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Application of Conservation and Preservation Techniques to Enhance the Life of Traditional and Digital Information Resources in Libraries

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ABSTRACT

India has always been rich in knowledge from ancient times which is passed on from one generation to another. The method of passing knowledge is different in different regions of India. Due to huge advancement in ICT, there has been astronomical growth of digital resources. These resources are popular among students and researchers; hence libraries spend so much on them. Unfortunately, accessibility and use of these resources by future generations depends on technology which very rapidly evolves and changes. The fragile nature of digital resources makes its accessibility dependable on technology which is rapidly evolving. Hence, access to such resources for future users is a huge task for libraries. To use this information in daily life, we perform conservation techniques. In this research paper, we are exploring the different preservation and conservation techniques for traditional documents as well as digital resources used in selected libraries of New Delhi, India.

Keywords: Digital; Preservation and conservation; Digitisation; Information; Technology.

1. INTRODUCTION

Preservation means the act or process of maintaining something in its original state or maintaining safety from damage and keeping the things in perfect or unaltered condition. The "concept of digital preservation was originally developed in libraries as an aid to on-going library analogue preservation efforts and it is a relatively new one that has developed side by side with concepts such as digital" libraries[1] and digital curation[2]. Digital preservation is also explained "as a combination of policies, strategies and actions to ensure that digital objects remain authentic and accessible to users and systems over a long period of time, regardless of the challenges of component and management" failures[3]. There are various techniques "which can be adopted in the process of digital preservation. Some of such important techniques include: Intellectual preservation; technological preservation; emulation; data migration; refreshing"; data archaeology; output to analogue media. digital conservation and preservation expects to guarantee that digital media and information systems will be interpretable into the inconclusive future. It also ensures that every important part of the digital materials should be moved, conserved, preserved or emulated. Digital systems offer numerous advantages, thus different institutions and agencies must guarantee that the digital documents they collect ought to get by as long as these are required, and can be perused and comprehended. For instance, significant email messages must be put away into corporate recordkeeping systems where they can be preserved consistently and found effectively. Preservation and conservation of digital records is likewise critical as the records ought to be opened and be moved forward with the progressions of software and hardware[4].

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2. LITERATURE REVIEW

This section highlights the changing library milieu and analyses the conservation and preservation techniques and digitisation. Viswanath[5] discusses that dissemination of information isn't just the principle scope of a library; it also preserves various forms of documents for future generation. Preservation and conservation of library records enables prolonged access to documents. Each library follows various "preservation and conservation technique to preserve world heritage viz. manuscripts, Government records, ephemeral, rare collections", etc. Masenya and Ngulube[6]analysed for the future generations to gain access to digital resources there is a need to understand the extent of their preservation in various contexts. Gaur & Tripathi[7] explained nature of Digital content is fragile and not durable. Its accessibility and use by future generations depends on technology which very rapidly evolves and changes. Mani[8] discusses the approach of digitisation, its importance, and demand and also how to preserve the digitised documents by digital preservation. Palmer[9] discussed "the scalable and preservation environments (SCAPE) also developed a framework for automated, quality-assured preservation workflows and integrated these components into a policy-based preservation planning and watch system. All these initiatives are aimed at addressing the challenges posed by digital information". The Council of Canadian Academies[10] "observed that libraries, archives and museums are facing numerous challenges as they attempt to adapt the digital age".

3. OBJECTIVES OF THE STUDY

- To investigate methods adopted for digital preservation of library collections
- To examine processes and techniques of conservation and preservation of information resources in selected libraries.

4. SCOPE OF THE STUDY

The study is focuses on use of preservation and conservation techniques to enhance the life of digital information resources in libraries. This data is collected from the respective library of Indira Gandhi National Centre of Arts (IGNCA), National Archives of India (NAI), The Nehru Memorial Museum and Library (NMML), Central Archaeological Library (CAL), National Museum Library (NML) and Zakir Hussain Library (ZHL).

