PRESERVATION OF CULTURAL HERITAGE IN THE DIGITAL AGE

Author : Begam Suraiya Jeasmin Laskar

Assistant Librarian, Nabinchandra College, Badarpur

e-mail ID- jeasminelaskar92@gmail.com

Abstract

This study explores the preservation of cultural heritage in the digital age within the context of library science. The primary purpose is to examine how libraries can safeguard cultural assets, such as rare manuscripts, historical documents, and oral traditions, through digital preservation. The methodology involves a survey method of digital preservation strategies in libraries. Key findings reveal that while digitization ensures the longevity of fragile materials, challenges such as technological obsolescence, inconsistent metadata practices, and limited funding pose significant risks to long-term preservation. Furthermore, the study identifies best practices in digital repository management and highlights the importance of collaboration between libraries, technology experts, and cultural institutions. The practical application of this study lies in providing a framework for libraries to develop comprehensive digital preservation strategies that ensure the secure storage, accessibility, and ethical management of digital cultural heritage. Libraries are encouraged to implement advanced metadata standards, adopt scalable preservation technologies, and engage in interdisciplinary partnerships. This study's originality lies in its holistic approach to digital preservation, which integrates both technological and ethical considerations. It emphasizes the library's evolving role as a custodian of cultural heritage in a digital environment and addresses the need for sustained efforts to balance access, ownership, and cultural sensitivity in the digital age. This research contributes to the growing body of knowledge by offering actionable recommendations for library professionals in their digital preservation efforts.

Key words: Digital preservation, Digitization, Cultural heritage, Digital repositories, Technological obsolescence

Paper type : Survey method

ACKNOWLEDGEMENT

All of the people who assisted me in different ways with this paper have my sincere gratitude. However, it would not have been feasible without the generous assistance and support of numerous people and institutions. My heartfelt gratitude goes out to each and every one of them.

I am grateful that God gave me everything I needed to finish this paper. My parents' gracious cooperation and encouragement enabled me to finish this research paper, and for that I am greatly grateful.

I am very grateful to Sahir Ahmed Laskar, Yeasmin Laskar, Rinki Dey, and Papari Das for their advice, for giving me the information I needed for the paper, and for helping me finish it.

I am grateful that the International Conference on Re-Imaginning Academic Libraries (ICRAL-2025) will display their unique and creative ideas, methods, and research. I would especially want to thank the library staff and all of my colleagues at Nabinchandra College Badarpur for their help and cooperation in completing they paper.

Begam Suraiya Jeasmin Laskar
Assistant Librarian
Nabinchandra College, Badarpur
Date : 10/12/2024

1. INTRODUCTION

The preservation of cultural heritage is essential for sustaining the diversity of human expression and ensuring that future generations can access and appreciate their historical roots. Libraries have traditionally been entrusted with the care of physical materials such as manuscripts, books, maps, and photographs. Digitization, however, offers an effective solution to mitigate these risks. By converting physical items into digital formats, libraries can ensure that fragile artifacts are preserved while providing users with access to their contents in a more sustainable manner. In the digital age, libraries leverage technologies such as high-resolution imaging, 3D scanning, and metadata creation to document and archive cultural heritage items. These digital surrogates allow researchers, students, and the general public to engage with rare and delicate artifacts without endangering the originals. Furthermore, digital preservation facilitates global access, enabling institutions to share cultural treasures with a worldwide audience. Online platforms and digital repositories have emerged as vital tools in democratizing access to cultural heritage, breaking down geographical and socioeconomic barriers. By digitizing these cultural treasures, digital libraries ensure that they can be accessed, studied, and appreciated by people around the world, regardless of physical location or travel restrictions. By teaching the next generation about their history, cultural heritage initiatives promote tolerance for various cultures. Involving local communities in preservation efforts empowers them to protect and promote their cultural heritage while also fostering a sense of ownership. When cultural heritage is conserved through a sustainable lens, financial, environmental, and cultural resources are managed appropriately. This benefits both current and future generations by promoting long-term global development and preserving a society's distinctive character.

Digitization for Knowledge and Cultural Heritage Preservation In order to maintain, safeguard, and make cultural assets available to a wider audience, publication entails transforming tangible materials into digital representations. No matter where they are in the globe, everyone can use digital platforms to learn about cultural heritage. Digitized documents can be used for study and education by historians, scholars, and schools. Immersion experiences are made possible by 3D models, augmented reality, and virtual reality. The preservation of endangered languages is aided by the digitization of oral histories and texts. Documenting underrepresented communities ensures their cultural narratives are preserved. The knowledge economy refers to an economic system where the creation,

distribution, and use of knowledge drive growth, innovation, and value. In this context, cultural heritage plays a critical role, as it encapsulates the collective knowledge, traditions, and histories of societies. Publishing cultural heritage within the knowledge economy transforms cultural assets into valuable resources for education, tourism, research, and cultural diplomacy. Digitized cultural heritage can be monetized through virtual tours, exhibitions, and educational content. Digitization involves converting physical cultural assets into digital formats to preserve, protect, and enhance access to cultural heritage. This process plays a crucial role in safeguarding history, promoting global access, and fostering cultural continuity for future generations. Digitized assets remain safe from natural disasters, theft, or conflicts. Digital collections provide valuable data for researchers worldwide, fostering cross-disciplinary studies. Schools and universities integrate digital heritage into curricula, offering interactive learning experiences. Public involvement in tagging, transcribing, and cataloging enriches heritage data. Museums and institutions create virtual tours, increasing cultural engagement.

