

University of Nebraska - Lincoln

DigitalCommons@University of Nebraska - Lincoln

Library Philosophy and Practice (e-journal)

Libraries at University of Nebraska-Lincoln

January 2014

Analytical Survey on Digital Preservation and Techniques among Engineering Education Institutional Libraries in Rayalaseema Region of Andhra Pradesh

K Kumar
kumarkkutty@gmail.com

Follow this and additional works at: <https://digitalcommons.unl.edu/libphilprac>



Part of the [Library and Information Science Commons](#)

Kumar, K, "Analytical Survey on Digital Preservation and Techniques among Engineering Education Institutional Libraries in Rayalaseema Region of Andhra Pradesh" (2014). *Library Philosophy and Practice (e-journal)*. 1045.

<https://digitalcommons.unl.edu/libphilprac/1045>

Analytical Survey on Digital Preservation and Techniques among Engineering Education Institutional Libraries in Rayalaseema Region of Andhra Pradesh

Author: Dr.K.Kumar

Assistant Professor,
Department of Library and Information Science,
College of Veterinary Science,
Proddatur-516360.

Email:kumarkkutty@gmail.com, Mobile: +919440327436

Abstract

Digital libraries, either open source or commercial, are the center of the information community. But still, research into their extended durability and the easier accessibility of their operations remains unexplored. Preservation of digital materials is a dynamic and evolving process: the methods are changing, as are the technical requirements. It is hard, and the complex surrounding digital preservation has made it even harder. This article studies on Digital Preservation and Techniques among Engineering Education Institutional Libraries in Rayalaseema Region of Andhra Pradesh.

Keywords: Digital Preservation, Libraries, Engineering Institutions, Techniques

Introduction

Digital preservation is a broad, evolving, and important¹ facet of digital asset management, yet often overlooked by library administration and understated in library operations. Digital preservation² refers to all of the actions required to maintain access to digital materials beyond the limits of media failure or technological change. Those digital materials may be records created during the day-to-day business of an organization;"born-digital" materials created for a specific purpose (e.g. teaching resources); or the products of digitization projects. The purpose of this paper is to provide an analytical survey of digital preservation, techniques and constraints faced by engineering education institutional libraries at Rayalaseema region of Andhrapradesh.

Review of Literature

Roland, Lena (2012)³ investigates the challenges of preserving information in the digital age, and explores how this may affect the future of historical knowledge. The study is based on a series of semi-structured interviews with forty-one historians, archivists, librarians, and web researchers. While the results reject the idea of a single 'digital black hole' in historical records, they emphasize the importance of the issue for the future of history, and the complexity

of the solutions to be adopted. The need for planning, for education, and for cooperation between historians and the information professions is also emphasized. **Kastellec, Mike (2012)**⁴ examines factors that limit the ability of institutions to digitally preserve the cultural heritage of the modern era. The author takes a wide-ranging approach to shed light on limitations to the scope of digital preservation. The authors find that technological limitations to digital preservation have been addressed but still exist, and that non-technical aspects-access, selection, law, and finances-move into the foreground as technological limitations recede. The authors propose a nested model of constraints to the scope of digital preservation and conclude that costs are digital preservation's most pervasive limitation. **Katre, Dinesh (2012)**⁵ provides a comparison between the American and Indian digital preservation programmes based on the essential building blocks such as national legislation for digital preservation, basic legal framework, national digital preservation initiative, digital preservation tools, standards and practice guidelines, digital repository infrastructure, and audit and certification. Selected digital preservation policies of the organizations from UK, USA, Canada, and Australia are also analyzed. The gap analysis shows that in the Indian context, legislation on digital preservation of electronic records and institutional digital preservation policies are the missing elements, which need to be addressed on high priority. **Singh, Anil (2012)**⁶ examines the potential for preserving Indian's cultural heritage resources in a digital world and making it globally accessible. The paper discusses the initiatives taken by Indian government for digital preservation of cultural heritage resources and manuscripts.

Objectives

The objective of this survey is to make an analysis on the Digital Preservation of Engineering Education Institutional Libraries in Rayalaseema Region of Andhra Pradesh. Other objectives of the study are:

- To examine various digital preservation objects used in engineering education institutional libraries under study.
- To identify different types of preservation techniques relied upon by the librarians, of respective institutions.
- To survey on data about best supported operating system in preservation of digital library.

- To assess and identify the constraints faced by the librarians under survey on digital library preservation.
- To offer suggestion towards digital preservation issues.

Limitation

- The study covers the attempts of the engineering educational institutions established before the year July 2010.
- The survey has covered only the librarians of the respective institutions and the semi professionals not covered (Assistant Librarian, Library Assistant and others).

Methodology

The respondents from the questionnaire were drawn from three types of Engineering⁵ Institutions (Government, Minority and Private) in Rayalaseema Region of Andhra Pradesh. The Stratified Random Sampling Technique was adopted for data collection. This study has considered 92 institutions, which were established before July 2010, and the structured questionnaire was framed. Out of 92 questionnaires distributed only 81 have responded, Table 1 presents the data pertaining to the distribution of questionnaires and the responses received.