Table 1. Duration of familiarity with the conservation and preservation techniques

Libraries	1-5 Years	6-10 Years	11-15 Years	16-20 Years	21 Years and above
IGNCA	×	×	✓	×	×
NAI	×	×	×	×	✓
NMML	×	×	×	×	✓
CAL	×	×	×	×	✓
ZHL	×	×	✓	×	×
NML	✓	×	×	×	×

✓= presence, × = absence

5. METHODOLOGY

Data collected from these libraries is used to identify different forms of digital conservation and preservation techniques of information resources. Comparative analysis of data is done and then Chi-Square test is employed to test the claim if the digital conservation and preservation technique of library resources is significant or not in these selected libraries.

6. USE OF CONSERVATION AND PRESERVATION TECHNIQUES

The degradation and deterioration of library materials is unavoidable, but it can be controlled and reduced as much as possible and the valuable data from these resources can be preserved and conserved. Preservation is the errand of limiting or lessening the physical and chemical deterioration of records. Conservation is the upkeep of reports in a usable condition through treatment and fixes of individual things to moderate the procedure of decay or to restore them to a usable state. These preservation and conservation works are carried out with some techniques that depend upon the type of library materials, for example print or non-print materials. Shown below are some techniques and whether they are used by the particular libraries. Table 1 shows NAI, NMML, CAL, have been employing conservation and preservation techniques in their libraries for 21 years and above, IGNCA and ZHL for 11-15 years and NML for 1-5 years.

Table 2. Preservation techniques and time interval survey findings

Libraries	Time Interval	Cleaning	Photo-copying	Shelving	Maintain Temp.	Adequate Security	Use of Insecticide	Other Preservations
	I	✓	×	×	✓	✓	×	✓
IGNCA	II	×	✓	×	×	×	✓	×
	III	×	×	✓	×	×	×	×
	I	✓	✓	✓	✓	✓	✓	✓
NAI	II	×	×	×	×	×	×	×
	III	×	×	×	×	×	×	×
	I	✓	×	✓	✓	✓	✓	✓
NMML	II	×	✓	×	×	×	×	×
	III	×	×	×	×	×	×	×
	I	✓	✓	✓	✓	×	✓	✓
CAL	II	×	×	×	×	×	×	×
	III	×	×	×	×	✓	×	×
	I	✓	✓	✓	✓	×	×	✓
ZHL	II	×	×	×	×	✓	×	×
	III	×	×	×	×	×	✓	×
	I	✓	✓	✓	✓	✓	✓	✓
NML	II	×	×	×	×	×	×	×
	III	×	×	×	×	×	×	×

Key:I – Very often, II – Occasionally, III – Never, ✓=presence, ×= absence

6.1 Preservation Techniques

The IGNCA uses cleaning, maintaining temperature, providing adequate security and other preservatives like Neem leaves and Silica gel very often and photocopying and using insecticides occasionally. As is evident from Table 1 & Table 2, these methods have been in use at the IGNCA for more than a decade. The NAI for past two decades does all these processes very often. The NMML for past 20 years practices all these methods very often except for photocopying, preservations through other preservatives. The CAL does all this very often except giving any adequate security to their information resources. The ZHL for last 10-15years practices cleaning, photocopying, shelving, maintaining adequate temperature and other preservatives like naphthalene balls, thymol crystals, silica gel, etc. very frequently and provide additional security occasionally. The NML only recently has started using all these methods.

Table 2 also shows the data of use of processes in different libraries with the time interval at which they are used i.e. how frequently are they done.

There are a total of 7 preservation techniques for these 6 libraries making it 42 numbers of preservation techniques commonly, out of which 33 (8 %) are practiced very often, 5 (12 %) are practiced occasionally and 4 (10 %) are never practiced.

Table 3 shows Chi-square test is conducted to test the claim that techniques used for preservation are not significantly different in the selected libraries. Since the p-value is greater than 0.05. It is proved that there is difference in the techniques used for preservation in the selected libraries.

Table 3. Results of Chi- Square statistics and its significance

$\chi 2$ Statistic	d.f	P-value	Remarks
2.21	5.00	0.819	Insignificant

*Significant at 5% level ($p<0.05$) and d.f- degree of freedom for the chi- square.