Through immersive virtual reality experiences, Digital and Virtual Heritage Services can remotely explore historical places and museums. Visits to Sites using Augmented Reality AR apps enhance on-site visits by superimposing historical data or 3D reconstructions onto actual locations. Interactive Narrative AR and VR use interactive, multimodal experiences to bring historical narratives to life. Digital Replicas in 3D For study and virtual exhibitions, high-resolution 3D scans maintain the physical characteristics of objects. 3D printing makes it possible to produce physical copies of artifacts, which can be used for teaching or to replace broken originals. AI and Machine Learning Application AI tools analyze digital images, texts, and audio files to generate descriptive metadata, enhancing cataloging and search ability. AI algorithms reconstruct damaged or missing parts of artifacts, manuscripts, or artworks, offering insights into their original state. Digital tools enhance faded texts or images, aiding historians in deciphering ancient documents. They are more than just places to borrow books they are depositories, or safe storage spaces, for important cultural materials. These materials include books, manuscripts, historical documents, photographs, maps, and even digital files that reflect a society's history, knowledge, and traditions. Collecting and Storing Libraries gather rare and valuable items like ancient texts, local history books, and traditional stories to keep them safe for future generations. Digitizing They convert physical items into digital formats to prevent loss from wear, age, or disasters, making them accessible online. Cataloging By organizing materials with detailed descriptions, libraries ensure that people can easily find and learn from cultural resources.

Cultural heritage projects foster tolerance for other cultures by educating future generations about their history. By including local communities in preservation initiatives, a sense of ownership is fostered and they are empowered to safeguard and promote their cultural heritage. Cultural, environmental, and financial resources are handled responsibly when cultural heritage is preserved via a sustainable lens. This helps sustain a society's unique character while encouraging long-term global development, benefiting both present and future generations.

1.2 NEED OF PRESEVATION AND CONSERVATION

Maintaining the cultural, historical, and intellectual legacy of society depends on the preservation and conservation of library collections. Books, manuscripts, images, maps, audiovisual materials, and digital resources are among the many items that librarians have on hand. Here are some reasons why conservation and preservation initiatives are crucial.

1.2.1 Cultural and Historical Significance : Rare and unusual materials that shed light on a society's history, culture, and evolution are frequently found in library collections. By preserving these resources, we can make sure that future generations can use and benefit from them.

1.2.2 Intellectual Heritage: Libraries are stores of information and concepts that have been gathered over many years. Scholars, researchers, and students can build upon prior knowledge by preserving these materials, which permits the continuation of intellectual endeavors.

1.2.3 Research and Scholarship: Library collections are used by researchers to carry out investigations, confirm information, and obtain new perspectives. The precision and dependability of study are guaranteed by the availability of well-preserved resources.

1.2.4 Public Access: Libraries are easily accessible public resources that provide entertainment, education, and information. Libraries guarantee that information is accessible to everyone in society, irrespective of socioeconomic background, by conserving collections.

1.2.5 Preventing Irreversible Loss : A lot of library resources might deteriorate over time as a result of handling, light, humidity, and pests. An irreversible loss of cultural and historical heritage may result from improper preservation attempts, which could cause these things to disappear forever.

1.3 FACTORS FOR DETERIORATION OF DOCUMENTS IN LIBRARIES

1.3.1 Climatic Factors: Two significant climatic influences are abrupt changes in moisture and temperature. Therefore, the documents should be stacked in a dry location with a consistent temperature. Avoiding direct sunlight will lessen the paper's and the binding's suppleness. Books, journals, and other paper-based publications can also be harmed by moisture, humidity, and dampness.

1.3.2 Chemical Factors: Paper is made from fibers with low cellulose content and chemical compounds like alum, rosin, and others for paper sizing. These chemicals have an acidic effect and help the paper deteriorate chemically over time. In addition, there are a number of undesirable substances in the atmosphere, including carbon, sulfur, nitrogen, and hydrogen sulfide oxides, which are absorbed by paper when wet and impair library books.

1.3.3 Insects and Rodents: The library' stack room is home to a variety of insects that can readily damage the documents stored inside, including silverfish, book lice, book worms, termites, black beetles, and cockroaches. Black beetles and cockroaches are typically found in warm nations. They eat away at the documents' gummed portions, including the binding. They can be killed with DDT powder. As an alternative, naphthalene or camphor pills may be utilized.

1.4 PRESERVATION OF MATERIAL IS DONE IN TWO WAYS.

1.4.1 Manual preservation: Numerous valuable and historic books are harmed by pests, fungi, or bacteria that affect hardcopy knowledge in the form of books, which are a library's primary asset. Additionally, direct exposure to many natural physical agents, such as heat, water, dust, etc., can be harmful. These days, a variety of techniques are employed, such as the employment of fungicide pesticide sprays and the preservation of pages in high shelves using naphthalene. However, there are some negative effects of these treatments. Accidental finger licking when flipping over chemically treated book pages, for example, can result in the intake of diseases because these substances are toxic to human health. To prevent dust exposure, which is the primary cause of pests like silverfish, cockroach rats, and beetles, the preservation area should be constructed with sufficient lighting and air conditioning instead.

1.4.2. Digital preservation: As science and technology have advanced, so too have many digital preservation techniques. Every district library has an e-library cell where patrons can access the books they want by logging in to their websites. It can be highly beneficial and successful to scan old books that are in a state of deterioration. Preservation and conservation

can only be effective if there is joint help of readers and library authority. The reader must realize that the idea and action were carried out solely for their own gain and should not be disregarded in the name of public interest. Every person contributes to the public.