Table 1: Sample Size

S.No	Questionnaires	Engineering Institutions			Total
		Government	Minority	Private	
1	Distributed	6 (6.52)	3 (3.26)	83 (90.22)	92 (100)
2	Received	6 (7.41)	3 (3.70)	72 (88.89)	81 (100)

Response Rate **88.04%** (N=81)

It is seen from the Table 1 that the response rate is 88.04%. A majority (72) of the respondents (88.89%) belong to Private Engineering Institutions. About 3.70% responses belong to Private Minority Engineering Institutions and only 7.41% belong to Government Institution. Figure 1 given below depicts number of responses received through a bar diagram. This shows that the privatization of Engineering Education in Rayalaseema region is a more dominating phenomenon.

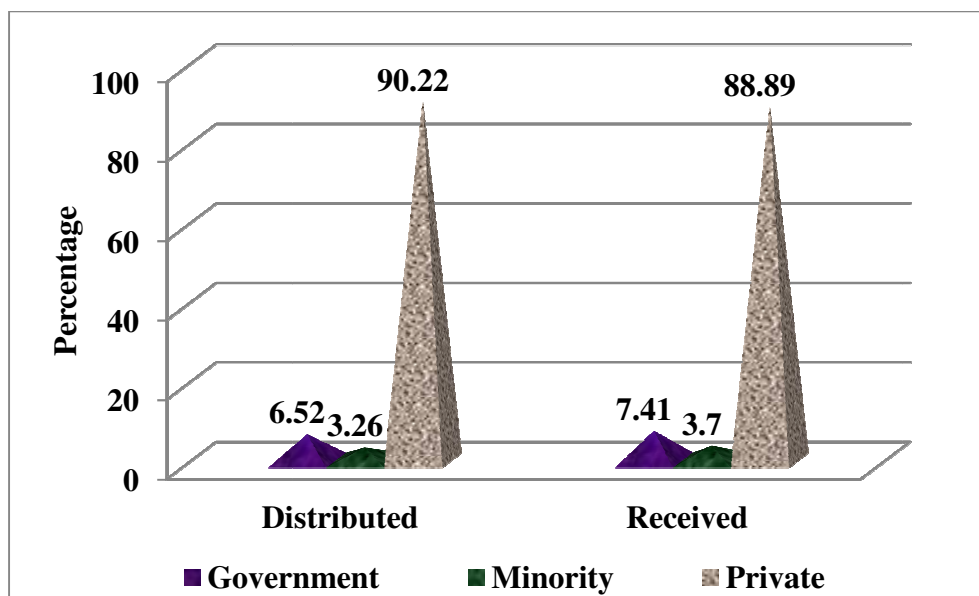


Figure 1: Percentage of Distributed and Responses Received

Data Analysis and Interpretation

The data collected from the questionnaire has been analyzed to fulfill the above stated objectives. For this purpose, Statistical Package for the Social Science (SPSS) software packages has been used for the analysis of data. Statistical analysis techniques such as Frequency Distribution, Percentage Analysis, Cluster Analysis and Discriminant Analysis have been employed depending on the nature of the data collected from the respondents.

Digital Preservation Materials Opted in Libraries

In the context of various digital preservation objects used, the data is tabulated in Table 2.

Table 2: Types of Institutions Vs Digital Preservation Materials Opted in Libraries

S.No	Digital Preservation Materials Opted in Libraries	Type of Institution			Total
		Govt.	Minority	Private	
1	Photographic Material				
1.1	Motion picture	1 (1.23)	3 (3.70)	2 (2.47)	6 (7.40)
1.2	Film	2 (2.47)	2 (2.47)	13 (16.05)	17 (20.98)
1.3	Microforms	2 (2.47)	2 (2.47)	7 (8.64)	11 (13.58)
2	Optical Discs				
1.2	CD-ROM / DVD	6 (7.41)	3 (3.70)	69 (85.19)	78 (96.29)
1.3	Optical Character Recognition	1	3	26	30

	(OCR)	(1.23)	(3.70)	(32.10)	(37.03)
1.4	Magnetic Ink Character Recognition (MICR)	0	3 (3.70)	3 (3.70)	6 (7.40)
1.5	Bar Pens	0	1 (1.23)	1 (1.23)	2 (2.46)
1.6	Video Discs	4 (4.94)	3 (3.70)	36 (44.44)	43 (53.08)
3	Sound Discs				
3.1	Microgroove Discs	0	0	1 (1.23)	1 (1.23)
3.2	Shellac Discs	0	2 (2.47)	3 (3.70)	5 (6.17)
3.3	Vinyl Discs	0	2 (2.47)	1 (1.23)	3 (3.70)
4	Magnetic Media				
4.1	Cassettes	6 (7.41)	3 (3.70)	55 (67.90)	64 (79.01)
4.2	Floppy Discs	3 (3.70)	3 (3.70)	33 (40.74)	39 (48.15)
4.3	Magnetic Tapes	2 (2.47)	3 (3.70)	20 (24.69)	25 (30.86)
5	Hard Discs	6 (7.41)	3 (3.70)	72 (88.89)	81 (100)

(Figures in Parentheses indicate percentage)

With regard to various digital preservation objects used, it is observed from the above table (Table 5.128) that Films (20.98%) are most preferred among 'photo graphic materials', in case of 'optical discs' 96.29% prefer 'CD-ROM/DVD'. Moving onto 'sound discs' 6.17% use 'Shellac discs', 79.01% still use 'cassettes' and all the respondents (100%) use 'Hard Discs' for preservation.