6.2 Conservation Techniques

Other than preservation, conservation methods are also employed in libraries. These are mainly used for materials that are in much deteriorated conditions and preserving them is either not feasible or not a good option. The methods for conserving the materials are fumigation, spraying, digitisation,

Table 4. Conservation techniques and time intervals survey findings

Libraries	Time interval	Fumigation	Spraying	Digitisation	Scanning	Lamination	Micro-filming	De-Acidification	Binding	En-capsulation
IGNCA	I	×	✓	✓	✓	×	×	×	✓	×
	II	×	×	×	×	×	×	×	×	×
	III	✓	×	×	×	✓	✓	✓	×	✓
NAI	I	✓	✓	✓	✓	✓	✓	✓	✓	×
	II	×	×	×	×	×	×	×	×	✓
	III	×	×	×	×	×	×	×	×	×
NMML	I	×	✓	✓	×	×	✓	✓	✓	×
	II	✓	×	×	✓	✓	×	×	×	×
	III	×	×	×	×	×	×	✓	×	✓
CAL	I	✓	✓	×	✓	×	×	✓	✓	×
	II	×	×	✓	×	✓	×	×	×	✓
	III	×	×	×	×	×	✓	×	×	×
ZHL	I	✓	×	✓	✓	✓	✓	✓	✓	✓
	II	×	×	×	×	×	×	×	×	×
	III	×	✓	×	×	×	×	×	×	×
NML	I	×	✓	✓	×	×	×	×	✓	×
	II	✓	×	×	✓	✓	×	✓	×	×
	III	×	×	×	×	×	✓	×	×	✓

Key:I – Very often, II – Occasionally, III – Never, ✓=presence, ×= absence

Table 5. Results of Chi-square statistics and its significance

$\chi 2$ Statistic	d.f	P-value	Remarks
10.16	5.00	0.071	Insignificant

*Significant at 5% level ($p<0.05$) and d.f- degree of freedom for the chi- square

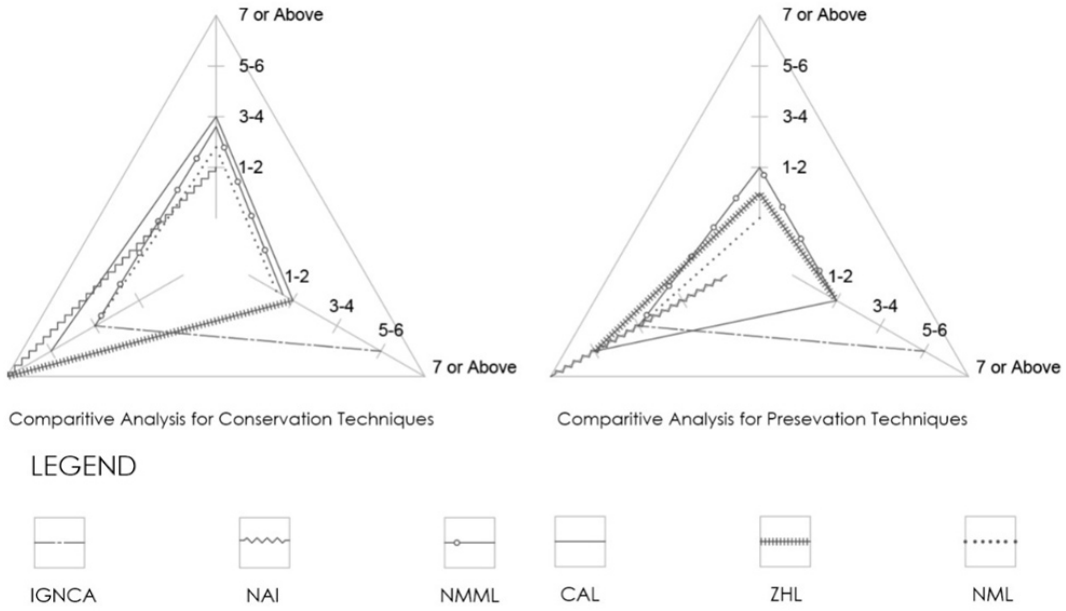

Figure 1. Comparative analysis for conservation and preservation techniques.

