use of information technology(IT). This paper presents the results of a research study conducted to survey the use of IT in CU libraries. It describes libraries collection, current periodicals, library staff, users, budget, and infrastructural facilities of CU libraries. It discusses planning approaches adopted for IT implementation, objectives of library automation, persons involved in library automation planning, steps taken for library automation implementation, factors considered in selecting library automation software, and constraints faced in library automation. It covers computers and software packages used, computerised library operations, development of databases, bibliographic standards used, computerised information services, level of participation in networks and computerised facilities offered to users, etc. The results summarized in this paper reflect the current trends and future plans relating to the use of IT in CU libraries.

1. INTRODUCTION

Today, libraries are functioning under constantly changing environment and face a variety of complex challenges like information explosion, IT revolution, network evolution, shrinking library budgets, escalating prices of documents, high level of user expectations, availability of information resources in diverse media and so on. IT offers a wide range of opportunities, which could provide solutions to some of these major challenges. Rapid advances in modern technologies have greatly improved the capabilities of storage, processing, retrieval, repackaging, communicating, sharing, and managing the explosive growth of information effectively and economically in libraries. Use of IT in libraries has become inevitable in an era of information explosion and the emergence of a wide range of new technologies in order to satisfy the changing complex information needs of users.

Libraries have been using IT in general and computer technology in particular, to automate a wide range of administrative and technical processes, build databases, OPACs, networks and provide better services to their users. The use of IT for better management of information in all types of libraries has grown significantly in recent years. This widespread use of IT in libraries has created a profound impact on all aspects of the present library environment.

Central Universities (CU) are universities established by Acts of Parliament by Government of India. They impart education on a wide range of general, special, technical and professional disciplines in variety of courses ranging from Diploma/Degree to Doctoral level in the country. Libraries form an important integral part of central university education system by providing suitable information material useful for study, teaching, education, and research purposes. CU

libraries in India are actively involved in using IT to computerise their operations and offer information services to their users. Therefore, a study was conducted to survey the use of IT in CU libraries in India. This paper presents the analysis of the data gathered through the survey.

In the survey, the following 16 Central Universities were considered/chosen from different parts of the country:

1. Aligarh Muslim University (AMU), Aligarh
2. Assam University (AU), Silchar
3. Babasaheb Bhimrao Ambedkar University (BBAU), Lucknow
4. Banaras Hindu University (BHU), Varanasi
5. University of Delhi (UOD), Delhi
6. University of Hyderabad (UOH), Hyderabad
7. Indira Gandhi National Open University (IGNOU), New Delhi
8. Jamia Millia Islamia (JMI), New Delhi
9. Jawaharlal Nehru University (JNU), New Delhi
10. Mahatma Gandhi Antarrastreeya Hindi Viswavidyalaya (MGAHV)
11. Maulana Azad National Urdu University (MANUU), Hyderabad
12. Nagaland University (NU), Kohima
13. North-Eastern Hill University (NEHU), Shillong
14. Pondicherry University (PU), Pondicherry
15. Tezpur University (TU), Tezpur
16. Visva Bharati (VB), Shanti Niketan, West Bengal.

Out of 16, the questionnaires were sent to 14 CU libraries as the two universities viz. Mahatma Gandhi Antarrastriya Hindi Viswavidyalaya and Maulana Azad National Urdu University were established recently in 1997 and 1998 respectively and are in the process of developing infrastructural facilities, academic programmes and libraries. The group of libraries surveyed ranged widely in terms of age, size, stock, budget, number of users, etc. The abbreviated form of the names of central universities used in this

study represent their respective university libraries.

2. LIBRARY COLLECTION

Library collection forms a sound foundation for efficient services. The details of collection of CU libraries are presented in Table 1. Delhi University Library System (DULS) is an integrated network of 30 libraries including five divisional libraries, four faculty libraries, four special libraries, 13 departmental libraries and four zonal libraries, which are maintained at the expense of UOD. The Aligarh Muslim University Library System is a centralised system consisting of a main library viz. Moulana Azad Library, four college libraries, 50 department/institutes libraries and 14 libraries of the halls of residence. These libraries are simply extensions of the central library located at different places in the campus for the convenience of teachers and students. They function under the full administrative and technical control of university library.

As can be seen from the Table 1 that DULS has the largest collection of 14 lakh books including back volumes of periodicals followed by AMU with 9,80,000 books and BHU with 7,67,383 books. On the other hand, BBAU has the smallest number of 1000 books. BHU, UOD, UOH, and NEHU have good collections of more than 3,000 theses in each library, while JNU has a good collection of audio visual materials. UOH, IGNOU, NEHU and TU have also acquired CD-ROM databases. Regarding back volumes of periodicals, JNU Library has the largest number of 1,48,552 volumes followed by BHU with 1,01,756 and UOH with 69,000 volumes.

3. CURRENT PERIODICALS

In periodicals, DULS subscribes to the largest number of 3000 current periodicals followed by BHU with 1,301 and JNU with 1000 periodicals. It is worth noting that TU has reported having 85 periodicals in floppy disc and 21 in CD-ROM discs followed by PU with eight and one respectively.