1.5 BACKGROUND OF THE STUDY

History

A developing society needs aesthetic realities, and its leadership belongs to the class. a general guideline supported by Abraham Maslow's well-known Hierarchy of Needs (1908–1970). A society cannot be considered progressive if its leadership is subordinate. Self-destructive sometimes. As a result, young people lack leadership until they choose not to share the experiences of previous generations. The subject of leadership pertains to developing civilizations, which are influenced by their historical heritage. There are two types of cultural heritage: intangible (like music) and tangible (like monuments). The present is based on the past, however it may have existed. According to Romanian-American author and Auschwitz survivor Elie Wiesel (1928–2016), culture cannot exist without memory. There wouldn't be any culture, society, or future without memory.

In every industry where digital technology is used, the conversion of tangible cultural material into intangible cultural heritage happens more quickly. Those who have seen the Gladiator (2000) film have never been to the Colosseum. Producing and making money from the 1997 film Titanic is significantly more expensive than building the Titanic and hoping to make money on her first and only journey. Such changes are sparked by the June 18, 2023, implosion of the Titan submarine. Discover the details of fatalities and their background, we'll find Marslow's Hierarchy of Needs at full-swing.

April 19, 2024

Our younger generations occasionally come across historical sites on the internet. They are unable to visit tangible heritage because of their restricted finances and rigid choices; the digital era turns tangible heritage into intangible heritage. Are you unsure? It took time to build Rome. The dichotomy of existence in the real world and existence in the realm of intellect merge to generate information, which is now both a proven commodity and a source of power. The digital age with a rich tapestry of ancient sites, monuments, temples, palaces, and traditional settlements that document its illustrious past spanning millennia, India stands as a reservoir of diverse cultural treasures. In addition to being physical reminders of India's illustrious history, these cultural treasures are also of great socioeconomic and cultural importance, drawing millions of tourists from both domestic and foreign countries every year.

Bakshi (2016) However, there are many obstacles to the preservation and upkeep of these priceless gems, which are made worse by things like growing urbanization, environmental deterioration, a lack of finance, and inadequate infrastructure (Malik et al., 2017).

Digital preservation has the potential to revolutionize cultural heritage sites in India, but its acceptance and application are still restricted and dispersed. Many heritage sites throughout the nation continue to suffer from neglect, degradation, and even destruction as a result of insufficient preservation efforts, despite the emergence of some noteworthy initiatives, such as the National Mission on Monuments and Antiquities (NMMA) and the Digital India program (TK, & G. K., 2022).

In light of this, the study aims to investigate and assess the digital preservation techniques used for Indian cultural heritage sites. Through the analysis of case studies, existing literature, and secondary data sources, the research attempts to pinpoint important opportunities, challenges, and best practices in digital preservation in the Indian context (TK, G. K., 2022).

1.6 LITERATURE REVIEW

A literature review is a crucial component of every research project. To conduct research on a certain topic, a thorough understanding of the field's literature is necessary. A literature review is a thorough synopsis and critical evaluation of previous studies and writings on a particular subject. Usually, academic research papers, theses, dissertations, or stand-alone publications include literature evaluations. An essential part of any research study is a literature review. A deep comprehension of the literature in the discipline is required in order to do research on a particular issue. A literature review is a comprehensive summary and critical assessment of earlier research and writings on a certain topic. Literature reviews are typically included in academic research articles, theses, dissertations, or stand-alone publications.

Since digital tools and technology provide new means of documenting, storing, and sharing cultural material, the importance of preserving it has grown. The approaches, difficulties, and ethical issues surrounding the preservation of digital history are all covered in this overview of the literature.

1.6.1 Digital Preservation: A Time Bomb for Digital Libraries Hedstrom, Margaret (1997) The development of digital libraries may be hampered by the cost and complexity of preserving digital material. After libraries and archives incorporated preservation into general planning and resource allocation, the success and methodical nature of conventional material

preservation increased. The majority of digital preservation is experimental, and therefore carries all the hazards of using unproven techniques. The requirements and limitations of repositories influence digital preservation strategies, with little thought given to the present and future users of digital scholarly resources. The current status of digital preservation is examined, user and custodian requirements are stated, and research needs in storage medium, migration, conversion, and general management strategies are suggested.

1.6.2 New Media and the Forensic Imagination (2012) Kirschenbaum, M. The textual and technological primitives that control writing, inscription, and textual transmission in all media erasure, variability, repeatability, and survivability are compared to new media and electronic writing by Matthew Kirschenbaum. The first book in its genre to focus heavily on storage, specifically the hard drive, Mechanisms makes the case that knowledge of the affordances of storage devices is crucial to comprehending new media. In his analysis of new media works, Kirschenbaum use applied computer forensics techniques to distinguish between "forensic materiality" and "formal materiality." Computer forensics encourages us to view new media in terms of particular versions, platforms, systems, and devices, much like the humanities field of textual studies analyzes books as tangible things and tracks various text variants.

1.6.3 3D Visualization of Cultural Heritage Artefacts with Virtual Reality devices. Giandomenico Caruso and Sara Gonizzi Barsanti (2015) The potential of these digital materials is not fully realized until they are utilized to interactively convey their value to non-specialists, despite the fact that 3D models are helpful for preserving information about historical artifacts. This thought led to an investigation into a novel approach to giving museum visitors additional information. The goal of the study is to elevate and increase the accessibility of the Egyptian burial items on display at Milan's Sforza Castle. The research's findings will be applied to revitalize the existing show at Milan's Archaeological Museum by making it more appealing. To enhance the experience, a 3D virtual interactive scenario about the "path of the dead," a significant ancient Egyptian ceremony, was created.