Types of Institutions Vs Digital Preservation Technique

Different types of preservation techniques used by librarians. The respondents were questioned regarding preservation techniques and their responses are tabulated in Table 3.

Table 3: Types of Institutions Vs Digital Preservation Technique

S.No	Digital Preservation Technique	Type of Institution			Total
		Govt.	Minority	Private	
1	Preservation Techniques - Refreshing (Periodic copy from one physical medium to another)	6 (7.41)	3 (3.70)	67 (82.71)	76 (93.82)
2	Preservation Techniques - Technology Preservation (Replicating any old configuration of	6 (7.41)	3 (3.70)	54 (66.67)	63 (77.78)

	hardware and software)				
3	Preservation Techniques - Migration (Transfer of digital materials from one generation of computer technology to subsequent generation)	6 (7.41)	3(3.70)	59 (72.84)	68 (83.95)
4	Preservation Techniques - Emulation (Preserving the original application program)	6 (7.41)	3 (3.70)	50 (61.73)	59 (72.83)
5	Preservation Techniques - Encapsulation (Creating the original application that was used to create or access the digital object on future computer platforms)	6 (7.41)	3 (3.70)	47 (58.02)	56 (69.13)
6	None of Above	0	7 (8.64)	0	7 (8.64)

(Figures in Parentheses indicate percentage)

Majority of the librarians (93.83%) prefer refreshing (Periodic copy from one physical medium to another), while 83.95% prefer Emulation (Preserving the original application program), 77.78% opt for technology preservation while 69.13% prefer Encapsulation (Creating the original application that was used to create or access the digital object on future computer platforms).

Digital Preservation Techniques used Vs Institutions, Age and Experience

Digital Preservation Techniques used was dichotomized using cluster analysis. Cluster analysis was used to extract the dichotomous homogenous groups that characterize Highly Used and less Used Digital Preservation Techniques. The researcher conducted **K-means cluster** to extract homogenous groups because the number of groups were pre-determined. The variables that entered the cluster model are the Digital Preservation Techniques used variables measured ‘Preservation Techniques - Refreshing (Periodic copy from one physical medium to another)’, ‘Preservation Techniques - Technology Preservation (Replicating any old configuration of hardware and software)’, ‘Preservation Techniques - Migration (Transfer of digital materials from one generation of computer technology to subsequent generation)’, ‘Preservation Techniques - Emulation (Preserving the original application program)’.

Table 4 shows, the cluster analysis resulted in two clusters comprising 26 members in the first cluster and 55 in the second cluster.

Table 4: the Mean of Digital Preservation Technique Used Variables

S.No	Digital Preservation Techniques	Cluster 1	Cluster 2
-------------	--	------------------	------------------

1	Preservation Techniques - Refreshing (Periodic copy from one physical medium to another)	1.16	1.50
2	Preservation Techniques - Technology Preservation (Replicating any old configuration of hardware and software)	1.42	2.69
3	Preservation Techniques - Migration (Transfer of digital materials from one generation of computer technology to subsequent generation)	1.51	2.38
4	Preservation Techniques - Emulation (Preserving the original application program)	1.42	2.85
5	Preservation Techniques - Encapsulation (Creating the original application that was used to create or access the digital object on future computer platforms)	1.53	2.92

The mean of cluster 1 is low across Digital Preservation Techniques variables compared to the mean in the second cluster 2. Hence, cluster 1 is labeled as low use of Digital Preservation Techniques because of its lower mean than cluster 2. Discriminant Analysis is performed to predict the Types of Institutions, Age and Experience of the respondents by the Digital Preservation Techniques Used factors. The stepwise DA resulted in 2-step discriminant model.

Table 5: Test of Equality of Group Means for Digital Preservation Techniques Used Vs Institutions, Age and Experience of the Respondents

S.No	Independent Variables	Wilks' Lambda	F	df1	df2	Sig.
1	Types of Institutions	0.982	1.463	1	79	0.230
2	Age	0.866	12.270	1	79	0.001
3	Experience	0.869	11.953	1	79	0.001

From the Table 5 the significance levels of the individual variables reveal that on a univariate basis, except the variable Types of Institutions, all other variables display in significant differences between the group means. Visual examination of the group means provide information about the differences between the groups. However, the statistical significance of any specific comparison is unknown. This is important in discriminant analysis.

Table 6: Variables in the Analysis for Digital Preservation Techniques Used Vs Institutions, Age and Experience of the Respondents

Step		Tolerance	F to Remove
1	Age	1.000	12.270
2	Experience	0.805	4.159

The above Table 6 presents the 1 and 2 step of the stepwise discriminant model. In the first and second step, the variable Digital Preservation Techniques Used were entered the model. Since stepwise discriminant analysis is performed, Mahalanobis D^2 (Min D^2) is used to evaluate the statistical significance of the discriminatory power of the discriminant function and to determine the variable with the greatest power of discrimination. This is used over Rao's V because it is based on generalized squared Euclidean distance that adjusts unequal variances. It is also preferred because the researcher is interested in the maximal use of the available information and also of its computation in the original space of the predictor variable rather than as a collapsed version as used in other measures.