Table 1. Collection of central university libraries

S. No.	Name of University	Books	Back Volumes of periodicals	Theses	Audio-Visual materials	CD-ROM databases	Others
1.	AMU	9,80,000	20,000	8,448	—	—	—
2.	AU	32,357	6	—	—	—	2000
3.	BBAU	1,000	---	—	—	—	—
4.	BHU	7,67,383	1,01,756	8,684	—	—	7,201
5.	UOD	14,00,000	—	14,500	4,175	30	—
6.	UOH	1,82,000	69,000	2,800	—	25	—
7.	IGNOU	73,291	5,077	25	—	91	—
8.	JNU	3,07,058	1,48,552	—	6,311	—	—
9.	JMI	2,50,000	6,000	600	300	—	—
10.	NU	25,204	10,000	200	—	—	—
11.	NEHU	1,61,737	36,764	3,500	200	30	—
12.	PU	1,00,000	5,000	1,329	—	8	1,976
13.	TU	8,800	250	—	60	21	—
14.	VB	3,59,601	60,771	550	—	—	23,225

Table 2. Current periodicals

S. No.	Name of University	Indian	Foreign	Gift/Exchange	Total
1.	AMU	632	455	—	1,087
2.	AU	84	19	2	105
3.	BBAU	—	—	—	—
4.	BHU	—	—	595	1,301
5.	UOD	—	—	—	3,000
6.	UOH	70	650	20	740
7.	IGNOU	215	296	13	524
8.	JNU	795	—	205	1,000
9.	JMI	—	—	—	500
10.	NU	27	60	40	127
11.	NEHU	366	316	126	808
12.	PU	—	—	20	384
13.	TU	56	6	—	62
14.	VB	256	130	145	531
Total		2,501	1,932	1,166	10,169

4. LIBRARY USERS

Library users consist of faculty members, students and administrative staff of a university. The details of each category of users of CU libraries are presented in Table 3. Out of 14 CU libraries surveyed, one library did not indicate user figures. The remaining 13 universities have a total of 76,157 users representing 11,281 (14.8%) faculty, 9,980

(13.1%) research scholars, 32,466 (42.6%) PG students, 11,759 (15.5%) administrative staff and 10,671 (14%) others including students of undergraduate, distance education courses, etc.

The DULS has the largest number of 23,300 users followed by BHU with 18,695 and JMI with 8,188 users. Regarding the average number of users visiting library per day, DULS is on the top of all with 2500

followed by JNU with 600 and UOH and PU with 500 each. The total number of users visiting these libraries per day is 5,425 and the average is 452 users per university.

5. LIBRARY STAFF

Human resources play a prominent role for the successful management of any library. The details of human resources available in CU libraries are presented in Table 4. The table demonstrates that there are 1,214 staff

Table 3. Library users

S. No.	Name of University	Faculty members	Research scholars	P G students	Administrative staff	Others	Total	Average visitors*
1.	AMU	450	300	950	805	110	2,615	—
2.	AU	130	60	1700	250	—	2,140	300
3.	BBAU	14	3	150	20	—	187	20
4.	BHU	1,222	1,180	10,409	5,575	309	18,695	—
5.	UOD	7,000	4,300	12,000	—	—	23,300	2,500
6.	UOH	260	860	1,158	1,000	3,200	6,478	500
7.	IGNOU	373	—	—	810	—	1,183	156
8.	JNU	462	1,696	1,525	612	46	4,341	600
9.	JMI	400	911	1,750	1,112	4,015	8,188	—
10.	NU	37	10	144	50	200	441	150
11.	NEHU	373	400	1,100	350	200	2,423	428
12.	PU	—	—	—	—	—	—	500
13.	TU	135	10	320	125	15	605	40
14.	VB	425	250	1,260	1,050	2,576	5,561	225
	Total	11,281	9,980	32,466	11,759	10,671	76,157	5,425
	Percentage	14.8	13.1	42.6	15.5	14	100	—

*Average no. of users visiting library per day

Table 4. Library staff in CU libraries

S. No.	Name of University	University librarian	Deputy librarians	Assistant librarians	Professional assistants	Library assistants	Others	Total
1.	AMU	1	4	12	65	125	25	232
2.	AU	1	0	1	5	4	10	21
3.	BBAU	1	—	1	2	—	2	6
4.	BHU	1	1	9	5	35	—	51
5.	UOD	1	10	24	78	162	125	400
6.	UOH	1	2	5	8	16	40	72
7.	IGNOU	1	—	2	3	4	10	20
8.	JNU	1	4	18	31	16	90	160
9.	JMI	1	3	3	11	8	35	61
10.	NU	—	—	1	—	2	11	14
11.	NEHU	1	1	4	10	34	35	85
12.	PU	1	1	4	7	—	10	23
13.	TU	1	—	1	1	1	6	10
14.	VB	—	4	9	22	8	16	59
	Total	12	30	94	248	415	415	1,214
	Percentage	1	2.5	7.7	20.4	34.2	34.2	100

members working in 14 CU libraries. Out of 14 responded libraries, DULS has the largest number of 400 staff members followed by JNU with 160 and NEHU with 85.

Of the 1,214 library staff, there are 12 (1%) university librarians (ULs), 30 (2.5%) deputy librarians (DLs), 94 (7.7%) assistant librarians (ALs) (including documentation officers and two information scientists), 248 (20.4%) professional assistants, 415 (34.2%) library assistants and remaining others 415 (34.2%) includes semi-professional and other supporting staff. The data analysis reveals that the CU libraries are managed by a good team of professional and non-professional staff.

The supervisory staff drawing UGC scales in the cadres of ULs, DLs and ALs constitute 11.2% of total staff. More than half of the library staff comprising professional assistants and library assistants belongs to middle level staff. The remaining one third of staff include semi-professional and supporting staff.

6. LIBRARY BUDGET

Finance is the lifeblood of any organisation. Annual budget is an important indicator of financial commitment of any library. CU libraries spend significant amount

for acquisition of books, subscription of periodicals and implementation of IT. The details of the budget of CU libraries are presented in Table 5. The table shows that DULS's budget for acquisition of books and periodicals during 1997-98 was four crore rupees followed by JNU with Rs. 1.38 crores and UOH with Rs. 1.18 crores.

Nine CU libraries reported IT budget figures, have spent Rs. 677.87 lakhs for IT during three years from 1995-96, 1996-97 and 1997-98. PU reported to have spent Rs. 35.6 lakhs for databases during 1995-98. According to *INFLBNET Directory (2000)*, all the CU libraries shown in Table 4 were provided funds except BBAU. In addition, UGC provided special grants to some CU libraries. This clearly shows that CU libraries in general, are spending significant amount on IT and are using new technologies. The situation, may further be improved as libraries are likely to invest more on IT in future.