1.6.4 Maintain the Persistence of a Distributed Ledger for Future Generations. In 2022, Thomas Rose and Thomas Osterland It's critical to realize that publicly distributed ledgers are not a limitless source of trust. Rather, the resource is divided across several use cases, and an uneven use will raise the network's operating expenses. Lastly, archivists now face the same challenges as distributed ledger node operators. In order to keep the distributed ledger stable and secure for upcoming generations, they must preserve the data within it. The time frame in which a use case can operate at profitable margins becomes unavoidably a function of time

when we take into account that we require previous transactions to demonstrate the accuracy of current transactions and that maintaining these earlier transactions entails ongoing preservation expenses. Furthermore, it is challenging to design economically viable DLT applications due to the issue of financial speculation, which makes transaction prices unpredictable even for medium time horizons. Of course, the duration of an application's profitability varies depending on the use case, such as profit margins, and can be quite long.

1.6.5 Decolonizing Design with Technology in Cultural Heritage Contexts - Systematic Literature Review. Jonna Hakkila, Mari Suoheimo, and Siiri Paananen (2022) The findings of a thorough literature study that examined the intersections of decolonizing design, cultural heritage, and technology are presented in this paper. A total of 26 pertinent publications were located and thoroughly reviewed. A developing trend, decolonizing design has seen the most articles since 2017. By looking at the findings, we will present the current discussions and arguments about the use of technology in the field of cultural heritage using a decolonizing design method. We note that although technology itself seems neutral, its application is viewed via a set of values that might be linked to power and politics. This can be improved by integrating the design processes with the cultural and local context. Co-creation and participative methods are used to achieve this. Overall, even if the concept of decolonizing design is becoming more and more popular, there are still just a few studies that discuss incorporating the method into design practice. Key words Design decolonization Sensitivities of cultural heritage technology design Design of human-computer interaction thorough review of the literature.

1.6.6 Result of the study of Literature Review

According to the literature review, preservation is crucial for any organization. The preservation of these services has been used by numerous institutions throughout the past few years. However, the majority of librarians in the Barak Valley are unaware of the preservation of cultural material for a variety of reasons, including a lack of funding and knowledge. Research on how to preserve cultural heritage in the digital age is desperately needed.

1.7 RESEARCH PROBLEM

The literature review states that any organization must prioritize preservation. Over the past few years, many institutions have made use of the preservation of these services. For a number of reasons, including a lack of resources and expertise, most librarians in the Barak

Valley are ignorant about the preservation of cultural materials. Research on how to preserve cultural heritage in the digital age is desperately needed.

The following are some of the research issues in this field:

1. Respondents may ignore surveys due to lack of interest or time.
2. Respondents may misunderstand questions, leading to inaccurate answers.
3. Online surveys may face problems like website downtime, poor mobile optimization, or lost data.
4. Skipped questions or partially completed surveys reduce data usability.
5. Difficulty in defining clear research questions relevant to the library context (e.g., user satisfaction, resource usage, or service improvement).

1.8 OBJECTIVE OF THE STUDY

1. Investigate advanced technologies (e.g., 3D scanning, AI, virtual reality) for the accurate digitization of cultural artifacts and historical records.
2. Identify long-term strategies for digital preservation, including data storage, migration, and format standardization.
3. Evaluate how digital platforms can enhance public engagement and accessibility, making cultural heritage more inclusive and interactive.
4. Address ethical concerns related to digital ownership, cultural sensitivity, and the digital divide.
5. Propose collaborative models involving governments, cultural institutions, and technology providers to ensure effective preservation and dissemination.

1.9 RESEARCH QUESTION

1. Are you familiar with digital preservation of cultural heritage?
2. How important do you think preserving cultural heritage digitally is for future generations?
3. Have you used digital platforms (e.g., online archives, virtual museums) to access cultural heritage resources?
4. Which of the following digital preservation methods are you aware of ?
5. In your opinion, which digital medium is most effective for preserving cultural heritage?
6. What do you think are the biggest challenges in digitally preserving cultural heritage?
7. Would you contribute to or support projects aimed at digitally preserving cultural heritage?

8. How likely are you to use virtual tools like AR/VR to explore cultural heritage sites?

9. What cultural heritage elements do you think should be prioritized for digital preservation?

10. What role do you believe Artificial Intelligence and Machine Learning can play in cultural heritage preservation?

2. METHODOLOGY

2.1 Research Methodology

Research Methodology refers to the systematic, theoretical analysis of the methods applied to a field of study. It describes how research is conducted, including the tools, techniques, and processes used to collect, analyze, and interpret data. Methodology is more than just the methods you intend to use to collect data; it is frequently necessary to include a consideration of the concepts and theories which underlie the methods.

An effective questionnaire requires careful planning to ensure that you gather accurate, actionable data. Purpose: Clearly state your goals, awareness of preservation, etc. A questionnaire has been designed in structural form with the set objectives in mind, covering various facts of the problem.

2.2 Data Analysis and Interpretation

Data analysis is the process of examining, cleaning, transforming, and modeling data to find relevant information, support decision-making, and draw conclusions. Based on completed questionnaires, the data was analyzed and tabulated, and all of the results were presented in the form of tables and/or graphs. Microsoft Excel (software) was used to create the graphs, while percentage techniques were used for the data analysis procedures.

2.3 CLASSIFICATION AND CHARACTERISTICS OF RESPONDENTS

2.3.1 Responses Received from the Respondents

The respondents were given 40 questionnaires in total, of which 37 were returned by Barak Valley Colleges after being properly completed by the librarian.

Table 1: Reactions from the librarian.