Table 7: Summary of Variables Entered/Removed (a, b, c, d)

Step	Entered	Min. D Squared					
		Statistic	Between Groups	Exact F			
				Statistic	df1	df2	Sig.
1	Age	.695	1 and 2	12.270	1	79.000	.001
2	Experience	.952	1 and 2	8.295	2	78.000	.001

At each step, the variable that minimizes the overall Mahalanobis distance between the two closest groups is entered.

- a Maximum number of steps is 6.
- b Minimum partial F to enter is 3.84.
- c Maximum partial F to remove is 2.71.
- d F level, tolerance, or VIN insufficient for further computation.

The above Table 7 gives a summary of the 1 and 2 steps involved in the 2-groups of discriminant analysis. The variables the above results show 1 and 2 steps of the stepwise discriminant model. In the first step, the dependent variable Digital Preservation Techniques and Independent variables of the Types of Institutions, Age and Experience were entered in the

model and Age and Experience variables was qualified for the analysis. The table 7 shows the Variables in the Analysis.

The table 8 and table 9 describe the variables that were significant discriminators based on their Wilks' lambda and minimum Mahalanobis D^2 .

Table 8: Wilks' Lambda for Digital Preservation Techniques Used Vs Types of Institutions, Age and Experience

Step	Number of Variables	Lambda	df1	df2	df3	Exact F			
						Statistic	df1	df2	Sig.
1	1	0.866	1	1	79	12.270	1	79.000	0.001
2	2	0.825	2	1	79	8.295	2	78.000	0.001

The multivariate aspects of the discriminant model are explained by the Canonical Discriminant Functions reported in the table below. The multivariate aspects of the discriminant model are explained by the Canonical Discriminant Functions as reported in the table. Two groups were involved and the model produced one discriminant function. The discriminant function is significant displaying a canonical correlation of 100%. The function is statistically significant as measured by the Chi-Square statistic.

Table 9: Eigen values for Digital Preservation Techniques Used and Types of Institutions, Age and Experience

Function	Eigen value	% of Variance	Cumulative %	Canonical Correlation	Wiks' Lambda	Chi-Square	df	Sig.
1	0.213(a)	100.0	100.0	0.419	0.825	15.042	2	0.001

a the canonical discriminant function as used in the analysis.

To assess the contribution of the other predictors, the researcher has used the values in the structure matrix given in the following table:

Table 10: Structure Matrix for Digital Preservation Techniques Used and Types of Institutions, Age and Experience

Personality Traits	Function
	1
Age	0.855
Experience	0.843
Type of Institution(a)	-.089

Pooled within-groups correlations between

discriminating variables and standardized canonical discriminant functions. Variables ordered by absolute size of correlation within function. (a) This variable is Unused in the analysis.

Table 10 shows that the variable Age has the greatest predictive power as indicated by its coefficient 0.855 followed by Experience.

Formats Used for Page Layout

The respondents were asked to state the nature of the formats being used for page layout and results were shown in Table 11.

Table 11: Types of Institutions Vs Page Layout Used

S.No	Page Layout Used	Type of Institution			Total	Rank
		Govt.	Minority	Private		
1	Hypertext Markup Language (HTML)	3 (3.70)	3 (3.70)	47 (58.02)	53 (65.43)	1
2	Extensible Markup Language (XML)	2 (2.47)	1 (1.23)	12 (14.81)	15 (18.52)	3
3	Portable Document Format (PDF)	3 (3.70)	2 (2.47)	35 (43.21)	40 (49.38)	2
4	Text Format (TXT)	1 (1.23)	0	4 (4.94)	5 (6.17)	4
5	Standard Generalized Markup Language (SGML)	0	0	1 (1.23)	1 (1.23)	5
6	American Standard Code for Information Interchange (ASCII)	0	0	1 (1.23)	1 (1.23)	5

(Figures in Parentheses indicate percentage)

It is observed from the table that 65.43% of the sample used 'Hypertext Markup Language (HTML)', while 49.38% use 'Portable Document Format (PDF)'. From this it is inferred that, HTML and PDF are freely downloadable software, there is a portability that these libraries are opting for PDF and HTML.

Cluster Analysis for Page Layout Used

Table 12: Formats Used for Page Layout (Variables and Variable Codes)

S.No	Variable Code	Variable Name
1	PLU A	Hypertext Markup Language (HTML)
2	PLU B	Extensible Markup Language (XML)
3	PLU C	Portable Document Format(PDF)
4	PLU D	Text Format(TXT)

5	PLU E	Standard Generalized Markup Language (SGML)
6	PLU F	American Standard Code for Information Interchange (ASCII)

In order to analyze statistically the results of the formats used for page layout, cluster analysis has been applied. The variables and variable codes for the formats are shown in Table 12.