Further analysis revealed that out of total amount, a lion's share has gone for IT hardware and less amount was spared for software. IT maintenance and training were allotted very meager amounts. This confirms the findings of several earlier studies which

Table 5. Library budget (in lakhs)

S. No.	Name of University	Books			Periodicals			Information Technology		
		1995-96	1996-97	1997-98	1995-96	1996-97	1997-98	1995-96	1996-97	1997-98
1.	AMU	—	—	—	70.00	77.00	77.00	10.00	—	—
2.	AU	99.00	60.00	20.00	0.20	0.20	3.00	—	—	—
3.	BBAU	—	—	10.00	—	—	—	—	—	—
4.	BHU	—	—	—	—	97.00	104.00	—	—	—
5.	UOD	—	—	400.00	—	—	—	*100.00	*100.00	—
6.	UOH	20.00	20.00	25.00	77.00	83.00	93.00	20.05	1.45	2.43
7.	IGNOU	35.00	27.50	60.00	13.00	20.00	20.00	—	10.00	15.00
8.	JNU	12.55	10.85	18.11	120.00	120.00	120.00	—	—	—
9.	JMI	14.43	31.23	9.94	—	—	—	—	*200.00	—
10.	NU	8.25	13.00	33.00	5.00	5.00	7.00	—	—	—
11.	NEHU	10.00	10.00	10.00	60.00	60.00	60.00	*100.00	—	—
12.	PU	7.31	27.46	—	22.20	22.14	—	—	8.84	0.60
13.	TU	—	—	—	3.00	5.00	5.00	2.50	3.00	4.00
14.	VB	10.84	17.80	20.75	28.08	28.76	44.00	—	*100.00	—

*UGC special grant

reported that inadequate funds were allocated for training staff in the use of IT.

7. INFRASTRUCTURAL FACILITIES

The data gathered from questionnaire responses regarding the infrastructural facilities available in CU libraries is presented in Table 6. This table shows that all the 14 (100%) libraries surveyed have telephone, 12 (86%) have xerox and e-mail, seven (50%) have fax, internet and six (43%) have scanners. In addition to the items mentioned in the Table 6, UOH has V-SAT, voice input devices and film projector, IGNOU has video conferencing, PU has V-SAT and VB has telex facilities. Infrastructural facilities form a sound basis for effective communication both within and outside the library. Since most of the CU libraries have the basic infrastructural facilities, they would facilitate the introduction and use of IT in these libraries.

8. AUTOMATION PLANNING

Strategic planning is a key to the successful library automation implementation. Therefore, this section is intended to cover the kind of planning approaches and policy considerations taken into account by CU

libraries to support the introduction and use of IT. In order to identify planning approaches to library automation, the survey included questions about what are the important objectives of library automation, who has participated in planning, what steps they have taken for implementation and, what are the important factors considered in choosing a software. Each of these questions contained a variable number of choices and the respondents were asked to prioritise them beginning with one in the order of importance. All these numbered responses were totalled and averaged to get Mean scores. These scores were used as a basis for assigning ranks to the choices. The mean score closer to one is the most important one and the rest are in the decreasing order of their importance.

8.1 Library Automation Objectives

In order to identify the goals for library automation, university librarians were offered 10 choices plus 'any other' and asked to prioritise each choice in the order of their importance (one is the most important). The result is presented in Table 7.

Table 6. Infrastructural facilities in CU libraries

Name of Univ.	Teleph- hone	Fa x	E- mail	Inte rnet	Web site	Home page	Xe- rox	Bar Code	Sca- nner	Multi- media	Online Search	Micro film	Micro fiche	Slide proj	TV	V- CR	OH- P
AMU	Y	N	Y	Y	N	N	Y	N	N	N	N	Y	N	Y	N	N	N
AU	Y	Y	N	N	N	N	Y	N	Y	N	N	N	N	N	N	N	N
BBAU	Y	N	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N
BHU	Y	N	Y	N	N	N	Y	N	N	N	N	N	N	N	N	N	N
UOD	Y	Y	Y	Y	N	N	Y	N	Y	Y	Y	Y	Y	N	Y	Y	Y
UOH	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	Y	N	N	Y
IGNOU	Y	N	Y	Y	N	N	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	N
JNU	Y	N	Y	Y	N	N	Y	Y	Y	N	Y	Y	Y	N	N	N	N
JMI	Y	Y	Y	Y	N	N	Y	N	N	N	N	N	N	Y	Y	N	N
NU	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
NEHU	Y	Y	Y	N	N	N	Y	N	N	N	N	Y	Y	Y	Y	Y	N
PU	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	N	N	N	Y	Y	Y
TU	Y	N	Y	N	N	N	Y	N	N	N	N	N	N	N	N	N	N
VB	Y	Y	Y	N	N	N	Y	N	N	N	N	N	N	N	N	N	N
Total	14	7	13	7	2	2	12	3	6	5	5	5	4	3	5	4	3
%	100	50	93	50	14	14	86	21	43	35	35	35	28	21	35	28	21

Y= Yes; N=No;

Table 7. Objectives of library automation

Rank*	Mean	N	Objectives
1	1.7	13	To improve access to collection
2	2.8	13	To improve the quality of existing services
3	3.8	13	To reduce routine and time consuming clerical works
4	4.8	13	To improve the speed of cataloguing, technical processing and putting items on shelves faster
5	4.9	13	To offer improved range of services
6	5.2	13	To improve co-operation and resource sharing among libraries
7	6.2	12	To easily participate and utilise national and international computer networks
8	7.8	12	To provide more current and comprehensive reporting of library information to managers
9	7.9	12	To reduce the number of library staff required
10	9.6	12	To improve prestige and visibility of library

* Rank ordered by mean score; N=No. of libraries;

The most important objectives of library automation rated by respondents are: to improve access to collection, to improve the quality of existing services and to reduce routine and time consuming clerical works. The other objectives are shown in the table according to their descending order of their rank. The least regarded objectives are to improve prestige and visibility of our library and to reduce the number of staff required. It clearly shows that libraries are more concerned to improve user services.