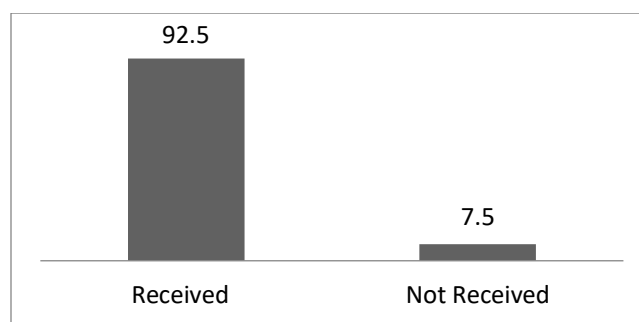| Responses	Total	Percentage(%)
Received	37	92.5
Not Received	3	7.5
Total Distribution	40	100

Figure 1: Reactions from the librarian.

2.3.2 Familiar with digital preservation of cultural heritage.

The greatest number of librarians are knowledgeable about digital cultural heritage preservation. According to 62% of librarians, they are familiar Just 10% of librarians are somewhat familiar with digital cultural heritage preservation, while 27% claim they are not familiar with it.

Table 2 : Familiar with digital preservation of cultural heritage.

Familiar	No. of Respondents	Percentage%
Yes	23	62.16
No	10	27.02
Somewhat	4	10.81
Total	37	100
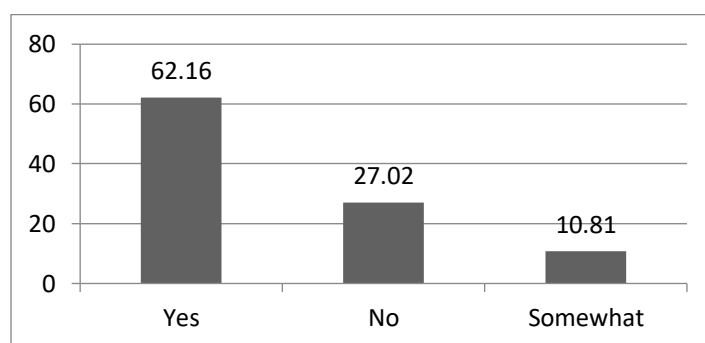
Figure 2 : Familiar with digital preservation of cultural heritage.

2.3.3 Important of preserving cultural heritage digitally is for future generations.

The importance of preserving cultural heritage for future generations is demonstrated by the fact that, of the 37 librarians surveyed, only 2% believe it is not important, 10.81% believe it is somewhat important, and many believe that digital cultural heritage preservation is extremely important for future generations.

Table 3 : Important of preserving cultural heritage digitally.

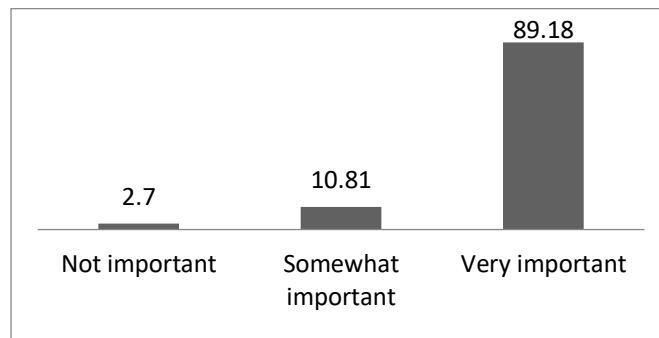| Important	No. of Respondents	Percentage%
Not important	1	2.7
Somewhat important	4	10.81
Very important	33	89.18
Total	37	100

Figure 3 : Important of preserving cultural heritage digitally.

2.3.4 Have you used digital platforms (e.g., online archives, virtual museums) to access cultural heritage resources.

Describe how you accessed cultural heritage resources using digital platforms (such as virtual museums and online archives). Of librarians, 45.94% think they can use digital platforms, while 54.05% say they can't because of library access issues.

Table 4 : Have you used digital platforms.

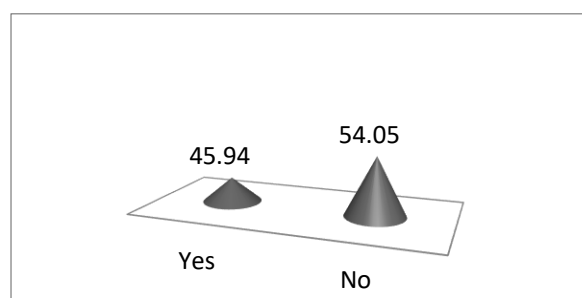| Platform	No. of Respondents	Percentage%
Yes	17	45.94
No	20	54.05
Total	37	100

Figure 4 : Have you used digital platforms.

2.3.5 Which of the following digital preservation methods are you aware of?

This table displays the types of digital preservation techniques that are known to exist. Artifact digitization (such as 3D scanning) 18.91% that the librarian chose Digital access to documents was chosen by 27.02% of librarians, virtual reality recreations of historical locations by 21.62%, and social media campaigns for cultural awareness by 32.43% of librarians.

Table 5 : Digital Preservation methods.

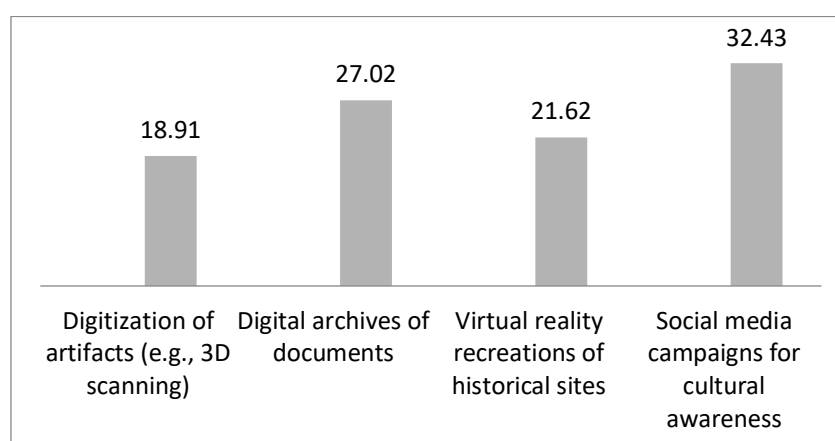| Methods	No. of Respondents	Percentage%
Digitization of artifacts (e.g. 3D scanning)	7	18.91
Digital archives of documents	10	27.02
Virtual reality recreations of historical sites	8	21.62
Social media campaigns for cultural awareness	12	32.43
Total	37	100

Figure 5 : Digital Preservation methods.