HIERARCHICAL CLUSTER ANALYSIS

Dendrogram using Average Linkage (Between Groups)

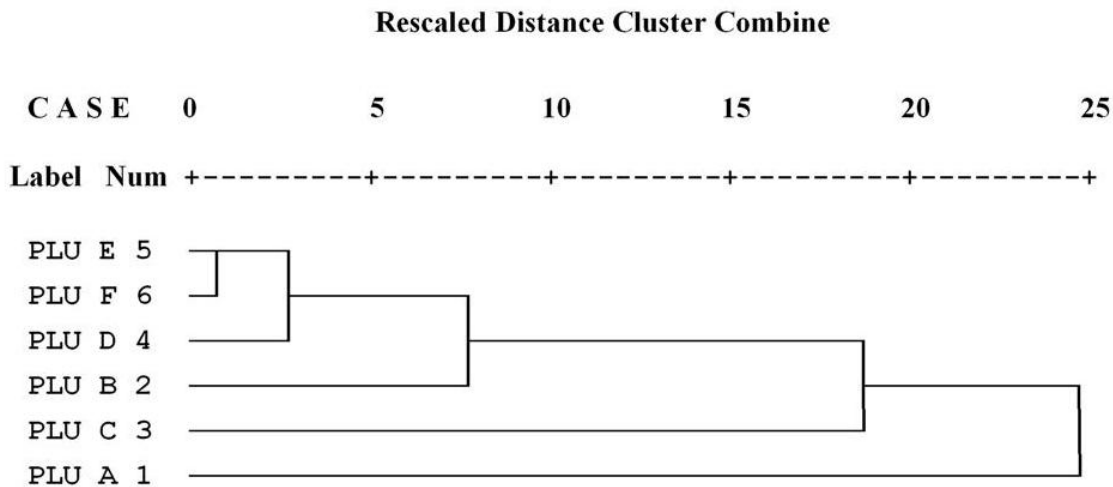


Figure 2: Dendrogram for Page Layout Used

The resulting Dendrogram is shown in Figure 2. At 25% level in the Dendrogram, it is found that two clusters have been formed. The cluster 1 covers two variables as shown in Table 13. The agree and disagree ratio has been arrived as 1.35:1, which means that these formats are best preferred by the librarians. Hence this cluster has been named as ‘best preferred format for page layout’.

Table 13: Cluster 1: Best Preferred format for Page Layout

S.No	Variable Code	Variable Name	Agree	Disagree
1	PLU C	Portable Document Format(PDF)	40	41
2	PLU A	Hypertext Markup Language (HTML)	53	28
Total			93	69

N = 81

Agree: 93

Disagree: 69

Agree ratio: $93/81 = 1.15$

Disagree ratio: $69/81 = 0.85$

Agree and Disagree Ratio ($1.15:0.85$) = 1.35: 1

In cluster 2, four variables has been grouped as shown is Table 14 the agree, disagree ratio is 0.07:1, which means that this format is the least preferred one, hence this cluster has been named as ‘least preferred format for page layout’.

Table 14: Cluster2: Least Preferred format for Page Layout

S.No	Variable Code	Variable Name	Agree	Disagree
1	PTU E	Standard Generalized Markup Language (SGML)	1	80
2	PTU F	American Standard Code for Information Interchange (ASCII)	1	80
3	PTU D	Text Format(TXT)	5	76
4	PTU B	Extensible Markup Language (XML)	15	66
Total			22	302

N = 81

Agree: 22

Disagree: 302

Agree ratio: $22/81 = 0.27$

Disagree ratio: $302/81 = 3.72$

Agree and Disagree Ratio ($0.27:37.2$) = 0.07:1

Best Supporting Operating System in Digital Library

Table 15 reveals data about best supported operating system in digitalization of library, 58.02% prefer windows, while 41.98% institutions prefer Linux.

Table 15: Types of Institutions Vs Best Supporting Operating System in Digital Library

S.No	Best Supporting Operating System in Digital Library	Type of Institution			Total
		Govt.	Minority	Private	
1	Windows	4 (4.94)	2 (2.47)	41 (50.62)	47 (58.02)
2	Linux	2 (2.47)	1 (1.23)	31 (38.27)	34 (41.98)
Total		6 (7.41)	3 (3.70)	72 (88.89)	81 (100.00)

(Figures in Parentheses indicate percentage)

Constraints for Digital Preservation

At the initial attempts of any activity in an organization, the constraints in the implementation are managerial phenomenon. The digital library preservation is not an exception to these phenomena. The efforts in developing digital libraries are of recent origin and while doing so, certain constraints are expressed by the librarians. In this study, several broad categories have been identified and the respondents were asked to mark the constraints, they face in developing digital library preservations. The responses are given in Table 16.

The most perennial problem faced by the majority of the respondents (90.1%) seems to be 'intellectual properties rights issue'. This is followed by 'users lack of interest in digital services' (86.4%), 'top management not interested' (77.8%), as second and third position respectively. Further it is also observed that 'initial cost very high' (76.5%), 'virus effect' (70.4%)', 'lack of professional recognition' (53.1%) have gained fourth, fifth and sixth places respectively.