Table 6. Distribution of library collections

DOCUMENTS TYPE	IGNCA	NML	ZHL	NMML	CAL	NAI	TOTAL
Audio and Video Discs	1000	0	1250	8500	0	2689	13439
Microfiche	143000	0	38921	51322	0	14000	247243
Microfilms	25000	0	19526	18500	0	69879	132905
Music Records	450	228	0	0	0	896	1574
Newspaper Cuttings/ Clipping	25	0	1658	245	260 (2011 onwards)	29300	31463
Slides	100000	67000	0	900	0	17256	185156

scanning, lamination, microfilming, de-acidification, binding, encapsulation, etc. Table 4 shows various methods of conservation and time intervals at which they are done.

Spraying, digitisation, binding and scanning are among the more popular techniques used more or less frequently in these libraries. While fumigation, lamination, microfilming, de-acidification and encapsulation are the less popular techniques employed.

There are a total of 9 conservation techniques for these 6 libraries making it a total of 54 numbers of conservation techniques commonly, out of which 32 (60 %) are practiced very often, 11 (20 %) are practiced occasionally and 11 (20 %) are never practiced.

Table 5 Chi-square test is conducted to test the claim that techniques used for methods of conservation is not significantly different in the selected libraries. Since the p-value is greater than 0.05, and it is proved that there is difference in the techniques used for methods of conservation in the selected libraries.

6.3 Comparison Analysis of Conservation and Preservation Techniques

After the data analysis of this section, a comparative study has been done to understand the preservation and conservation techniques that are adopted by the libraries. There are a total of seven preservation techniques (cleaning, photocopying, shelving, maintain temp., adequate security, use of insecticide, other preservations) and nine conservation techniques (fumigation, spraying, digitisation, scanning, lamination, microfilming, de-acidification, binding, encapsulation) techniques used in the libraries which have also been shown in (Fig.1). The graphical representation also shows the number of items/ methods which are used at different time intervals, as explained in the above paragraphs.

In this study, we make a cycle graph or triangular graph to understand the situation better in selected libraries. We divide the graph into four segments (1 to 2, 3 to 4, 5 to 6, and 7 or above). These segments show how much are these preservation and conservation techniques adopted by the library, and each segment is on three vertexes (often, occasionally and never). By combining and understanding of data, we make libraries different graph of each preservation and conservation to understand the better picture. After the whole graph is prepared, we combine it and see how many resourceful libraries have.

7. ICT UTILISATION IN CONSERVATION AND PRESERVATION

In this fast growing digital world it has become a necessity

Table 7. Digital preservation techniques and time intervals of their application

Libraries	Time Interval	Refreshing	Technology Preservation	Migration	Emulation	En-capsulation	Micro-filming
IGNCA	I	✓	✓	×	×	✓	✓
	II	×	×	✓	✓	×	×
	III	×	×	×	×	×	×
NAI	I	✓	✓	✓	×	×	✓
	II	×	×	×	✓	✓	×
	III	×	×	×	×	×	×
NMML	I	×	×	×	×	×	✓
	II	×	✓	✓	✓	✓	×
	III	✓	×	×	×	×	×
CAL	I	×	×	×	×	✓	×
	II	×	×	×	×	×	×
	III	✓	✓	✓	✓	×	✓
ZHL	I	×	×	×	✓	×	×
	II	×	✓	✓	×	✓	×
	III	✓	×	×	×	×	✓
NML	I	×	×	×	×	×	×
	II	×	×	×	×	×	×
	III	✓	✓	✓	✓	✓	✓