2.3.6 In your opinion, which digital medium is most effective for preserving cultural heritage?

Indicate which digital platform, in your opinion, is best for conserving cultural heritage. 21.62% of librarians selected records on audio and video. Just 8.10% of respondents selected text and image archives, while 27.02% selected virtual reality experiences or 43.24% selected interactive websites.

Table 6 : Which digital medium is most effective.

Effective	No. of Respondents	Percentage%

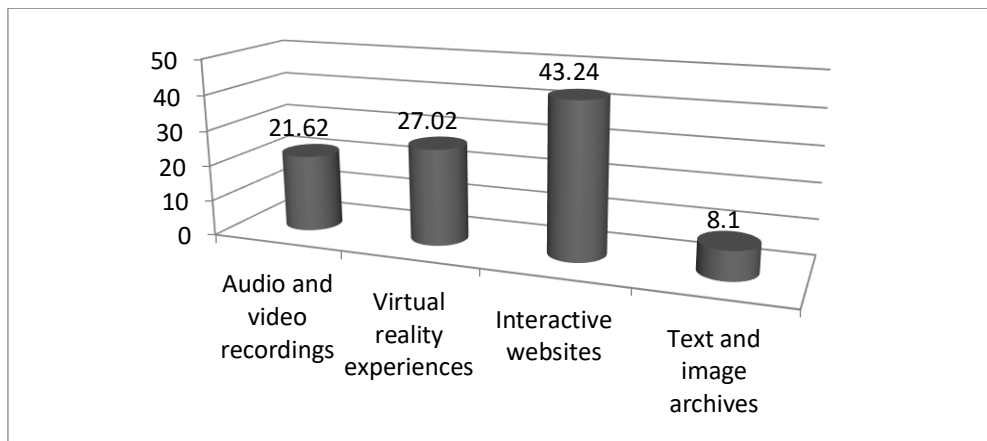|		
Audio and video recordings	8	21.62
Virtual reality experiences	10	27.02
Interactive websites	16	43.24
Text and image archives	3	8.10
Total	37	100

Figure 6 : Which digital medium is most effective

2.3.7 What do you think are the biggest challenges in digitally preserving cultural heritage?

The largest obstacle to digitally preserving cultural material is a lack of financing, which 18.91% of librarians cited. 24.32% of librarians selected restricted technology access. 16.21% of librarians selected digital format obsolescence. 10.81% of librarians selected authenticity and accuracy as their top concerns. The greatest percentage of librarians 29.72% selected limited public interest.

Table 7 : Challenges in digitally preserving cultural heritage.

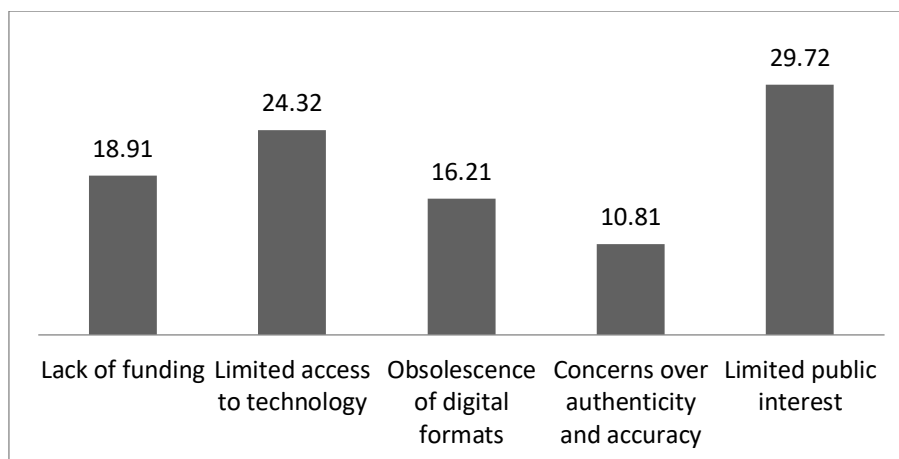| Challenges	No. of Respondents	Percentage%
Lack of funding	7	18.91
Limited access to technology	9	24.32
Obsolescence of digital formats	6	16.21
Concerns over authenticity and accuracy	4	10.81
Limited public interest	11	29.72
Total	37	100

Figure 7 : Biggest challenges in digitally preserving cultural heritage.

2.3.8 Would you contribute to or support projects aimed at digitally preserving cultural heritage?

Find out that the majority of librarians (40.54%) selected a project to help preserve cultural heritage digitally by sharing and promoting content. 29.72% say they will donate, 16.21% say they would volunteer, and 13.51% say they have no interest in digitally preserving cultural heritage.

Table 8 : Contribute to or support digitally preserving cultural heritage.