Table 16: Constraints for Digital Preservation

S.No	Constraints	Type of Institution			Total n=81	Rank
		Govt.	Minority	Private		
1	Financial Problem					
1.1	Financial Problem - Insufficient Funds	4 (4.9)	2 (2.5)	23 (28.4)	29 (35.8)	9
1.2	Financial Problem - Inability to absorb recurring costs	1 (1.2)	0	14 (17.3)	15 (18.5)	14
1.3	Financial Problem - Initial cost is very high	3 (3.7)	2 (2.5)	57 (70.4)	62 (76.5)	4
2	Top Management not Interested	3 (3.7)	2 (2.5)	58 (71.6)	63 (77.8)	3
3	Library Staff					
3.1	Lack of Professional recognition	4 (4.9)	1 (1.2)	38 (46.9)	43 (53.1)	6
3.2	Library staff members are not interested in digital initiatives	0	0	27 (33.3)	27 (33.3)	11
3.3	Lack of coordination among the library staff	1 (1.2)	2 (2.5)	20 (24.7)	23 (28.4)	12
3.4	Lack of adequate trained staff in digitization activities	2 (2.5)	1 (1.2)	33 (40.7)	36 (44.4)	7
3.5	The library staffs are not interested in learning digitization activities	1 (1.2)	0	27 (33.3)	28 (34.6)	10
4	Legal Problems: Intellectual Property	5	1	67	73	1

	Rights (IPR) Issues	(6.2)	(1.2)	(82.7)	(90.1)	
5	Users: Lack of not interested in digital services	5 (6.2)	0	65 (80.2)	70 (86.4)	2
6	Security Problem					
6.1	Hacking	5 (6.2)	1 (1.2)	28 (34.6)	34 (42.0)	8
6.2	Virus Effect	2 (2.5)	3 (3.7)	52 (64.2)	57 (70.4)	5
6.3	Delete and Format of Hard Disc	1 (1.2)	1 (1.2)	26 (32.1)	28 (34.6)	10
6.4	Others Specify	0	0	1 (1.23)	1 (1.23)	15
7	Power Problem	0	0	16 (19.8)	16 (19.8)	13

(Figures in Parentheses indicate percentage)

Cluster Analysis for Constraints in Digital Library Initiatives

In order to group the constraints based on similarities, cluster analysis has been applied. The variables and variable codes are shown in the Table 17.

Table 17: Constraints in Digital Library Initiatives (Variables and Variable Codes)

S.No	Variable Code	Variable Name
1	CDL A	Financial Problem - Insufficient Funds
2	CDL B	Financial Problem - Inability to absorb recurring costs
3	CDL C	Financial Problem - Initial cost is very high
4	CDL D	Top Management not Interested
5	CDL E	Lack of Professional recognition
6	CDL F	Library staff members are not interested in digital initiatives
7	CDL G	Lack of coordination among the library staff
8	CDL H	Lack of adequate trained staff in digitization activities
9	CDL I	The library staffs are not interested in learning digitization activities
10	CDL J	Legal Problems: Intellectual Property Rights (IPR) Issues
11	CDL K	Users: Lack of not interested in digital services
12	CDL L	Hacking
13	CDL M	Virus Effect
14	CDL N	Delete and Format of Hard Disc
15	CDL O	Others Specify
16	CDL P	Power Problem

The Dendrogram using average linkage method is shown as Figure 3. It is observed from the Dendrogram that at 24% level two interpretable clusters have been formed.

HIERARCHICAL CLUSTER ANALYSIS

Dendrogram using Average Linkage (Between Groups)

