Role of Database Management Systems in Selected Engineering Institutions of Andhra Pradesh: An Analytical Survey

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ABSTRACT

This paper aims to analyze the function of database management systems from the perspective of librarians working in engineering institutions in Andhra Pradesh. Ninety-eight librarians from one hundred thirty engineering institutions participated in the study. The paper reveals that training by computer suppliers and software packages are the significant mode of acquiring DBMS skills by librarians; three-fourths of the librarians are postgraduate degree holders. Most colleges use database applications for automation purposes and content value. Electrical problems and untrained staff seem to be major constraints faced by respondents for managing library databases.

1. Introduction

Libraries use Information Technology (IT) to automate an extensive range of administrative and technical processes, to build databases, OPACs, as well as networks, and to offer better services to their users. This widespread application of IT in libraries has created a need to reflect on all aspects of the present library environment. Computers are being used for routine housekeeping activities of the library, which saves the time of the end users as well as library professionals, avoids repetition of work and makes the library services smooth and effective (Sinha, 2000). Figure 1 represents the implications of DBMS in engineering college libraries.

Previous studies using seventy-six librarian subjects (Partridge et al., 2010), which explored the skills, knowledge and attributes required by the contemporary library and information professional in a world of ever changing technology, reported that personality traits, not just qualifications, would be critical to being a successful librarian or information worker in the future. Baro et al. (2013) investigated the achievements of librarians who attended a workshop on e-library services. They reported that the librarians who participated in the workshop were exposed to skills in areas such as database searching, using different search engines, using social media, knowledge of relevant websites, and knowledge of planning for e-libraries. According to the authors, acquiring such skills would enable the librarians to effectively use e-resources and train users on different search strategies.

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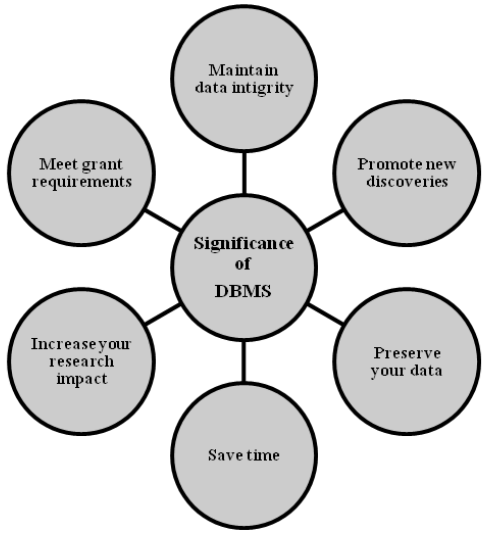

Fig. 1. Significance of Database Management

Enormous studies done all over India on the impact of Information and Communication Technology in engineering institutions (Balu & Reddy, 2011; R. Kumar, 2012; Satpathy & Maharana, 2011; Ramasesh, Chowdappa, & Devi, 2012). The role of DBMS became inevitable in every academic institution, which ultimately transformed the job of a librarian into being an information-specialist. Very few studies made on DBMS in the point of view of librarian. Hence, the present study was carried out in selected institutions of Andhra Pradesh through the perspective of librarians. Librarians were questioned on various modes of acquiring DBMS skills and their application in the libraries. Their responses are analyzed and presented in this paper.

2. Review of Literature

Jean (2011) described the innovative blend of personalization and persuasive technology in the academic library database environment. The paper provided features and options within popular library databases.

Shiva (2005) studied the development of indigenous databases and their benefits for library users in libraries and information centers in the research and development institutions of the Council of Scientific & Industrial Research of North India, and discussed the role of indigenous databases, their development and impact. The paper gave an overview of factors responsible for developing indigenous databases; perceptions of librarians towards them; database forms and formats; database development from a national perspective; database maintenance, services and marketing.

Venkata and Chandrasekhar (2003) discusses planning approaches adopted for IT implementation in Central University Libraries in India, It covers computers and software packages used, computerized library operations, development of databases, bibliographic standards used, computerized information

services, and the level of participation in networks and computerized facilities offered to users, etc.

M. Kumar and Kumar (2010) presents a study on issues and strategies in digital library management. The author mentions the managerial issues and strategies needed to understand the function of digital libraries including hardware and software management, and preservation of materials. The author also points out the role of library information science (LIS) professionals in the information and communication technology (ICT) environment such as a collector of data and evaluator of information.

3. Objectives of the Study

The study aimed to look at the professional and educational implications of librarians who are strongly connected to support environments for academic libraries, particularly with regard to data management and information retrieval. Several academic librarians perceive that the institutions are increasing data management services in the library but they are constrained by gaps in staff skills, knowledge, confidence, and resourcing issues in dealing with these functions. The following are the objectives framed to seek out the areas of concern for the librarians, and the current state of data management in the libraries in order to recommend additional support that is necessary.

- ➢ Trace the sources through which database skills are achieved by librarians who work in engineering colleges.
- ➢ What kinds of ICT software/hardware are available in the library for information storage and retrieval?
- ➢ Identify the various database applications provided in organizations for library administration.
- ➢ Uncover the extent of backup facilities maintained by librarians in engineering colleges.
- ➢ Find out the constraints encountered by librarians as they work with database management applications.