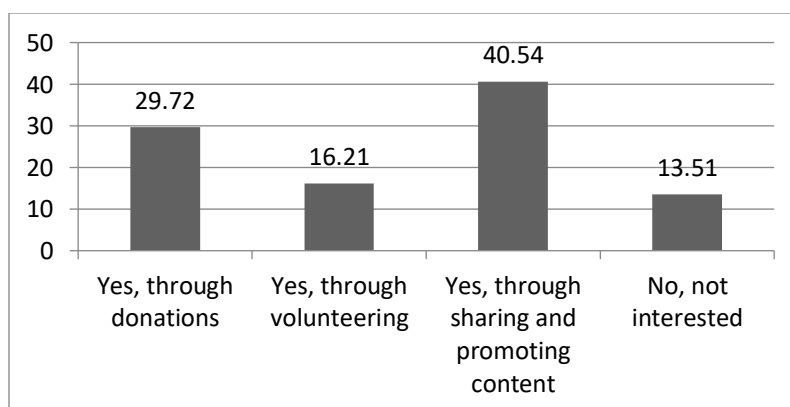| Support	No. of Respondents	Percentage%
Yes, through donations	11	29.72
Yes, through volunteering	6	16.21
Yes, through sharing and promoting content	15	40.54
No, not interested	5	13.51
Total	37	100

Figure 8 : Contribute to or support digitally preserving cultural heritage.

2.3.9 How likely are you to use virtual tools like AR/VR to explore cultural heritage sites?

Show that 56.75% of librarians are extremely likely to investigate cultural heritage sites using virtual reality (AR/VR). While 18.91% of librarians believe they are unlikely to use the virtual tools, 24.32% think they are quite likely to do so.

Table 9 : Use virtual tools like AR/VR to explore cultural heritage sites.

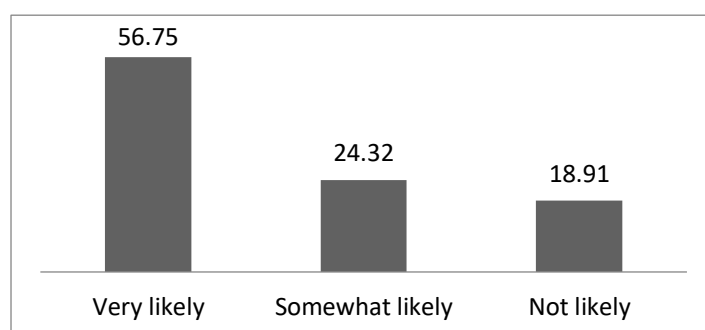| Response	No. of Respondents	Percentage%
Very likely	21	56.75
Somewhat likely	9	24.32
Not likely	7	18.91
Total	37	100

Figure 9 : Use virtual tools like AR/VR to explore cultural heritage sites.

2.3.10 What cultural heritage elements do you think should be prioritized for digital preservation?

show that 24.32% of librarians selected historical landmarks, monuments, and traditional crafts as cultural heritage assets that should be emphasized for digital preservation. 32.43% of librarians choose historical documents for digital preservation, while 18.91% choose oral traditions and stories.

Table 10 : cultural heritage elements prioritized for digital preservation.

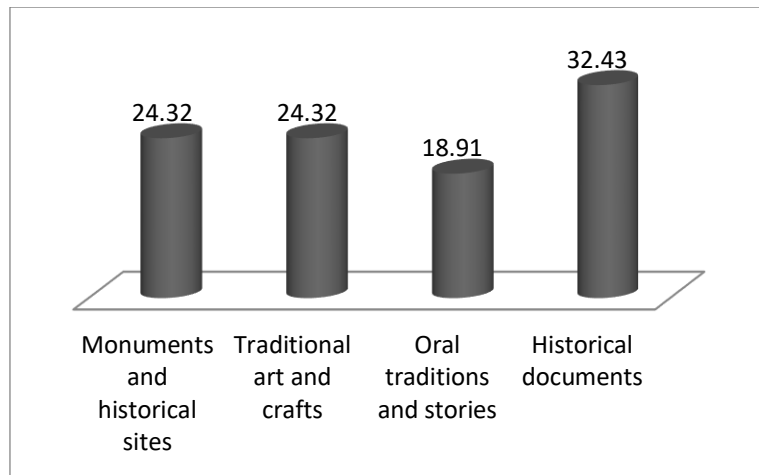| Elements	No. of Respondents	Percentage%
Monuments and historical sites	9	24.32
Traditional art and crafts	9	24.32
Oral traditions and stories	7	18.91
Historical documents	12	32.43
Total	37	100

Figure 10 : cultural heritage elements prioritized for digital preservation.

2.3.11 What role do you believe Artificial Intelligence and Machine Learning can play in cultural heritage preservation. Reveal that 18.91% of people think that making artificial intelligence and machine learning more accessible can help preserve cultural heritage. Restoring damaged artifacts was selected by 43.24% of respondents. Cataloguing and data analysis were selected by 32.43% of respondents, while 5.40 percent chose none at all.

Table 11 : A/I and M/L can play in cultural heritage preservation.

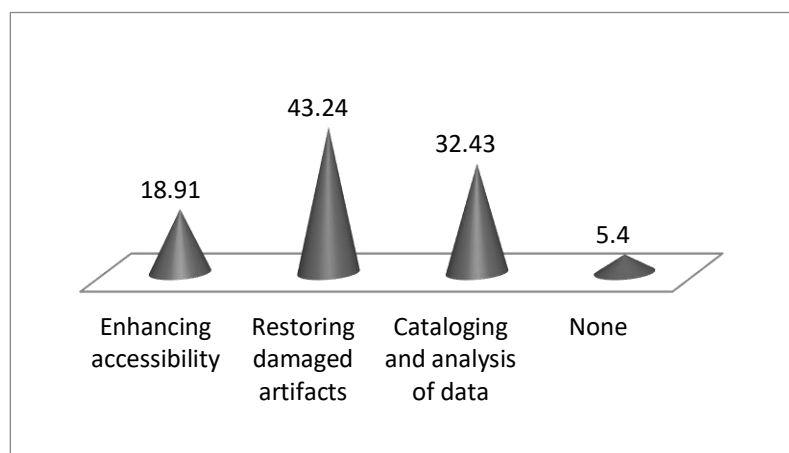| Response	No. of Respondents	Percentage%
Enhancing accessibility	7	18.91
Restoring damaged artifacts	16	43.24
Cataloging and analysis of data	12	32.43
None	2	5.40
Total	37	100

Figure 11 : A/I and M/L can play in cultural heritage preservation.

