

An Empirical Study on Digital Preservation Challenges in Bangladesh's National Archives

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ABSTRACT

Introduction: Digital preservation has become a critical function of national archives to ensure long-term access to documentary heritage. The National Archives of Bangladesh (NAB), as a key custodial institution, faces multiple challenges in adapting to digital preservation practices.

Objectives: This study aims to identify and analyze the challenges of digital preservation at NAB, focusing on institutional readiness, infrastructure, staff capacity, and policy-related constraints.

Methods:

A quantitative survey design was employed, collecting data from 20 archival professionals working at NAB. The data were analyzed using descriptive statistical techniques in SPSS to assess the current state of digital preservation practices.

Findings: The findings reveal significant limitations across multiple dimensions. Approximately 75% of respondents lack formal training in digital preservation, while over 60% report serious infrastructure deficiencies. Although moderate administrative support exists, major barriers persist in technical capacity, legal frameworks, and human resources. Additionally, the absence of comprehensive national-level digital preservation policies further constrains effective implementation.

Social Implications: The study highlights the broader implications for preserving national heritage in developing countries, emphasizing the risks of loss of information and limited accessibility without proper digital preservation strategies.

Limitations: The study is limited by its small sample size and focuses on only one institution which may affect the generalizability of the findings.

Practical Implications / Recommendations: The study recommends targeted capacity-building initiatives, modernization of infrastructure, and development of national digital preservation policies.

Keywords: Digital Preservation, National Archives of Bangladesh, Archival Challenges, Developing Countries.

INTRODUCTION

Archival record preservation has advanced well beyond traditional techniques in today's digital environment. In order to preserve the long-term accessibility, dependability, and integrity of information, it now requires sophisticated technology and strategic planning (Conway, 2010; Gracy & Kahn, 2012). At the heart of this development are national archives, which preserve a country's historical and cultural documents. However, there are several major challenges associated with the shift to digital preservation. Limited infrastructure, ambiguous rules, and deficiencies in staff training are just a few of the difficulties that institutions encounter (Kalusopa, 2018; Sanett, 2013).

These issues are typically more serious in developing countries like Bangladesh (World Bank, 2023). The National Archives of Bangladesh (NAB) still has difficulty implementing and overseeing digital preservation

mechanisms, despite increased awareness and some basic infrastructure in place. Major problems have been identified by research, including the absence of a national policy for digital preservation, technological and financial limitations, a lack of expertise, and unresolved legal difficulties pertaining to digital content (Shuva, 2009; Akter, 2013; Mahmud & Reza, 2020).

Few empirical studies have been conducted on the unique conditions within Bangladesh's archival institutions, despite the fact that international research have addressed common practices and challenges in digital preservation. Developing successful, long-term preservation solutions requires learning from experts who are actively involved in archive work (Masenya & Ngulube, 2019; Sambo et al., 2017).

The main obstacles to digital preservation at NAB are examined in this paper. It focuses on policy gaps, worker readiness, institutional capability, and technical and legal constraints. A structured questionnaire was used to gather data with the goal of offering workable, fact-based ways to improve digital preservation procedures in Bangladesh.

Research Objectives

1. To assess the institutional readiness and infrastructural capacity for digital preservation in the National Archives of Bangladesh.
2. To identify key technical, legal, and human resource challenges affecting digital preservation efforts.
3. To explore staff perceptions on policy needs, administrative support, and preferred strategies for effective digital preservation.

Research Questions

1. What is the current state of institutional readiness and infrastructure for digital preservation in the National Archives of Bangladesh?
2. What are the major technical, legal, and human resource challenges faced by the staff of the National Archives in implementing digital preservation?
3. How do archival staff perceive the role of policy, training, and administrative support in enhancing digital preservation practices?

LITERATURE REVIEW

Digital preservation is mandatory in modern archival institutions as records are now created, stored, and accessed in digital formats (Conway, 2010). Unlike traditional preservation, digital records require continuous technological support, regular system updates, and proper policy frameworks to ensure long-term accessibility. However, institutions in developing countries continue to face significant difficulties in ensuring effective digital preservation due to limited resources, weak infrastructure, and lack of policy support (Masenya & Ngulube, 2019).