Key: I – Very often, II – Occasionally, III – Never,✓=presence, ×= absence

Table 8. Conversion of digital media though hardware & software

Digital Media	Hardware & Software
Roll Film Slide Film Microfiche Film	Universal Microform Scanner Output Media: TIFF, PDF, JPJ,PNG,BMP Operating System: Windows 7,8,10 Output Resolution:100-2400dpi.
Magnetic Tape	Using Audacity to for Audio Transfer and some hardware (Tape Deck, RCA Cable, Sound Card, PC).
Floppy	Floppy Hardware Driver is connected to USB interface that enables links between devices and a host controller.
Compact Disc (CD)	CD hardware driver is Connected to USB interface that enables links between devices and a host controller.
DVD	DVD hardware driver is Connected to USB interface that enables links between devices and a host controller.

to keep important data in the form of digital data. This makes the data transfer very easy and stores data as a back-up too. The libraries too are adapting this method of data storage for past few years. But digitisation is very different from digital preservation like most libraries have digital media storage but not the digital preservation section. Table 6 shows distribution of storage media in these libraries across Delhi. Only a few storage media are used in libraries to store data, and it is renewed timely according to requirements. The listed examples of such types of storage media include audio and video discs, microfiches, microfilms, music records, newspaper cuttings/clippings, slides. The microfiche is the most used storage media in these libraries followed by slides and microfilms. All these libraries use above mentioned storage media according to their requirements for their collections with the exception of NML which only uses music records and CAL which only collects newspaper cuttings/clippings.

This digital preservation also helps in preserving and conserving the data through various techniques like refreshing, technology preservation, migration, emulation, encapsulation, microfilming, etc. Table 7 below shows the different digital preservation techniques and how often are they used in different libraries.

All the libraries mentioned have digital resources in its collections except NML. So they do not practice any of the techniques shown in the Table 7.

The IGNCA have been using refreshing, technology preservation, encapsulation and microfilming very often and migration and emulation occasionally and they have been using these techniques for a couple of years now. Whereas the NAI uses refreshing, technology preservation, migration and microfilming very often and emulation and encapsulation occasionally and they have been using these for more than a decade now. In NMML, microfilming technique is very often used as the digital preservation technique and techniques like technology preservation, migration, emulation and encapsulation are occasionally used but they don't use refreshing and they too have been using these techniques for more than a decade now. The CAL only uses encapsulation to preserve their digital data and they use it very often and also they have been preserving their data using this technique for more than a decade. The ZHL uses only emulation technique

very often and they occasionally use the technologies like preservation, migration and encapsulation only. Also they have started using these techniques very recently, less than a year. The NML as said does not have any digital resources.

There are a total of 6 preservation ways for these 6 libraries making it 36 numbers of digital preservation techniques commonly, out of which 11 (30 %) are practiced very often, 11 (30 %) are practiced occasionally and 14 (40 %) are never practiced.

8. DIGITAL MEDIA

Table 8 indicates there are only a few digital media uses in libraries to store data and it is renewed or uses time to time according to requirements.

Digital media technology modifies time to time and media deteriorate with time also. We can restore storage media data with the latest technology but cannot enhance their life span. To preserve data, we have to convert all data into a digital footprint.

9. CONCLUSIONS

Conservation and Preservation are the important part of library's activities and archival work. In research, we found out that the selected libraries are not entirely sufficient to manage the manuscript resources alone, except NAI, NMML &CAL. The techniques used for preservation are not much effective in libraries chosen and some of the libraries are not even practising it because of lack of resources and skilled manpower. The manuscript resources are preserved digitally to store their information, but digital technology has been upgrading rapidly in past ten years. The selected libraries are not effectively updating their technology of digitisation and may face difficulty in retrieval of data which they have digitised twenty five years back. In the survey, we found out that manuscript resources may not be available to our future generation because of lack of maintenance and they might also not be able to access it digitally due to rapid change in technology. Storage media innovation alters from time to time and media fade with time too. We can re-establish capacity of media information with the most recent innovation yet can't improve their life expectancy. To save information, we need to change overall information into a digital impression. So far in existence, digital preservation is the best and the latest means, to preserve the world memory for future generations.

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She contributed in the analysis, interpreted the results, participated in the drafting of the research analysis, collected data and wrote the introduction and literature review section.

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In the current study, he conceptualised the study and its framework, designed the research methodology and presented it in the present form.