4. Limitation

- ➢ The study was only conducted among librarians of engineering colleges, and other library staff was excluded.
- ➢ Due to limited time and financial factors, the survey was carried out only for engineering educational institutions of Andhra Pradesh.
- ➢ Since the study was based on database management in the library, only those colleges equipped with automation and digital library facilities were selected for the survey.
- ➢ Those institutions established after 2010 lacked library infrastructure facilities (including digital libraries), and hence were eliminated from the survey.

5. Methodology

Data was collected using a structured questionnaire. One hundred thirty questionnaires were distributed to engineering colleges within the four zones of Andhra Pradesh. Each zone was comprised of three districts except Zone IV, which included four districts. Ten questionnaires were distributed randomly to engineering college libraries (that had digital library and automation services) in each district. Out of 130 questionnaires distributed, 98 were completely filled out and were qualified as valid, which constituted a 75.38% response rate. In this study, the response received for mode of acquiring DBMS skills was vigilantly analyzed using SPSS (Statistical Package for the Social Sciences) software version 19 for statistical analysis of the data. Table 1 illustrates the zone wise distribution of districts (Saidul, 2013) and Figure 2, the sample size.

Table 1. Sample Size

S.No	Zone	District	Questionnaires Distributed	Questionnaires Received
1	Zone-I	Srikakulam	10 (7.69)	4 (4.08)
2		Visakhapatnam	10 (7.69)	9 (9.18)
3		Vizianagaram	10 (7.69)	6 (6.12)
4	Zone-II	East Godavari	10 (7.69)	8 (8.16)
5		West Godavari	10 (7.69)	8 (8.16)
6		Krishna	10 (7.69)	9 (9.18)
7	Zone-III	Guntur	10 (7.69)	9 (9.18)
8		Prakasam	10 (7.69)	6 (6.12)
9		Nellore	10 (7.69)	7 (7.14)
10	Zone-IV	Anantapur	10 (7.69)	7 (7.14)
11		Chittoor	10 (7.69)	9 (9.18)
12		Kadapa	10 (7.69)	8 (8.16)
13		Kurnool	10 (7.69)	8 (8.16)
	Total		130 (100)	98 (100)
				Response Rate 75.38%

(Figures in Parentheses indicate percentage)

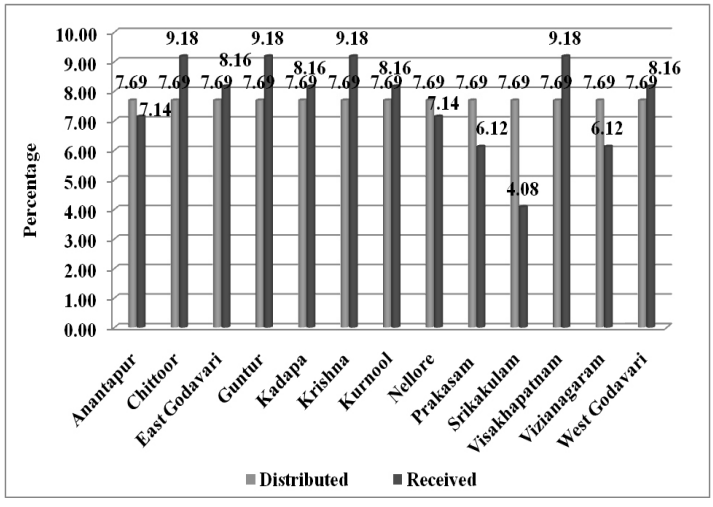

Fig. 2. Sample Size

6. Data Analysis and Interpretation

Analysis of data was divided into four sections. Part- A provides general information about the respondents. The criterion includes gender, age, educational qualification, and mode of acquiring database management skills. Part-B gives data on information and communication technology facilities available in the engineering college libraries included in the survey. Part- C reveals information about the application of database management in the college libraries using data collected under the following parameters: purpose of database, staff in-charge of database, storage file formats, and device used for data storage, preservation and backup techniques with which they were acquainted. Part - D indicates constraints faced by respondents in performing database management.

6.1 Part - A: General Information

6.1.1 Gender Wise

Librarianship (Yilmaz, 2012) is a professional career in which there are quantitatively more female workers than males however; library professionals, specifically female librarians (Irvine, 1985), have a negative image in popular culture. Even though studies show that males make up approximately 20% of library staff (Schott & Connor, 2010) Table 2 provides gender wise distribution of respondents, which show that among the total respondents of the survey, 81.33% were male while 18.37% were female.

Table 2. Gender Wise Distribution

S.No	Gender	Frequency
1	Male	80 (81.63)
2	Female	18 (18.37)
	Total	98 (100.00)

(Figures in Parentheses indicate percentage)

6.1.2 Age Wise

Table 3. Age Wise Distribution

S.No	Age	Frequency
1	Below 30	8 (8.16)
2	31-35	39 (39.80)
3	36-40	21 (21.43)
4	41-45	16 (16.33)
5	46 Above	14 (14.29)
	Total	98 (100.00)

(Figures in Parentheses indicate percentage)

It should be noted from Table 3 that 39.80% of the respondents fall between the ages of 31-35, 21.43% are between 36-40 years of age and only 8.16% are below 30 years of age.