Of all the automation objectives, improving access to collection received the highest rank as it is the primary objective of any library. This confirms the findings of Borgman¹ who surveyed library automation progress in six Central and Eastern European countries.

8.2 Personnel Involved

The success of library automation largely depends upon the persons involved in its planning and implementation. Respondents were, therefore, asked to rank the persons in the order of their involvement in automation planning and implementation process. Table 8 indicates the range of staff involved in the automation planning and implementation process. The first position goes to the head of the library i.e., university librarian, followed by deputy librarian with second rank and assistant librarian with third rank. The other

persons participated include information scientist and other professional staff.

Table 8. Persons involved in library automation planning

Rank*	Mean	N	Designation
1	1.4	11	University Librarian
2	2.0	6	Deputy Librarian
3	2.6	11	Asst. Librarian
4	3.1	10	Computer specialist
5	3.7	3	I/C of automation program
6	4.3	6	Other professionals

* Rank ordered by mean score;
N=No. of libraries;

8.3 Steps Taken for Library Automation Implementation

The basic knowledge of technology is essential for successful planning and implementation of library automation. There are a variety of ways to gain knowledge of using IT in libraries.

Table 9 shows the steps taken for library automation implementation. The highly rated steps are: sending staff for training courses, visits to automated libraries and consultation with other librarians. This indicates that training has been identified as the most important step as it is a crucial to the successful library automation implementation.

Table 9. Steps taken for library automation implementation

Rank*	Mean	N	Steps
1	2.4	11	Sending staff for training
2	2.7	12	Visits to automated libraries
3	2.9	12	Consultation with other librarians
4	3.5	11	Attending meetings on library automation
5	3.8	11	Read library automation literature
6	5.8	4	Hired a consultant on library automation

* Rank ordered by mean score;
N=No. of libraries

8.4 Automation Software Selection

Software package play a key role for the success of library automation. There are a number of factors, which influence the selection of a particular package. Table 10 shows the important factors considered in selecting a library automation software package.

The first three ranked factors are: software that is the easiest for library staff and users to use, supports the cataloging record format most used in the country, and is in use at other libraries in the country. The other reason indicated by one library is that the software is integrated and comprehensive. This shows that the user-friendliness has been accorded as the major factor for selection of software in CU libraries.

9. CONSTRAINTS IN AUTOMATION IMPLEMENTATION

Library automation is an expensive, complex and continuous process involving various constraints faced in its implementation. In order to identify various constraints faced in library automation implementation by CU libraries, the respondents were offered 10 problems plus 'any other' and asked to rank each problem in the order of their severity using one as the most important. Table 11 indicates the ranked order of the number of constraints faced in library automation. The highly ranked constraints were inadequate financial resources, lack of well-accepted standard software package and non-availability of IT trained personnel. The problem of inadequate funds has been confirmed in the studies reported by Burton², Hauptman and Anderson³ and R.P. Kumar⁴. The least ranked problem was non-availability of consultancy services followed by resistance of library staff.

10. TYPE OF HARDWARE IN USE

The number of computers used in a library serves as an indicator of the level of library automation implementation. To identify the types of computers being used by the CU libraries, the respondents were requested to indicate the computer facilities available and also the number of computers used in their libraries. The data analysis indicates that most of the respondents except two indicated using some sort of computers and the result

Table 10. Important factors in selecting library automation software

Rank*	Mean	N	Factors
1	2.4	12	The software is the easiest for library staff and users to use
2	2.6	11	The software supports cataloging record format most used in the country
3	3.53	10	The software is in use at other libraries in the country
4	3.6	9	The software has the best features for connecting library to other computer networks
5	4.6	9	The software company offers the best training for library staff
6	4.7	7	The software is the least expensive overall
7	5.8	6	The software is rated as the best in competitive bidding process
8	5.9	7	The software has been endorsed for general use in our country by the appropriate agency.

* Rank ordered by mean score; N=No. of libraries;

is presented in Table 12. When these were analysed according to size, most of CU libraries are using personal computers (PC) while mini computer is used only in UOH and none had main-frame computer.

Regarding the use of PCs, out of 14, the largest number i.e., 11 (79%) libraries are found using computers, two are in the process of procurement and one did not report the number of computers available in the library. These 11 libraries have a total of 169 purchase ranging from one to 53 with an

average of 15 PCs per CU library. There are altogether 30 terminals in five libraries providing OPAC service. In addition, the table demonstrates that eight (57%) libraries have computer network and five (36%) libraries have CD network too.

11. SOFTWARE IN USE

Another measure of IT utilisation is studied with respect to application software packages used in CU libraries. Responses indicate that 13 (93%) libraries use different operating

Table 11. Constraints faced in library automation implementation

Rank*	Mean	N	Constraints
1	2.2	11	Inadequate financial resources
2	3.6	9	Lack of well accepted standard software package
3	3.7	10	Non availability of IT trained personnel
4	4.8	10	Lack of official/policy guidelines
5	5.0	6	Non availability of less expensive software
6	5.3	8	Low priority of libraries
7	5.4	7	Unawareness of potential benefits of IT
8	5.7	9	Inadequate management support
9	6.5	8	Non availability of consultancy services
10	7.4	7	Resistance of library staff

* Rank ordered by mean score; N=No. of libraries;

Table 12. Computers used in CU libraries

S. No.	Name of University	Mini computer	No. of personal computers	CD drives	OPAC terminals	Computer network	CD network
1.	AMU	N	11	—	N	N	N
2.	AU	N	1	1	N	N	N
3.	BBAU	N	1	—	—	N	N
4.	BHU	N	11	1	—	N	N
5.	UOD	N	53	—	10	Y	N
6.	UOH	Y	25	25	8	Y	Y
7.	IGNOU	N	3	—	2	Y	Y
8.	JNU	N	18	5	6	Y	Y
9.	JMI	Y	13	—	—	Y	—
10.	NU	—	—	—	—	—	—
11.	NEHU	N	Y*	—	—	Y	Y
12.	PU	N	21	11	4	Y	Y
13.	TU	N	5	—	—	Y	N
14.	VB	N	—	—	—	N	N
Total		2	169	43	30	8	5
Percentage		14	—	—	—	57	36

Y= Yes; N=No; Y*= Number not mentioned;

systems, word processors, application software and programming languages. The result of the analysis of responses is presented in Table 13.