Conclusion

Any organization must prioritize preservation. Many institutions have been using the preservation of these services in recent years. For a variety of reasons, including a lack of funding and knowledge, the majority of librarians in the Barak Valley are unaware of the importance of cultural heritage preservation. Studies on the preservation of cultural heritage in the digital age are desperately needed. The long-term integrity of digital collections is a challenge for libraries, which are typically expected to protect physical records. Library budgets may be strained by the high expenses of digital infrastructure and the rapid depreciation of technology, which could result in the loss of priceless digital assets. Additionally, the tactile and genuine experience of working with original materials may be diminished by the transition from physical to digital formats, which would lessen the cultural and historical context that tangible artifacts offer. Copyright, access limitations, and the possible monopolization of cultural materials by big tech firms engaged in digitization initiatives are further ethical issues that libraries must deal with. This might undermine libraries' public duty by limiting some groups' access to cultural assets. Lastly, the digital divide is still a serious problem. Local histories and marginalized perspectives may be left out of the global digital narrative since not all libraries, particularly those in impoverished or rural locations, have the capacity to digitize and maintain their collections.

In summary, digitalization has revolutionized the way libraries conserve cultural heritage, but it also brings with it problems like data insecurity, obsolescence, physical item neglect, and unequal access. In order to guarantee that cultural heritage is conserved and available to future generations without suffering from severe loss or inequality, it is imperative that these challenges be addressed.

REFERENCE

1. https://blog.wonderslate.com/the-role-of-digital-libraries-in-preserving-cultural-heritage/
2. https://www.lisedunetwork.com/preservation-and-conservation-of-library-materials/
3. https://ebooks.inflibnet.ac.in/lisp12/chapter/preservation-management-and-weeding-out-collections/
4. https://publiclibraryservices.assam.gov.in/portlets/preservation-and-conservation-of-library-

materials#:~:text=The%20bookshelves%20should%20be%20kept,of%20pages%20should%20be%20stopped.

5. https://www.linkedin.com/pulse/preservation-cultural-heritage-digital-age-waad-ur-rehman-yg6zc/

6. https://www.researchgate.net/publication/378907574_A_STUDY_ON_DIGITAL_PRESERVATION_METHODS_FOR_CULTURAL_HERITAGE_SITES_IN_INDIA

7. https://www.researchgate.net/publication/30843346_Digital_Preservation_A_Time_Bomb_for_Digital_Libraries

8. https://mitpress.mit.edu/9780262517409/mechanisms/

9. https://www.researchgate.net/publication/281548173_3D_Visualization_of_Cultural_Heritage_Artefacts_with_Virtual_Reality_devices

10. https://dl.acm.org/doi/fullHtml/10.1145/3523181.3523184

11. https://www.researchgate.net/publication/365165199_Decolonizing_Design_with_Technology_in_Cultural_Heritage_Contexts_-_Systematic_Literature_Review

QUESTIONNAIRE FOR LIBRARIAN

PRESERVATION OF CULTURAL HERITAGE IN THE DIGITAL AGE.

(Please provide the necessary information or put a check mark (✓) opposite the item that corresponds to your response)

1. Are you familiar with digital preservation of cultural heritage?

   o Yes

   o No

   o Somewhat

2. How important do you think preserving cultural heritage digitally is for future generations?

   a. Not important

   b. Somewhat important

   c. Very important

3. Have you used digital platforms (e.g., online archives, virtual museums) to access cultural heritage resources?

- o Yes ☐
- o No ☐

4. Which of the following digital preservation methods are you aware of? (Select all that apply)

- o Digitization of artifacts (e.g., 3D scanning) ☐
- o Digital archives of documents ☐
- o Virtual reality recreations of historical sites ☐
- o Social media campaigns for cultural awareness ☐

5. In your opinion, which digital medium is most effective for preserving cultural heritage?

- o Audio and video recordings ☐
- o Virtual reality experiences ☐
- o Interactive websites ☐
- o Text and image archives ☐

6. What do you think are the biggest challenges in digitally preserving cultural heritage? (Select all that apply)

- o Lack of funding ☐
- o Limited access to technology ☐
- o Obsolescence of digital formats ☐
- o Concerns over authenticity and accuracy ☐
- o Limited public interest ☐

7. Would you contribute to or support projects aimed at digitally preserving cultural heritage?

- o Yes, through donations ☐
- o Yes, through volunteering ☐
- o Yes, through sharing and promoting content ☐
- o No, not interested

8. How likely are you to use virtual tools like AR/VR to explore cultural heritage sites?

- o Very likely ☐
- o Somewhat likely ☐

o   Not likely □

9. What cultural heritage elements do you think should be prioritized for digital preservation?

d. Monuments and historical sites □
e. Traditional art and crafts □
f. Oral traditions and stories □
g. Historical documents

10. What role do you believe Artificial Intelligence and Machine Learning can play in cultural heritage preservation?
o   Enhancing accessibility □
o   Restoring damaged artifacts □
o   Cataloging and analysis of data □
o   None □