6.1.3 Qualifications Wise

Studies have been conducted throughout the world on academic qualification of librarians (de Souza, 2006), in which being a LIS professional was considered as a significant criterion for social identity and professional visibility. Focusing on educational qualification, 64.29% are postgraduate degree holders, 28.57% have completed M. Phil, and 7.14% have attained a doctorate degree. The data is illustrated in Table 4. It is worth noting that the majority of librarians are postgraduate degree holders in the state of Andhra Pradesh, since the basic qualification for a librarian demands this.

Table 4. Qualifications Wise Distribution

S.No	Qualifications	Frequency
1	Graduate	0
2	Post Graduate	63 (64.29)
3	M. Phil	28 (28.57)
4	PhD	7 (7.14)
	Total	98 (100.00)

(Figures in Parentheses indicate percentage)

6.1.4 Mode of Acquiring Database Management Skills

A number of studies were done with the goal of developing an education system for librarianship (Ritchie et al., 2010), their objectives were to determine the future skills, and knowledge necessary. Some of the drivers for changing the profession of librarianship rely on their ability to extract data from organizational databases, respond to academic questions (Casterella & Vijayasarathy, 2013) and support decision-making. Table 5 depicts various means of acquiring database management skills that the respondents have used.

Table 5. Various Means of Gaining Skills on DBMS

S.No	Mode of acquiring DBMS Skills	Yes	No
1	Through Academic Education	23 (23.47)	75 (76.53)
2	Training by Suppliers of Computer and Software Packages	39 (39.80)	59 (60.20)
3	Attending Workshops, Seminar, etc.	19 (19.39)	79 (80.61)
4	Private Training Program	9 (9.18)	89 (90.82)
5	Online Course	8 (8.16)	90 (91.84)

(Figures in Parentheses indicate percentage)

The majority of the librarians (39.80%) have acquired DBMS skills through training by suppliers of computers and software packages and through academic education (23.47%). Nowadays, courses on DBMS start in school as a vocational training course (Chia-Wen, Pei-Di, & Meng-Chuan, 2011). The vocational schools in Taiwan regard professional certifications as a badge of skills achievement. The teaching in this context usually focuses on how to help students enhance their professional skills and pass the certificate examinations, particularly as this relates to computer courses. The above table denotes that only 8.16% are aware of online courses. A cluster analysis was made for this parameter and a dendogram generated, which is shown in Figure 3.

6.1.4.1 Cluster Analysis for Mode of Acquiring Database Management Skills

The major purpose of Cluster Analysis is to group together a collection of objects (e.g. feedback from respondents) into "clusters" so that the objects in the clusters are "similar". In terms of building prediction and classification models, cluster analysis (Thomas, 2010) can help the analyst identify groups of input variables that in turn can lead to different models for each group. Clustering became a popular software tool to enhance the significance of ranking by grouping items in a typically large list of results. Cluster analysis was based on variables with different scales of measurement across various disciplines worldwide (Chan, 2006; Moon et al., 2005; Hirakue, 2010; Ágústa, 2009; Karunanayake & Haruki, 2014; Bricker, 1991; Dutta, Majumder, & Sen, 2011; Perryman, 2009; Anuradha & Gopalan, 2007; Egea, González, & Menéndez, 2011; Nagata & Klopfer, 2011; Liao & Wen, 2007; Altingovde et al., 2008; Korenius et al., 2006; Kim, Song, & Koo, 2008; Shaw, 1993; Cassisi et al., 2013). The variables and variable codes considered for the cluster analysis representing the mode of acquiring database management skills are shown in Table 6.

Table 6. Mode of Acquiring DBMS Skills (Variables and Variable Codes)

S.No	Variable Code	Mode of Acquiring DBMS Skills
1	TAE	Through Academic Education
2	TSCSP	Training by Suppliers of Computer and Software Packages
3	AWS	Attending Workshops and Seminar, etc.
4	PTP	Private Training Programme
5	SS	Self Study

The resulting Dendrogram shown as figure 3

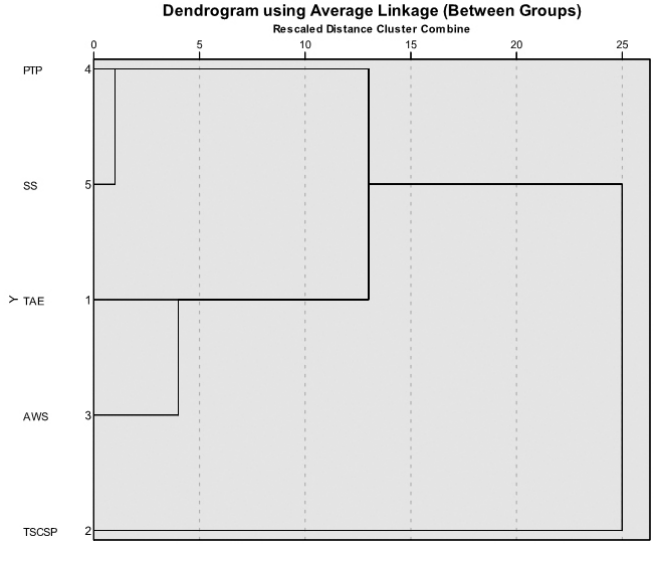

Fig. 3. Dendrogram for Acquiring DBMS Skills

Table 7. Cluster1- Least Frequently Used DBMS Skills

S.No	Variable Code	Variable Name	Agree	Disagree
1	TAE	Through Academic Education	23 (23.47)	75 (76.53)
2	AWS	Attending Workshops, Seminar, etc.	19 (19.39)	79 (80.61)
3	PTP	Private Training Program	9 (9.18)	89 (90.82)
4	SS	Self Study	8 (8.16)	90 (91.84)
		Total	59	333