Regarding operating systems, 13 (93%) libraries are using both MS-DOS and Windows and nine (64%) are using UNIX. With regard to word processors, 12 (86%) libraries use MS-Word, 11 (79%) WordStar, and five (35%) use Word Perfect.

The application software indicated as being in use for creating and maintaining internal databases are dBase III plus, CDS/ISIS and commercial library software packages. CDS/ISIS (freely distributed by UNESCO) is the most widely used software by many libraries. Almost 12 (86%) libraries are using CDS/ISIS, eight (57%) LIBSYS (a commercial software package), five (35%) dBase III plus/IV and four (28%) libraries use ILMS/SOUL developed by INFLIBNET of UGC. This finding confirms the results of the surveys reported by INFLIBNET Centre⁵ (2000) and Lakshmana Moorthy⁶. In addition, DULS uses Troodon and IGNOU uses Foxplus. Regarding programming languages,

four CU libraries use C, two each Basic and Pascal.

12. COMPUTERISED LIBRARY OPERATIONS

The mere availability of IT in a library is not enough, unless these technologies are put to use for solving problems of work environment. In order to obtain a benchmark on the progress of implementing automated systems for housekeeping operations, the survey offered a list of functions and asked the respondents to mark the computerised operations in their libraries. Although, the question asked for a list of operations currently in use, responses appear to include planned as well as current operations.

Table 14 shows that the most widely used library operations reported by 12 (86%) libraries are word processing followed by 11 (79%) in-house database creation, 10 (71%) cataloguing and nine (64%) retrospective conversion, eight (57%) serials control, seven (50%) acquisition and OPAC. The other applications in descending order are budgeting, management information, circulation, and statistical reports. In addition

Table 13. Software used in CU libraries

S. No.	Name of University	Operating systems			Word processors			Library software					
		MS DOS	UNIX	Win dows	Word Perfect	Word Star	MS Word	Dbase III+/IV	LIB SYS	Basis plus	CDS/ ISIS	ILMS/ SOUL	Others
1.	AMU	Y	N	Y	Y	Y	Y	N	N	N	Y	—	—
2.	AU	Y	N	Y	N	Y	Y	N	N	N	Y	N	N
3.	BBAU	Y	N	Y	N	Y	Y	Y	N	N	Y	Y	N
4.	BHU	Y	Y	Y	N	Y	Y	N	N	N	Y	Y	N
5.	UOD	Y	N	Y	Y	Y	Y	N	N	N	Y	N	Troodon
6.	UOH	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	—
7.	IGNOU	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	N	FoxPlus
8.	JNU	Y	Y	Y	N	Y	Y	N	Y	Y	Y	N	N
9.	JMI	Y	Y	Y	N	N	Y	N	Y	N	Y	N	N
10.	NU	—	—	—	—	—	—	—	—	—	—	—	—
11.	NEHU	Y	Y	Y	Y	Y	N	Y	Y	N	Y	N	N
12.	PU	Y	Y	Y	N	Y	Y	N	Y	N	Y	Y	N
13.	TU	Y	Y	Y	N	Y	Y	N	Y	N	Y	Y	N
14.	VB	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	N	N
Total		13	9	13	5	11	12	5	8	1	12	4	—
Percentage		93	64	93	35	79	86	35	57	7	86	28	—

Y= Yes; N=No;

Table 14. Computerised library operations

Name of Univ.	Word Processing	Inhouse database	Acquisition	Cataloguing	OP-AC	Re-Con.	Circulation	Serials control	Budgeting	Statistical reports	Management information
AMU	Y	Y	—	—	—	—	—	N	—	—	—
AU	Y	N	N	Y	N	Y	N	Y	N	N	N
BBAU	Y	Y	Y	Y	Y	N	N	Y	Y	Y	Y
BHU	Y	Y	N	N	N	Y	N	N	N	N	N
UOD	Y	Y	Y	Y	Y	Y	N	Y	N	N	Y
UOH	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
IGNOU	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N
JNU	Y	Y	Y	Y	Y	Y	N	Y	N	N	N
JMI	Y	Y	N	Y	N	N	N	N	N	N	N
NEHU	Y	Y	N	Y	N	Y	N	N	N	N	N
NU	—	—	—	—	—	—	—	—	—	—	—
PU	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y
TU	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N
VB	N	N	N	N	N	N	N	N	N	N	N
Total	12	11	7	10	7	9	3	8	4	3	4
%	86	79	50	71	50	64	21	57	28	21	28

Y= Yes; N=No;

to these, the other services provided are publications by DULS, network access by UOH and indexing and abstracting service by IGNOU, etc. The data analysis reveals that the majority of libraries surveyed use IT to various operations.

Of all the operations, word processing is widely used in CU libraries. This finding agrees with Mustafa⁷ (1985) who made a study on the use of microcomputers in 114 university libraries in USA.

12.1 Automation Implementation

Regarding the method followed for library automation implementation, Table 15, shows that eight (57%) libraries have adopted a single function approach in a phased manner in developing their computerised systems and two have stated for simultaneous implementation. Half of the libraries have integrated all modules of library operations. Overall it is observed that CU libraries are in favour of integrated approach in a phased manner. In the process of automating library functions, out of four responded libraries, three have accorded first priority to cataloguing.

Respondents were asked to indicate the operations they maintain in parallel both automated and manual systems, six (43%) libraries indicated cataloguing and serials control followed by circulation by five (35%) and acquisition by four (28%). From this it is observed that CU libraries will maintain both manual and automated systems parallelly for a specified period until the reliability of the new system is established.