Recent studies emphasize the potential of integrating advanced technologies—such as Artificial Intelligence (AI) and cloud computing—into digital preservation systems. There have also lack of digital policy globally including African countries (Kalusopa, 2018). According to (Muthoka et al., 2021), technological obsolescence is the main threads for digital preservation in Kenya, they also identified policy gaps, and unreliable infrastructure as threads of it. There has absence of secure data retention practices in South African university (Masenya & Ngulube, 2019). (Conway, 2011) identified the hardware and metadata deficiencies as challenges of digital preservation. Absence of policy to maintain born-digital records was found in the Southern African Development Community (SADC) (Ngoepe & Saurombe, 2016).

National Archives and Documentation Centre (NADC) had a number of difficulties that was not possible to overcome over nights, major barriers are lack of legal and IT policy, budget issue, and unskilled personnel (Shuva, 2009). (Islam & Akter, 2008), pointed that both physical and digital preservation of archives were in thread. (Akter, 2013), highlighted the difficulties of Archives mentioning it lack of policy, funds, poor infrastructure etc. More recent studies by (Rifat, 2021) found that there have lack of collaboration and positive

motive of authority in digitization. In addition to addressing regional challenges, it is essential to acknowledge the role of global frameworks that underpin best practices in digital preservation. International standards such as the Open Archival Information System (OAIS) Reference Model (ISO 14721), UNESCO's Charter on the Preservation of Digital Heritage (2003), and the IFLA/ICA international guidelines serve as foundational tools for managing digital heritage. (CCSDS, 2012; UNESCO, 2003; IFLA/ICA, 2016).

Research Gap

Even while more and more people throughout the world are talking about digital preservation, most of the research that has already been done is on industrialized countries that have solid policies, good infrastructure, and advanced technology. Research from places like North America and Europe goes into great detail about frameworks, metadata standards, and long-term access plans (Sanett, 2013; CCSDS, 2012). However, in underdeveloped nations, especially in South Asia, there is still not a lot of research, and what there is is often not based on real-world evidence.

There have been efforts to digitize historical documents in Bangladesh, but not many studies have looked at the institutional, technical, and human resource problems that national-level archive institutions face in a systematic way. Some studies focus on digitization activities in university libraries, while others look at larger ICT challenges without directly talking about digital preservation frameworks (Shuva, 2009; Mahmud & Reza, 2020). Also, people don't often look at global standards like OAIS, UNESCO's Charter, or IFLA/ICA principles to see if they work in places with limited resources, like the National Archives of Bangladesh. There isn't much real-world data on how new technologies like AI, blockchain, or cloud storage are used or seen in these kinds of places either.

This study fills a major gap in the research by giving real-world data on the legal, institutional, and infrastructural issues that come up while trying to preserve digital records in Bangladeshi archives, as well as the training needs that come with them. By putting preservation problems in the context of a developing country, it adds to both regional scholarship and global conversation.

Research Methodology

This study employed a quantitative research design, using a structured survey to explore the challenges of digital preservation in the National Archives of Bangladesh. A quantitative approach was deemed appropriate because it allows for the collection and analysis of measurable data from archival professionals, facilitating the identification of patterns and trends in institutional readiness, staff capacity, and technological barriers related to digital preservation.

Population and Sampling

The population of the study consisted of 53 professionals working directly in archival services at the Directorate of Archives and Libraries.

This includes:

- 20 officers
- 33 archival staff

Other personnel within the Directorate were excluded, as their roles are unrelated to archive management or digital preservation processes.

Purposive sampling was used to get data from 20 professionals in this group. This strategy made sense because the goal was to gather information directly from those who administer both digital and physical archives. A balanced mix of officers and archive personnel were among the chosen participants, representing a range of operational skills and responsibility levels. The entire sample consists of only employees actively engaged in preservation-related tasks, though representing nearly 39.62% of the target population. Consequently,

considering time and accessibility constraints, the sample offers enough representation and content validity for this exploratory study.

Data Collection Instrument and Analysis

Data were collected through a **structured, close-ended questionnaire** developed based on a review of existing literature and expert input. Studies consulted in the development of the questionnaire include works by (Kalusopa, 2018), (Sanett, 2013), (Masenya & Ngulube, 2019), and (Shuva, 2009), which informed the categorization of key challenges in digital preservation. The questionnaire was organized into the following thematic sections: - Institutional readiness and infrastructure

- Technical and legal challenges
- Staff training and administrative support
- Policy awareness and strategic needs

A mix of Likert scale items and categorical response questions was used to ensure clarity, consistency, and statistical comparability and the collected data were analyzed using SPSS.