(Figures in Parentheses indicate percentage)

N=98

Agree: 59 **Disagree: 333**

Agree Ratio: 59/98 = 0.60 **Disagree Ratio: 333/98 = 3.39**

Agree and Disagree Ratio (0.60:3.39) = 0.17:1

Table 7 provides the results of cluster 1 that includes data on the least frequently attained mode of database management skills; in cluster 1, four variables are grouped as shown in the table. The ratio of agree and disagree is 0.17:1, which can be interpreted as self-study is the least frequent mode of acquiring DBMS skills.

Table 8. Cluster 2 Most Frequently Used DBMS Skills

S.No	Variable Code	Variable Name	Agree	Disagree
1	TSCSP	Training by Suppliers of Computer and Software Packages	39 (39.80)	59 (60.20)
		Total	39	59

(Figures in Parentheses indicate percentage)

N=98

Agree: 39 **Disagree: 59**

Agree Ratio: 39/98 = 0.39 **Disagree Ratio: 59/98 = 0.60**

Agree and Disagree Ratio (0.39:0.60) = 0.65:1

Table 8 gives information on the mode used most frequently to attain database management skills by librarians in the study. In cluster 2 which recorded only a single variable, the agree and disagree ratio was found to be 0.65:1, which can be interpreted that the training by suppliers of computer and software packages seems to be most commonly preferred method for obtaining DBMS skills.

6.2 Part - B: Information and Communication Technology Facilities

6.2.1 Existing Hardware Facilities

Fortunately, for libraries and librarians, electronic journal terminology and software are heading (Stankus, 1999) for at least a momentary plateau, in which certain terms and technologies will be accepted as standard. Clark (1989) describes some of the available software and hardware tools being used to develop a decision support system, which will be implemented on computers, and discusses activities supported by software including data entry, data coding, finding and combining data, and data compatibility. Hardware considerations include speed, storage capacity, and networking.

Table 9. Available Hardware Facilities

S.No	Hardware	Yes	No	Rank
1	Servers	73 (74.49)	25 (25.51)	3
2	Computers	98 (100.00)	0 (0.00)	1
3	Laptop	8 (8.16)	90 (91.84)	5
4	External Hard Disc	41 (41.84)	57 (58.16)	4
5	Think Client	18 (18.37)	80 (81.63)	5
6	Pen Drive	87 (88.78)	11 (11.22)	2
7	CD/DVD Drive	98 (100.00)	0 (0.00)	1
8	Others	4 (4.08)	94 (95.92)	6

(Figures in Parentheses indicate percentage)

Table 9 provides information about hardware availability in the engineering colleges in the study and the ranks given them accordingly. It is obvious from the table that CD/DVD computers seem to be available in all of the libraries (100%). 88.78% libraries are provided with pen drives, and in 74.49% of the college libraries servers are available. Pen drives and servers attained second and third rankings respectively.

6.2.2 Important Factors of Procuring Hardware

Table 10. Important Factors of Procuring Hardware

S.No	Factors	Yes	No
1	Memory	51 (52.04)	47 (47.96)
2	Speed	43 (43.88)	55 (56.12)
3	Capacity	38 (38.78)	60 (61.22)
4	Durability	44 (44.90)	54 (55.10)
5	Price	62 (63.27)	36 (36.73)
6	Reliability	29 (29.59)	69 (70.41)
7	Standardization	43 (43.88)	55 (56.12)
8	Brand	24 (24.49)	74 (75.51)
9	Manufacturer Warranty	53 (54.08)	45 (45.92)
10	Scalability	39 (39.80)	50 (51.02)

(Figures in Parentheses indicate percentage)

Udoh-Ilomechine (2011) investigated the criteria used in the selection of computer hardware and software in six university libraries in Nigeria. The study revealed that the respondents took into account factors such as memory, speed, capacity, durability, costs, reliability and standardization, brand and manufacturer, warranty, and scalability of the system before procuring computer hardware. The respondents also considered the reliability and record of accomplishment of the vendor, service and technical support, previews or sample sections, compatibility with other programs used, product cost, and data migration before procuring computer software. Table 10 reveals significant factors considered by respondents before procuring hardware amenities. The data gives you an idea that price (63.27%) is the most important criteria, followed by manufacturer's warranty (54.08%). memory is taken into account by 52.04% of librarians.

6.2.3 Software Available

Table 11. Available Software Facilities

S.No	Software	Yes	No	Rank
1	Oracle	38 (38.78)	60 (61.22)	2
2	MySQL	45 (45.92)	53 (54.08)	1
3	PostgreSQL	13 (13.27)	85 (86.73)	3
4	RDM Server	2 (2.04)	96 (97.96)	4
5	Dbase	1 (1.02)	97 (98.98)	5
6	IBM DB2	1 (1.02)	97 (98.98)	6
7	Others	2 (2.04)	96 (97.96)	6

(Figures in Parentheses indicate percentage)

Data on software availability is given in Table 11 and ranks provided for the same. Studies report that the MySQL database management system (Dunlap, 2005) offers the combination ideal for developing reliable and scalable Web applications that can store, (Allison, 2012) access, and present information. By using existing SQL/database technology, not only are costs minimal for implementation of the new SQL extension, but users can seamlessly retrieve information (White, 2005) from the database. SQL is the language used by most databases (Wood & Ow, 2005) and advocated as a means to access specific Web data. Structured Query Language (SQL) is said to be relationally complete and used to express any query supported by predicate calculus. The above table shows that MySQL is used in the majority of the engineering college libraries (45.92%); hence MySQL received the ranking of first. Oracle (38.78%) and PostgreSQL (13.27%) secured the second and third rank respectively.