13. DATABASE DEVELOPMENT

Creation of databases of books, serials, theses is a pre-requisite for online library operations and networking. As an indicator of automation, respondents were asked to indicate the databases they created for public use such as books, serials, theses along with the number of records in each database. The results are presented in Table 16. As can be seen from the table that many CU libraries have made considerable progress in database activity as most of them have created one or more local databases. However, databases are not developed corresponding to their huge volume of collections.

Table 15. Library automation implementation

Name of Univ.	In Phases	Simultaneously	Integrated	Automation order
AMU	Y	—	—	—
AU	—	—	—	—
BBAU	N	Y	N	—
BHU	Y	N	N	—
UOD	Y	N	Y	—
UOH	Y	N	Y	Catg., Acqn., Sl.Cntl., Tech & Circ.
IGNOU	N	Y	Y	—
JNU	Y	N	Y	Catg, Doc, Sls, Membership, Acqn.
JMI	Y	N	Y	—
NU	—	—	—	—
NEHU	N	N	N	—
PU	Y	N	Y	ReCon.. Acqn., Sl.Cntl., OPAC
TU	Y	N	Y	Catg., Circ., Sl.Cntl., Acqn.
VB	N	N	N	—
Total	8	2	7	—
Percentage	57	14	50	—

Y= Yes; N=No;

Table 16. Development of databases

Name of Univ.	Year of starting computerisation	Number of records		
		Books	Back vols. of journals	Theses
AMU	1998	40,000	—	4,701
AU	1997	—	—	—
BBAU	1998	1,007	—	—
BHU	1996	305	2,010	8,500
UOD	1998	80,000	3,000	14,500
UOH	1989	1,82,000	69,000	2,800
IGNOU	1989	65,000	1,000	25
JNU	1989	95,940	1,880	1,195
JMI	1996	10,000	—	600
NU	—	—	—	—
NEHU	1986	20,000	—	—
PU	1995	70,000	600	1,000
TU	1995	5,500	50	—
VB	1998	—	—	—
Total records		5,29,752	77,540	33,321
Total collection as per Table 1		46,48,431	4,63,176	40,636
Percentage		11.4	16.7	82.0

Out of 14 libraries, 11(79%) have created database for books, eight (57%) theses, six (43%) serials and the rest are in the process. As compared to the number of documents viz. books, back volumes of periodicals and theses given in Table 1, it indicates that 11.4% books, 16.7% back volumes of

periodicals and 82% theses are entered in the databases. Although CU libraries have developed databases covering most of theses, they are yet to enter major portions of collection in respect of books and back volumes of periodicals.

NEHU initiated library computerisation in 1986 followed by UOH, IGNOU and JNU in 1989. The remaining CU libraries started computerization after 1995 and made significant progress during last five years, which may be more faster in the next couple of years.

The most remarkable fact is that the UOH has developed a database for complete collection over 1,82,000 records of books and 69,000 back volumes of serials followed by JNU with 95,940 records, DULS with 80,000, PU with 70,000 and IGNOU with 65,000 records in books database.

14. BIBLIOGRAPHIC STANDARDS

Standardisation is essential in the field of computersation for compatibility, exchange, economy in cost, efforts and sharing of resources. The ISO has brought out some standards for mechanisation and automation in documentation. Sharing resources in an automated environment requires agreement on standards among the participants especially for the content and structure of records to be exchanged or merged. Exchange of catalogue records is based on

several related international standards for record description and structure.

Standards for record content and structure are to be followed for successful development and use of databases and to facilitate sharing of resources. To find out the bibliographic standards followed in CU libraries, respondents were offered choice of formats and asked to indicate the formats used in their libraries. The result of the analysis of data is presented in Table 17. From the table, it is found that eight (57%) libraries are using CCF, followed by one (7%) each using ISO 2709, MARC, MARC compatible, local format and LIBSYS format. Regarding sources used for retrospective conversion of catalogue, many stated that they have converted their records by their own staff only and not used any electronic database sources.

The trend is different in Western countries, where libraries make maximum use of external CD-ROM and network databases for conversion of their records into machine readable form. The reason for this could be that the libraries in the West follow standards, which would facilitate easy downloading of data.

Table 17. Bibliographic standards

S. No.	Name of University	Formats					
		MARC	UNI MARC	MARC compatible	CCF	ISO 2709	Others
1.	AMU	N	N	N	Y	N	N
2.	AU	N	N	N	Y	N	N
3.	BBAU	N	N	N	N	N	Local
4.	BHU	N	N	N	Y	N	N
5.	UOD	N	N	N	Y	N	N
6.	UOH	N	N	Y	N	N	N
7.	IGNOU	N	N	N	N	N	Libsys
8.	JNU	N	N	N	Y	Y	N
9.	JMI	N	N	N	Y	N	N
10.	NU	—	—	—	—	—	—
11.	NEHU	Y	N	N	N	N	N
12.	PU	N	N	N	Y	N	N
13.	TU	N	N	N	Y	N	N
14.	VB	N	N	N	N	N	N
Total		1	—	1	8	1	1
Percentage		7	—	7	57	7	7

Y= Yes; N=No;

15. RETROSPECTIVE CONVERSION OF CATALOGUE

In order to know the extent, the library catalogue were converted into machine readable form, respondents were offered choices and asked them to indicate how much of their catalogue has been converted into machine readable form. The result is summarised in Table 18. As can be seen from the table, that only four libraries have converted all of their records and the rest are at various stages of progress.

Retrospective conversion of a catalogue is a complex task which requires not only a lot of effort and time but also huge financial and human resources. This is more so with CU libraries because of their large size holdings. Therefore, the retrospective conversion of catalogue work is progressing steadily in CU libraries.

Respondents were also asked to indicate which method they followed for retrospective conversion of their catalogue. As can be seen from the Table 19 that six libraries have done with existing staff, two each with temporary staff and contract basis.