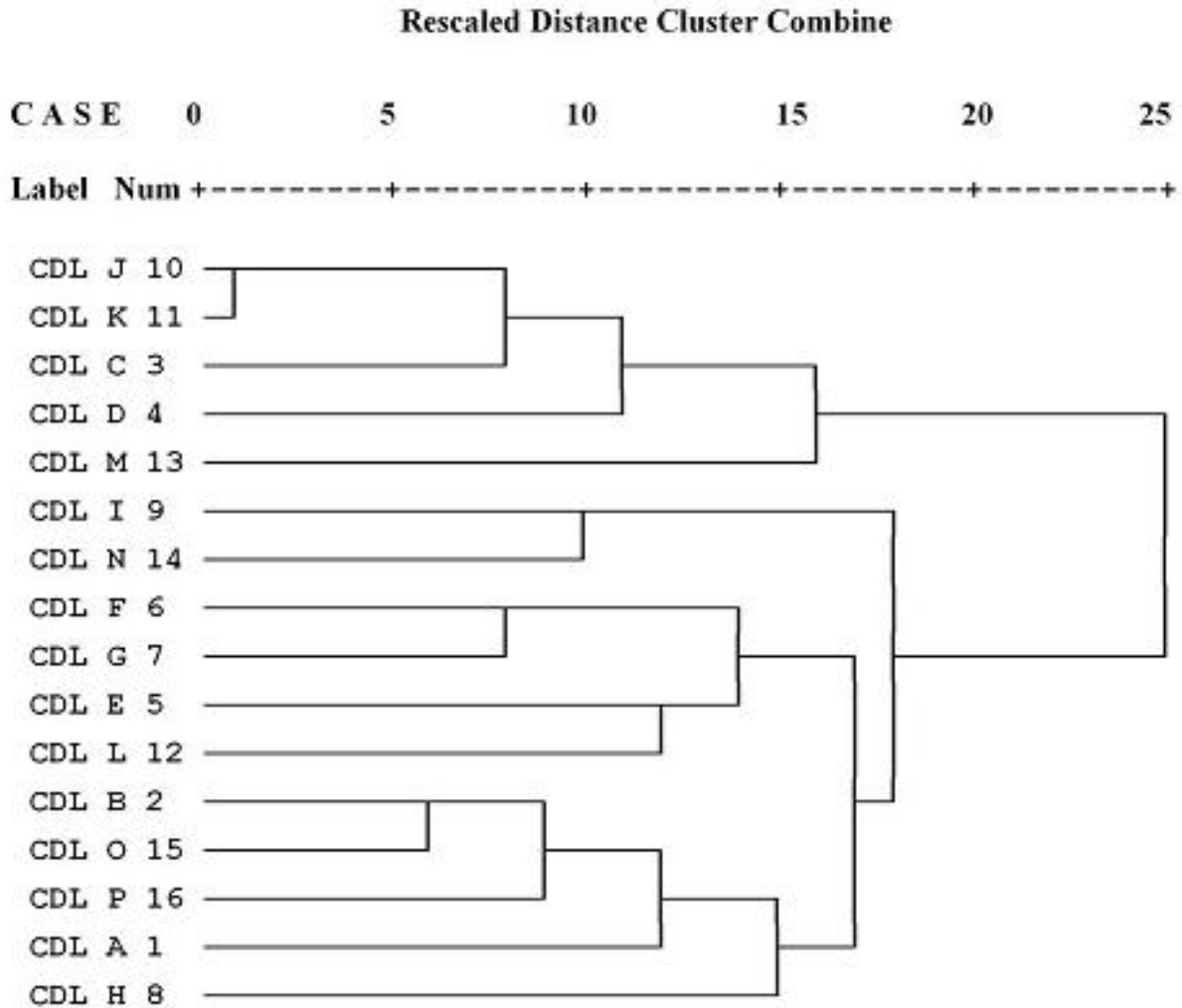


Figure 3: Dendrogram for Constraints in Digital Library Initiatives

In cluster 1, 10 variables are grouped as shown in table 18. The agree and disagree ratio is 1.14:1, which means that these are the major constraints in digital library initiatives. Hence, this cluster has been named as ‘major constraints in digital library initiatives’.

Table 18: Cluster 1: Major Constraints in Digital Library Initiatives

S.No	Variable Code	Variable Name	Agree	Disagree
1	CDL J	Legal Problems: Intellectual Property Rights (IPR) Issues	73	8

2	CDL K	Users: Lack of not interested in digital services	70	11
3	CDL C	Financial Problem - Initial cost is very high	62	19
4	CDL D	Top Management not Interested	63	18
5	CDL M	Virus Effect	57	24
6	CDL I	The library staffs are not interested in learning digitization activities	28	53
7	CDL N	Delete and Format of Hard Disc	28	53
8	CDL F	Library staff members are not interested in digital initiatives	27	54
9	CDL G	Lack of coordination among the library staff	23	58
10	CDL E	Lack of Professional recognition	43	38
Total			474	336

N = 81

Agree: 474

Disagree: 336

Agree ratio: $474/81 = 5.85$

Disagree ratio: $336/81 = 4.15$

Agree and Disagree Ratio ($5.85:4.15$) = 1.41: 1

Table 19: Cluster2: Minor Constraints in Digital Library Initiatives

S.No	Variable Code	Variable Name	Agree	Disagree
1	CDL L	Hacking	34	47
2	CDL B	Financial Problem - Inability to absorb recurring costs	15	66
3	CDL O	Others Specify	1	80
4	CDL P	Power Problem	16	65
5	CDL A	Financial Problem - Insufficient Funds	29	52
6	CDL H	Lack of adequate trained staff in digitization activities	36	45
Total			131	355

N = 81

Agree: 131

Disagree: 355

Agree ratio: $131/81 = 1.62$

Disagree ratio: $355/81 = 4.38$

Agree and Disagree Ratio ($1.62:4.38$) = 0.37:1

In cluster 2, six variables have been grouped as shown in table 19. The agree and disagree ratio is 0.37:1, which could be interpreted that these constraints are very minor. Therefore this cluster has been named as 'minor constraints in digital initiatives'.

Suggestions towards Digital Preservation Issues

After analyzing the constraints in digital preservation, it was thought necessary to solicit the respondent librarians' opinions on the possible suggestions towards digital preservation issues, they would feel necessary. Accordingly ten suggestions have been listed and asked to furnish their responses. The respondents' opinions are tabulated in Table 20.