Table 12. Important Factors of Procuring Software

S.No	Factors	Yes	No
1	Track Record of the Vendor	49 (50.00)	49 (50.00)
2	Service and Technical Support	62 (63.27)	36 (36.73)
3	Previews or Sample Sections	38 (38.78)	60 (61.22)
4	Compatibility with Other Programs Being Used	52 (53.06)	46 (46.94)
5	Product Cost	64 (65.31)	34 (34.69)
6	Data Migration	41 (41.84)	57 (58.16)

(Figures in Parentheses indicate percentage)

Table 12 denotes essential factors for decisions regarding software acquisition. 65.31% respondents look at product cost, 63.27% of librarians rely on service and technical support, while 53.06% of the respondents consider compatibility with other programs.

6.3 Part-C: Application of Database Management

Table 13. Purpose of Using Database

S.No	Purpose	Yes	No	Rank
1	Automation	91 (92.86)	7 (7.14)	1
2	Digital Library	16 (16.33)	82 (83.67)	2
3	Others	2 (2.04)	96 (97.96)	3

(Figures in Parentheses indicate percentage)

Automation in academic libraries (Stuart, 1990) is essential for the development of library databases, access to subjects in relation to external developments, and to improved user service. A question put to users to determine the purpose of using a database, found, as listed in table 13, that 92.86% of librarians use a database for automation while 16.33% rely on a digital library. Various aspects of library automation like circulation, retro-conversion, serial control, information retrieval and dissemination, current awareness of services, selective dissemination of information, bibliographical services, and on-line search of databases seem to be the major criteria for librarians to procure a database; hence, automation is ranked first.

Table 14. Have You Adopted Any Database Management Strategy / Protocol?

S.No	Strategy / Protocol	Yes	No
1	Written	16 (16.33)	82 (83.67)
2	Orally	29 (29.59)	69 (70.41)
3	Proposed	19 (19.39)	79 (80.61)

(Figures in Parentheses indicate percentage)

It can be noted from Table 14 that 29.59% of librarians adopted a database protocol through oral statements, 19.39% submitted a proposal, while only 16.33% provided a written protocol on DBMS.

Table 15. Concerned Staff for Database Management

S.No	In- charge of DBMS	Yes	No
1	Librarian	74 (75.51)	24 (24.49)
2	Library Staff	8 (8.16)	90 (91.84)
3	System administrator/IT Manager	16 (16.33)	82 (83.67)

(Figures in Parentheses indicate percentage)

It is very clear from Table 15 that 75.51% of librarians are in-charge of databases, while 16.33% of system administrators/IT managers take responsibility over management of databases.

Table 16. Criteria for Preferring Database for Library Administration

S.No	Criteria	Yes	No
1	Archival Value	64 (65.31)	34 (34.69)
2	Content Value	89 (90.82)	9 (9.18)
3	Rare Data	19 (19.39)	79 (80.61)
4	Frequency of Change	23 (23.47)	75 (76.53)
5	Other	8 (8.16)	90 (91.84)

(Figures in Parentheses indicate percentage)

Respondents responses concerning the criteria of preference for a database for library administration are provided in Table 16. 90.82% of the librarians preferred a database for content value, while 65.31% used databases for archival purposes.

Table 17. Data Storing File Formats

S.No	File Formats	Yes	No
1	Word	98 (100.00)	0 (0.00)
2	Excel	76 (77.55)	22 (22.45)
3	ASCII	32 (32.65)	66 (67.35)
4	PDF	69 (70.41)	29 (29.59)
5	MPEG-4	9 (9.18)	89 (90.82)

S.No	File Formats	Yes	No
6	TIFF	1 (1.02)	97 (98.98)
7	JPEG	38 (38.78)	60 (61.22)
8	Others	3 (3.06)	95 (96.94)

(Figures in Parentheses indicate percentage)

Chester (2006) discusses the ways to archive electronic files for long-term access. The study offers some solutions to the problem of preserving important electronic information. The authors present some formats in which files are converted. They include text format (Scholtes, 2007) particularly for alphanumeric information, XML format, still image formats such as TIFF, and mixed text and picture formats such as HTML, PDF, and JPEG2000. Table 17 gives information about various data storing file formats employed in libraries. Almost all the respondents (100%) are acquainted with the MS-Word file format, 77.55% of the data is stored using the MS-Excel format while 70.41% of the data is stored using the PDF format.