16. COMPUTERISED LIBRARY INFORMATION SERVICES

To measure the degree of automation in information services, the survey included questions about the computerised information services offered by each library. The result is present in Table 19. This table shows that seven libraries provide accession list, six internet service, five each reference service, and CD-ROM service, four each online service, ILL, and CAS, etc. The range of services offered by these libraries varied between three to seven.

16.1 Databases Used

Databases form sound foundation for providing efficient information services in a library. Respondents were asked to indicate type of databases used in their libraries for providing information retrieval services to users. The summary of analysis of databases used is presented in Table 20. The table shows that six libraries used inhouse databases and CD-ROM databases followed by four libraries using online databases and three libraries used INFLIBNET databases.

Table 18. Retrospective conversion of catalogue

S. No.	Name of University	Portion of library catalogue converted						Method followed		
		Last 1-2yr	Last 3-5yr	Last 6-10yr	All converted	Some portion	None	Contract	Temporary staff	Existing staff
1.	AMU	Y	N	N	N	N	N	N	N	Y
2.	AU	N	N	N	N	N	Y	N	Y	Y
3.	BBAU	N	N	N	Y	N	N	N	N	N
4.	BHU	N	N	N	N	Y	N	N	N	N
5.	UOD	Y	N	N	N	N	N	N	Y	Y
6.	UOH	N	N	N	Y	N	N	N	N	Y
7.	IGNOU	N	N	N	Y	N	N	Y	N	N
8.	JNU	N	N	Y	N	N	N	N	N	Y
9.	JMI	Y	N	N	N	N	N	Y	N	N
10.	NU	—	—	—	—	—	—	—	—	—
11.	NEHU	N	Y	N	N	N	N	N	N	Y
12.	PU	N	N	N	Y	N	N	N	N	Y
13.	TU	N	N	N	N	Y	N	N	N	Y
14.	VB	N	N	N	N	N	N	N	N	N
Total		3	1	1	4	2	3	2	2	6
Percentage		21	7	7	28	14	21	14	14	43

Y= Yes; N=No;

Table 19. Computerised library information services

S. No.	Name of University	Access-ion list	Reference service	CD-ROM service	Perl.cont. pages	CAS	Online services	Internet search	ILL	SDI service	Indexing
1.	AMU	N	N	N	N	N	N	N	N	N	
2.	AU	N	N	N	N	N	N	N	N	N	N
3.	BBAU	N	N	N	N	N	N	N	N	N	N
4.	BHU	N	N	N	N	N	N	N	N	N	N
5.	UOD	Y	Y	Y	N	N	N	Y	N	N	N
6.	UOH	Y	Y	Y	Y	Y	Y	Y	Y	Y	N
7.	IGNOU	Y	Y	Y	N	Y	N	Y	Y	Y	Y
8.	JNU	N	Y	Y	N	N	Y	Y	Y	N	Y
9.	JMI	Y	N	N	N	Y	N	Y	N	N	N
10.	NU	—	—	—	—	—	—	—	—	—	—
11.	NEHU	Y	N	N	N	N	N	N	N	N	N
12.	PU	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
13.	TU	Y	N	N	N	N	Y	N	N	N	N
14.	VB	N	N	N	N	N	N	N	N	N	N
Total		7	5	5	2	4	4	6	4	3	3
Percentage		50	35	35	14	28	28	43	28	21	21

Y= Yes; N=No;

Table 20. Databases used

S. No.	Name of University	In-house databases	CD-ROM databases	INFLIBNET databases	Online databases	Others
1.	AMU	N	N	N	N	N
2.	AU	N	N	N	N	N
3.	BBAU	N	N	N	N	N
4.	BHU	N	N	N	N	N
5.	UOD	Y	Y	N	Y	DELNET
6.	UOH	Y	Y	Y	Y	N
7.	IGNOU	Y	Y	N	N	DELNET
8.	JNU	Y	Y	Y	Y	N
9.	JMI	Y	N	N	Y	N
10.	NU	—	—	—	—	—
11.	NEHU	N	Y	N	N	N
12.	PU	Y	Y	Y	N	COPSAT (NCSI)
13.	TU	N	N	N	N	N
14.	VB	N	N	N	N	N
Total		6	6	3	4	3
Percentage		43	43	21	28	21

Y= Yes; N=No;

16.2 Computerised Facilities for Users

User is the kingpin of the library. So the main purpose of computersation is to provide better facilities and services to users. The

survey has asked to indicate the number of computers made available to users to use online catalogues, online and CD-ROM databases and internet within the library. Table 21 indicates the availability of computers and facilities accessible by the

end-users. As can be seen from the table that six libraries have provided computers for end users. The total number of computers provided by four libraries is 17 ranging from two to eight. Regarding facilities accessible by end-users within the library, five libraries provide access to OPAC, four each CD-ROM search service, electronic mail and internet.

17. NETWORKING AND RESOURCE SHARING

One of the major objectives of computerisation is to facilitate networking and resource sharing. In order to assess the progress made by CU libraries towards networking and resource sharing, respondents were asked to indicate their accessibility as well as level of participation in networks.

The Table 22 shows that five libraries have access to INFLIBNET, four ERNET, three NICNET, DELNET and INET each. Regarding participation in networks, seven libraries participate in LAN while five in MAN.

18. FUTURE PLANS

Finally, the respondents were asked an open-ended question soliciting the details

about their future plans of using IT in their libraries. Most of the CU libraries have indicated their enthusiastic future plans of using IT extensively for computersiation. These future plans ranged widely from initial level of introducing IT, computerisation of one or more new functions, integration of all operations, development and participation in networks and resource sharing and provision of internet services to the advanced level of developing digital libraries.