Table 20: Suggestions to Digital Preservation Issues

S.No	Suggestions	Type of Institution			Total n=81	Rank
		Govt.	Minority	Private		
1	With the advent of easy and cheap CD/DVD writers, is it possible to produce, store and disseminate every document in digital form	6 (7.41)	3 (3.70)	66 (81.48)	75 (92.59)	1
2	A law must be enacted to make it compulsory to produce digital copies along with hard copy for sale	2 (2.47)	2 (2.47)	51 (62.96)	55 (67.90)	6
3	It must be made mandatory by law to submit few copies in digital along with Printed copy under "Press and Registration of Books Act.1867 and delivery of books and News Paper Act.1954	4 (4.94)	2 (2.47)	57 (70.37)	63 (77.78)	4
4	There should be National Digital Library (NDI) Act to establish National Digital Library. The Authors / Publishers must submit at least one copy of every Published Material in Digital form for use and storage in NDI	6 (7.41)	3 (3.70)	59 (72.84)	68 (83.95)	3
5	The Existing copy Right Act must be amended under the digital environment to make Digital Information made easily available for Research & Development and Academic purpose	5 (6.17)	2 (2.47)	44 (54.32)	51 (62.96)	7
6	It must be made mandatory that Research Scholars shall submit Thesis/project reports in E-Form along with hard copy	3 (3.70)	3 (3.70)	45 (55.56)	51 (62.96)	7
7	Encourage Librarian for training in digitalization	6 (7.41)	3 (3.70)	61 (75.31)	70 (86.42)	2
8	Library schools must change their curricula focusing on digitization/digital library	3 (3.70)	2 (2.47)	50 (61.73)	55 (67.90)	6
9	All library professional organizations have to conduct national and international Seminars, Symposium towards digital library development	3 (3.70)	3 (3.70)	54 (66.67)	60 (74.07)	5
10	There shall be support from the top management	6 (7.41)	3 (3.70)	51 (62.96)	60 (74.07)	5

(Figures in Parentheses indicate percentage)

It was found that it is possible to store and disseminate information using 'CD/DVD' (92.59%). This is followed by encouraging 'librarian for training in digitization' (86.42 %), formation of 'national digital library act (NDI)' (77.78%), 'conducting seminar / symposium towards digital library development' (74.07%) and 'support from top management' (74.07%) have been ranked second, third, fourth and fifth position respectively.

Findings of the Study

- In the context of various digital preservation objects used it is observed that Films (20.98%) are most preferred among 'photo graphic materials', in case of 'optical discs' 96.29% prefer 'CD-ROM/DVD'. Moving onto 'sound discs' 6.17% use 'Shellac discs', 79.01% still use 'cassettes' and all the respondents (100%) use 'Hard Discs' for preservation.
- With regard to various digital preservation techniques used majority of the librarians (93.83%) prefer refreshing and 83.95% prefer Emulation.
- Discriminant Analysis performed to predict the Types of Institutions, Age and Experience of the respondents by the Digital Preservation Techniques Used factors shows that the variable Age has the greatest predictive power as indicated by its coefficient 0.855 followed by Experience.
- Statistical analysis on the nature of the formats being used for page layout revealed that 65.43% of the sample used 'Hypertext Markup Language (HTML)', while 49.38% use 'Portable Document Format (PDF)'. From this it is inferred that, HTML and PDF are freely downloadable software, there is a portability that these libraries are opting for PDF and HTML.
- It is found that majority of libraries prefer windows (58.02%) and 41.98% institutions prefer Linux for best supported operating system in digitalization.
- With regard to digital preservation issues most of the libraries face 'intellectual properties rights issue' followed by 'users lack of interest in digital services. However, it is heartening to note that in spite of constraints being faced by the respondents, still there is seamless interest on their part towards, the digital library preservations as observed and interacted by the researcher with respondents.

Conclusion

Digital preservation of materials is an essential and challenging task of the librarians. It has become a global issue today, which calls for a universal solution. The advancement on Digital preservation techniques has been instrumental to ensure the durability, usability, intellectual integrity of the information contained in the digital materials to preserve for the present generation and for the future. In this survey the investigator have analyzed various digital preservation techniques used in Engineering Education Institutional Libraries in Rayalaseema Region of Andhra Pradesh and brought to light about the best supporting operating system for digital preservation and had mentioned certain constrains faced by the librarians on preservation and had expressed some suggestion to overcome digital preservation issues.

Reference

1. Oehlerts, Beth; Liu, Shu. *Digital preservation strategies at Colorado State University Libraries Library Management*, 2013, Vol. 34 Issue 1/2, p83-95, 13p;
2. <http://www.dpconline.org/advice/preservationhandbook/introduction/definitions-and-concepts>
3. Roland, Lena; Bawden, David .The Future of History: Investigating the Preservation of Information in the Digital Age. *Library & Information History*, Sep2012, Vol. 28 Issue 3, p220-236, 17p;
4. Kastellec, Mike Practical Limits to the Scope of Digital Preservation. *Information Technology & Libraries*, Jun2012, Vol. 31 Issue 2, p63-71, 9p, 1 Diagram;
5. Katre, Dinesh .Need of Legislation and Digital Preservation Policy Framework in Indian Context. *DESIDOC Journal of Library & Information Technology*, Jul2012, Vol. 32 Issue 4, p321-326, 6p;
6. Singh, Anil. Digital preservation of cultural heritage resources and manuscripts: An Indian government initiative. *IFLA Journal*, Dec2012, Vol. 38 Issue 4, p289-296, 8p;