A radar graph, sometimes called a star or spider graph, is laid out in a circular fashion, rather than the more common (Nancy, 2005; Chambers et al., 1983; Jamali et al., 2014) linear arrangement. As represented in Figure 4, a radar graph consists of axis lines that start in the center of a circle and extend to its periphery. Each axis can represent an independent measure related to data storing file format. This spider chart represents the zone wise distribution versus various data storing file formats used by the engineering colleges in the study. Figure 4 explains that the MS-word, MS-Excel, ASCII, and PDF file formats are the most used by engineering college librarians of Zone IV and the JPEG format is employed in libraries of Zone III.

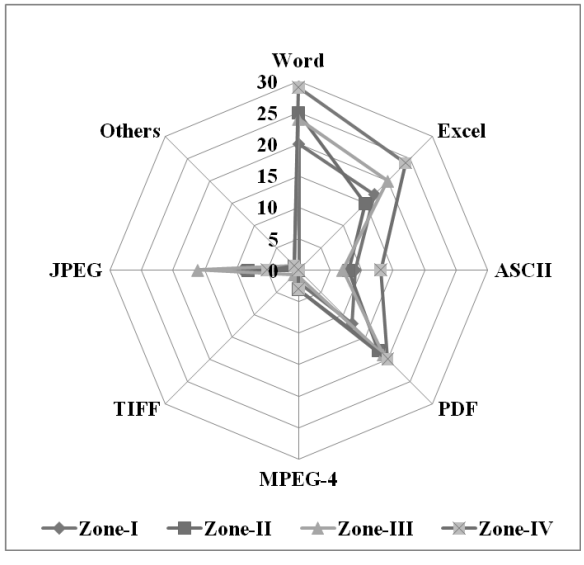

Fig. 4. Rating Data Storing File Format by Zone Wise Distribution

Table 18. Contentment Level of Data Storage Devices

S.No	Data Storage Devices	Excellent	Good	Satisfactory	Poor	No Comments
1	Servers	23 (23.47)	51 (52.04)	17 (17.35)	5 (5.10)	2 (2.04)
2	Computers	31 (31.63)	61 (62.24)	5 (5.10)	1 (1.02)	0 (0.00)
3	Laptop	2 (2.04)	6 (6.12)	0 (0.00)	0 (0.00)	0 (0.00)
4	External Hardisc	19 (19.39)	22 (22.45)	0 (0.00)	0 (0.00)	0 (0.00)
5	Cloud Storage	8 (8.16)	10 (10.20)	0 (0.00)	0 (0.00)	0 (0.00)
6	Pen Drive	26 (26.53)	39 (39.80)	19 (19.39)	2 (2.04)	1 (1.02)
7	CD/DVD	9 (9.18)	31 (31.63)	39 (39.80)	10 (10.20)	9 (9.18)
8	Others	1 (1.02)	1 (1.02)	1 (1.02)	0 (0.00)	1 (1.02)

(Figures in Parentheses indicate percentage)

In the present scenario, the nature and evolution (Malinconico, 1980) of direct access mass storage devices (Kadyszewski, 1977) are matters of particular concern. Studies that have been done focusing on the data storage devices (Veaner, 1983; Templeton, 1976) like CD-ROM and floppy discs indicate that CDs (Ryan, 1993) and floppies have a significant (Anderson & Spike, 2007) impact on centralized depositories, especially as librarians attempt to adapt to the demands of CD-ROM technology. When librarians were queried about the level of contentment with data storage devices their responses, as indicated in table 18, indicated that librarians are more content with computers (62.24%) and pen- drive (39.80%), than the other methods.

6.3.1 Database Backup

The concept of data integrity in databases (Gross, 1998) is as old as data storage. Various methods have been adopted to check the corruption of data, but they all fall fundamentally into three categories: backup, validation, and security. The following section features the backup practices used in the engineering colleges of Andhra Pradesh in the study.

Table 19. Frequency of Obtaining Backup

S.No	Frequency	Yes	No
1	Immediately	0 (0.00)	98 (100.00)
2	Every Day	61 (62.24)	37 (37.76)
3	Once in a Week	21 (21.43)	77 (78.57)
4	Once in a Month	10 (10.20)	88 (89.90)
5	Once in a Year	6 (6.12)	92 (93.88)

(Figures in Parentheses indicate percentage)

Studies done on data backup, suggest that institutions (Byers, 2007) must check their backups regularly and determine how often critical data changes to establish the frequency of the backup schedule. It is clear from Table 19 that 62.24% of librarians do backups everyday and 21.43% do them once a week.

Table 20. Type of Backup Method Followed

S.No	Backup Method	Yes	No
1	Full Backup	8 (8.16)	90 (91.84)
2	Incremental Backup	4 (4.08)	94 (95.92)
3	Automatic Backup	19 (19.39)	79 (80.61)
4	Manual Backup	67 (68.37)	31 (31.63)

(Figures in Parentheses indicate percentage)

Different methods have been adopted for database backup. Lohman et al. (1976) described a differential database representation that was shown to be an efficient method for storing large and volatile databases. The technique confines database modifications to a relatively small area of physical storage, and as a result offers two significant operational advantages. First, because the reference point for the database is inherently static, it can be simple and efficiently stored. Moreover, since all modifications to the database are physically localized, the processes of backup and recovery (Breeding, 2010) are relatively fast and inexpensive. With the focus on this type of backup, Table 20 reveals that 68.37% practice manual backup and 19.39% adopt automatic backup.