CONCLUSION

The survey has provided a useful summary of current state-of-the art of using IT in CU libraries in India. The survey confirmed that IT has deeply embedded in the management of information in university libraries. It has become a powerful tool in the management of routine library operations and services. The analysis has shown that the use of technology in CU libraries is increasing steadily and significantly. The level of response shown to the present survey indicated that CU libraries continue to be more interested in using IT in future. The respondents clearly indicated an awareness of current developments concerned with

Table 21. Computerised facilities offered to users

S. No.	Name of University	Computers provided for users	No. of computers	OPAC	CD-ROM Search	E-mail	Internet	Online search
1.	AMU	N	—	N	N	N	N	N
2.	AU	N	—	N	N	N	N	N
3.	BBAU	N	—	N	N	N	N	N
4.	BHU	N	—	N	N	N	N	N
5.	UOD	N	—	N	N	N	N	N
6.	UOH	Y	8	Y	Y	N	Y	Y
7.	IGNOU	Y	2	Y	Y	Y	Y	N
8.	JNU	Y	3	Y	Y	Y	Y	Y
9.	JMI	N	N	N	N	N	N	N
10.	NU	—	—	—	—	—	—	—
11.	NEHU	Y	N	N	N	N	N	N
12.	PU	Y	4	Y	Y	Y	Y	N
13.	TU	Y	—	Y	N	Y	N	N
14.	VB	N	—	N	N	N	N	N
Total		6	17	5	4	4	4	2
Percentage		43	—	35	28	28	28	14

Y= Yes; N=No;

Table 22. Networking and resource sharing

S. No.	Name of University	Accessibility to networks					Participation	
		INFLIBNET	ERNET	NICNET	INET	Others	MAN	LAN
1.	AMU	N	N	N	N	N	N	N
2.	AU	N	N	N	N	N	N	N
3.	BBAU	N	N	N	N	N	N	N
4.	BHU	N	Y	N	Y	N	N	Y
5.	UOD	N	N	N	N	DELNET	Y	N
6.	UOH	Y	Y	N	Y	N	Y	Y
7.	IGNOU	N	N	N	N	DELNET	Y	Y
8.	JNU	Y	N	Y	N	DELNET	Y	Y
9.	JMI	N	N	Y	N	N	Y	Y
10.	NU	—	—	—	—	—	—	—
11.	NEHU	N	N	N	N	N	N	N
12.	PU	Y	Y	Y	Y	N	N	Y
13.	TU	Y	N	N	N	N	N	Y
14.	VB	Y	Y	N	N	N	N	Y
Total		5	4	3	3	3	5	8
Percentage		35	28	21	21	21	35	57

Y= Yes; N=No;

automated library systems even in those libraries where IT has not been used much.

Use of IT in libraries has become inevitable in an era of information explosion and the emergence of a wide range of new technologies. Effective use of IT in libraries helps in performing their operations and services most efficiently. In India, many libraries have been adopting IT applications to library operations for providing efficient services and participating in networks for sharing resources. Implementation of IT to library operations is a complex and continuous process. It requires imaginative, intelligent planning and huge investment of financial as well as human resources. Libraries intending to use IT have to plan systematically well in advance for successful implementation to derive maximum benefits and minimise problems. To keep pace with the developments, libraries need to re-define and re-evaluate their roles and make consistent and systematic efforts to make use of the new technologies in order to satisfy variety of complex information needs of users. The role of the libraries in future would be heavily involved in adopting modern technologies and repackaging of information

to provide need-based, value-added services to their users.

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Information technology in India. From Wikipedia, the free encyclopedia. Information technology in India is an industry consisting of two major components: IT services and business process outsourcing (BPO).[1] The sector has increased its contribution to India's GDP from 1.2% in 1998 to 7.5% in 2012.[2] According to NASSCOM, the sector aggregated revenues of US\$160 billion in 2017,[3][4] with export revenue standing at.Â âœª India's Transformation: The Role of Information Technology. âœª Information technology in India.Â STPI set up software technology parks in different cities, each of which provided satellite links to be used by firms; the local link was a wireless radio link. Chicago. Yuvaraj, Mayank. "Status of University Libraries in India." In Encyclopedia of Information Science and Technology, Third Edition. edited by Mehdi Khosrow-Pour, D.B.A., 4911-4919. Hershey, PA: IGI Global, 2015. <http://doi:10.4018/978-1-4666-5888-2.ch484>. Export Reference. Available In. InfoSci-Books.Â India`s central government is divided into three distinct but interrelated branches: legislative, executive and judiciary. The constitutional head of the executive branch of the union is the president but the real executive powers lies with the council of ministers. Governor as a representative of the president is the head of the executive body while union territories are administered by the administrator appointed by the president. University libraries of Rajasthan (India) are using computer and associated technology for library activities. This study attempts to reveal the basic infrastructure, use, and privation during the implementation of ICT in University libraries of Rajasthan. The data have been collected using the survey method.Â The Information and Communication Technology (ICT) has affected the libraries to the great extent. Libraries use ICT to maintain housekeeping operations, services, uniformity and extension of library facilities. University libraries of Rajasthan (India) are using computer and associated technology for library activities. This study attempts to reveal the basic infrastructure, use, and privation during the implementation of ICT in University libraries of Rajasthan.

Venkata Raman and Chandrasekhar Rao studied the use of information technology in central university libraries of India. They confirmed that the use of IT in the libraries of central universities is increasing steadily and significantly. The comparative study of Verma and Kaur focused on the impact of e-resources in the libraries of IIT Delhi and IIT Roorkee. To study the various areas of library operations and services those are performed using the ICT in university libraries of MP. To identify the various factors those promote or hinder the development and use of ICT in university libraries. To provide. in India Academic Library Consortia, Consortia management, Networking, E-resources, Library. Networks, Consortia Resource Sharing and Networking Information Resources, Library. Information and Library Network (INFLIBNET), a programme of the University Grants Commission, was launched in May 1991. The main aim of INFLIBNET is to establish a national computer communication network to link libraries and information centers in universities, colleges, universities, UGC information centers, institutions of national importance, R&D institutions, etc., and thereby improve capability in information handling and services. This central database includes the library holdings of DELNET member libraries used as union catalogues of books/monographs.