Table 21. Processes Performed in Post Backup Practices

S.No	Process	Yes	No
1	Tagging	7 (7.14)	91 (92.96)
2	Classification	6 (6.12)	92 (93.88)
3	Verification	3 (3.06)	95 (96.94)
4	Authentication	8 (8.16)	87 (88.78)
5	Restoration	17 (17.35)	78 (79.59)
6	Preservation	57 (58.16)	41 (41.84)

(Figures in Parentheses indicate percentage)

Table 21 gives information regarding post backup practice processes. It was determined that 58.16% practice preservation of data while 17.35% adopt restoration processes.

Table 22. Steps Taken for Preservation of Database Backup

S.No	Strategy	Yes	No
1	Store in Secure & Proper Environment	31 (31.63)	67 (68.37)
2	Auditing	13 (13.27)	85 (86.73)
3	Migration/Refreshment	9 (9.18)	89 (90.82)
4	Replication	2 (2.04)	96 (97.96)
5	Cleaning of Storage Media	43 (43.88)	55 (56.12)

(Figures in Parentheses indicate percentage)

Even though digitization is not a preservation technique, digitized materials (Palmer, 2008) still need to be protected from adversity caused by a technical or organizational collapse. The study emphasizes the demand for abundant storage and redundant backup routines in digital environments. Steps taken by respondents for preserving database backup are provided in Table 22. 43.88% have opted for cleaning the storage media, while 31.63% store databases in secure and clean environments. For proper backup and safety, it is necessary to take precautions during backup. Some safety measures suggested below might help in maintaining database backup:

- ➢ UPS should be on.
- ➢ All files should be closed during backup.
- ➢ Enough storage space should be available on storage media.
- ➢ Sequential monitoring of backup should be ensured.
- ➢ There should be proper network connectivity.
- ➢ Backup should be done during downtime.
- ➢ Anti-virus software should be installed and updated regularly.

6.4 Part-D: Constraints

Studies indicate that a library with limited staff, funding, and systems development resources (Piorun & Palmer, 2007) can initiate and support a digital library. Facilitators to success include clear lines of authority, a strong champion, and the appropriate technology for the project. In the context of what is happening in India, libraries are still in the process (Rajesh, 2003) of the automation and digitization of their resources; however, the following table presents some of the hindrances faced by the respondents while managing database in their respective libraries.

Table 23. Constraints

S.No	Constraints	Yes	No
1	Huge Data for Maintenance and Backup	31 (31.63)	67 (68.37)
2	Lack of ICT Resources	16 (16.33)	82 (83.67)
3	Lack of Networking	38 (38.78)	60 (61.22)
4	Poor ICT Knowledge and Skills among some Staff	49 (50.00)	49 (50.00)
5	Lack of Security in Library	19 (19.39)	79 (80.61)
6	Electricity Problem	64 (65.31)	34 (34.39)
7	Software Version Compatibility	41 (41.84)	57 (58.16)
8	Post Backup Issues	33 (33.67)	65 (66.33)

(Figures in Parentheses indicate percentage)

Constraints faced by librarians during database management are illustrated in Table 23. Electricity problems (65.31%) were found to be the foremost issue. Additionally 50% of the respondents felt that poor ICT knowledge among staff was the key problem. Constraints are depicted through the radar plot (Figure 5).

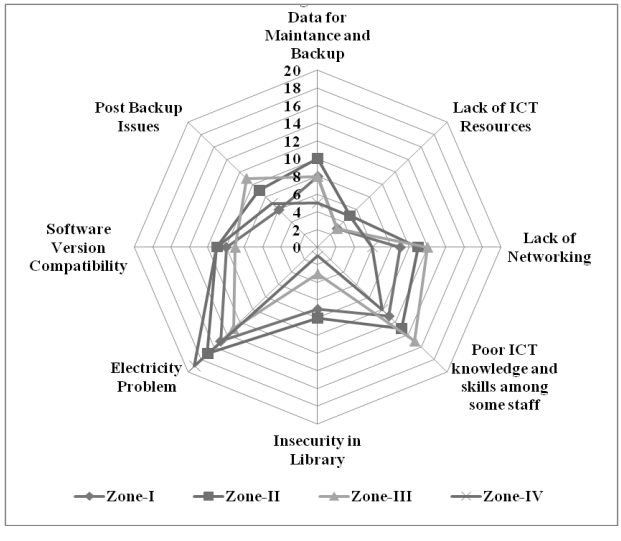

Fig. 5. Rating Constraints by Zone Wise Distribution

The above figure explains that librarians of Zone-II face more constraints in database management

with huge data and security issues in the library and electricity problems. Engineering college librarians of Zone-III encounter issues with networking and untrained library staff with the most frequency.

7. Conclusion

Librarians are perfectly poised to combine sound pedagogy with their expert knowledge of available digital resources to promote adult achievement in technology education. The most preferred way to obtain needed materials when failing to find information that is required is to approach a librarian directly (Noh et al., 2011). Librarians instruct their communities in the areas of internet searching, electronic database use, and personal computing skills. Many of the information seekers are adults, including other library staff members, community members, and non-traditional students. It is clear from the article that some aspects and components of Database Management Systems are complex and difficult. The librarian has to both learn them thoroughly and familiarize other library staff with them. To overcome the problem we suggest:

- ➢ Online training and orientation of library staff
- ➢ Asking the vendors to supply material in an easy format.
- ➢ Learning programs conducted by library associations, which include digital resources that provide opportunities for library professionals to make connections and form relationships across the boundaries of discipline, skill, nationality, and background.
- ➢ By incorporating an eclectic assortment (Lawson, 2005) of digital resources into computer/internet-related training, the organization ensures that librarians will be better able to connect what they have learned in life and are implement it in the library.

The survey showed that none of the library staff had any formal education and training in online searching. Most have learned it on the job, and have learned by trial and error methods. The staff has little time to train themselves, nor do database providers. Database providers generally supply a slide show rather than hands-on training. With regard to staff education and training, the individuals require a broader understanding of the latest research in different disciplines, scholarly landscape, and technology.

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[Appendix] Questionnaire

Role of Database Management Systems in Selected Engineering Institutions of Andhra Pradesh: An Analytical Survey

Dear Library Professionals,

The following survey conducted to know

- ➢ The source of acquiring Database management skills by Librarians in Andhra Pradesh
- ➢ Find out the preferred applications of Database Management in Library by Librarians in Andhra Pradesh.

Please make it convenient to answer the following simple questions and Tick (✓) in the relevant box, which will hardly take 5 min to complete. I guarantee strict confidentiality to your identity and information provided.

Part - A: Demographical Information

Kindly provide your personal details.

1 Name :
2 Gender :
3 Age :
4 Qualifications :

5. Please Selected the Following Mode of Acquiring Database Management Skills

S.No	Mode of Acquiring DBMS Skills	Yes	No
1	Through Academic Education		
2	Training by Suppliers of Computer and Software Packages		
3	Attending Workshops, Seminar, etc.		
4	Private Training Programme		
5	Online Course		

Part - B: Information and Communication Technology Facilities

1. What are the Accessible Hardware Available in your Library?

S.No	Hardware	Yes	No
1	Servers		
2	Computers		
3	Laptop		
4	External Hardisc		
5	Think Client		
6	Pen Drive		
7	CD/DVD		
8	Others		

1.1 What are the Important Factors for Procuring Hardware?

S.No	Factors	Yes	No
1	Memory		
2	Speed		
3	Capacity		
4	Durability		
5	Price		
6	Reliability		
7	Standardization		
8	Brand		
9	Manufacture Warranty		
10	Scalability		

2. Which is the Accessible Software among the Following in the Library?

S.No	Software	Yes	No
1	Oracle		
2	MySQL		
3	PostgreSQL		
4	RDM Server		
5	Dbase		
6	IBM DB2		
7	Others		

2.1 What are the Important Factors for Procuring Software?

S.No	Factors	Yes	No
1	Track Record of the Vendor		
2	Service and Technical Support		
3	Previews or Sample Sections		
4	Compatibility with other Programs Being Used		
5	Product Cost		
6	Data Migration		

Part-C: Application of Database Management

1. What is the Purpose of Using Database?

S.No	Purpose	Yes	No
1	Automation		
2	Digital Library		
3	Others		

2. Have You Adopted Any Database Management Strategy / Protocol?

S.No	Strategy / Protocol	Yes	No
1	Written		
2	Orally		
3	Proposed		

3. Who is a Concerned Staff for Database Management?

S.No	In- charge of DBMS	Yes	No
1	Librarian		
2	Library Staff		
3	System Administrator/IT Manager		

4. What are the Criteria for Preferring Database for Library Administration?

S.No	Criteria	Yes	No
1	Archival Value		
2	Content Value		
3	Rare Data		
4	Frequency of Change		
5	Other		

5. What are the Preferred Data Storing File Formats?

S.No	File Formats	Yes	No
1	Word		
2	Excel		
3	ASCII		
4	PDF		
5	MPEG-4		
6	TIFF		
7	JPEG		
8	Others		

6. Please State the Contentment Level of Data Storage Devices.

S.No	Data Storage Devices	Excellent	Good	Satisfactory	Poor	No Comments
1	Servers					
2	Computers					
3	Laptop					
4	External Hardisc					
5	Cloud Storage					
6	Pen Drive					
7	CD/DVD					
8	Others					

7. How Frequently is Backup Obtained?

S.No	Frequency	Yes	No
1	Immediately		
2	Every Day		
3	Once in a Week		
4	Once in a Month		
5	Once in a Year		

8. What is the Type of Backup Method Followed?

S.No	Backup Method	Yes	No
1	Full Backup		
2	Incremental Backup		
3	Automatic Backup		
4	Manual Backup		

9. Which among the Following Processes Performed in Post Backup Practices?

S.No	Process	Yes	No
1	Tagging		
2	Classification		
3	Verification		
4	Authentication		
5	Restoration		
6	Preservation		

10. What are the Steps Taken for Preservation of Database Backup?

S.No	Strategy	Yes	No
1	Store in Secure & Proper Environment		
2	Auditing		
3	Migration/Refreshment		
4	Replication		
5	Cleaning of Storage Media		

Part-D: What are the Major Constraints Encountered During Database Management?

S.No	Constraints	Yes	No
1	Huge No of Data for Maintance and Backup		
2	Lack of ICT Resources		
3	Lack of Networking		
4	Poor ICT Knowledge and Skills among Some Staff		
5	Insecurity in Library		
6	Electricity Problem		
7	Software Version Compatibility		
8	Post Backup Issues		

Thanks for your valuable response