FINDINGS

This survey explored the challenges faced by the National Archives of Bangladesh (NAB) in implementing effective digital preservation systems. Responses were collected from professionals directly involved in archiving and digital preservation activities. The SPSS software was used to perform descriptive statistical analysis on survey data collected from archival professionals.

The results are organized into four sections: Section A (Background Information), Section B (Institutional Capacity and Readiness), Section C (Challenges), and Section D (Institutional Practices and Recommendations). Each section presents relevant tables, figures, and descriptions derived from the analysis.

Background Information

Out of the 20 respondents, 75% reported no formal training in digital preservation, while 25% had received training. This indicates a significant skill gap within the workforce. The years of experience varied widely, with some respondents having decades of experience and others just entering the field.

Training in Digital Preservation

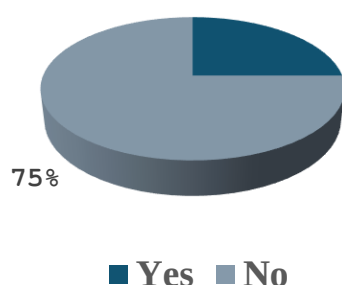


Figure 1: Training in Digital Preservation — Yes: 25%, No: 75%

Institutional Capacity and Readiness

Institutional readiness is mixed. Funding was perceived as insufficient by a large majority (50% disagreed or strongly disagreed). Infrastructure adequacy also received low confidence, with 60% in disagreement. However,

administrative commitment scored strongly, with 70% agreeing or strongly agreeing, indicating strong managerial support despite resource limitations.

Figure 2: Training rate of the respondents

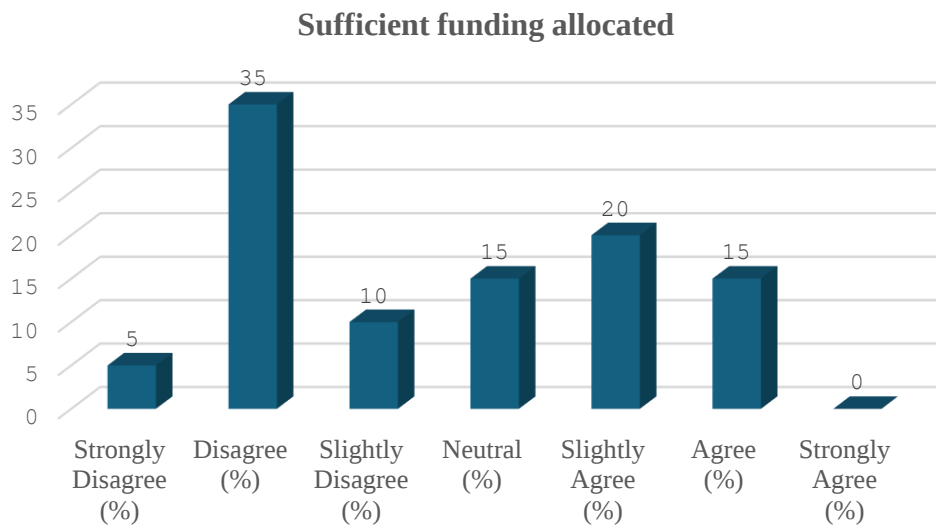


Figure 03: Results of agreement for funding allocation for digital preservation

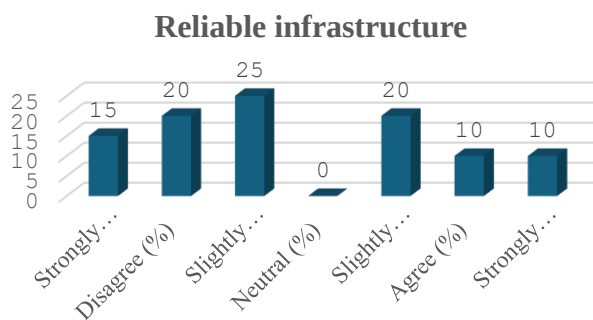


Figure 04: Results of agreement for reliable and adequate infrastructure for digital preservation

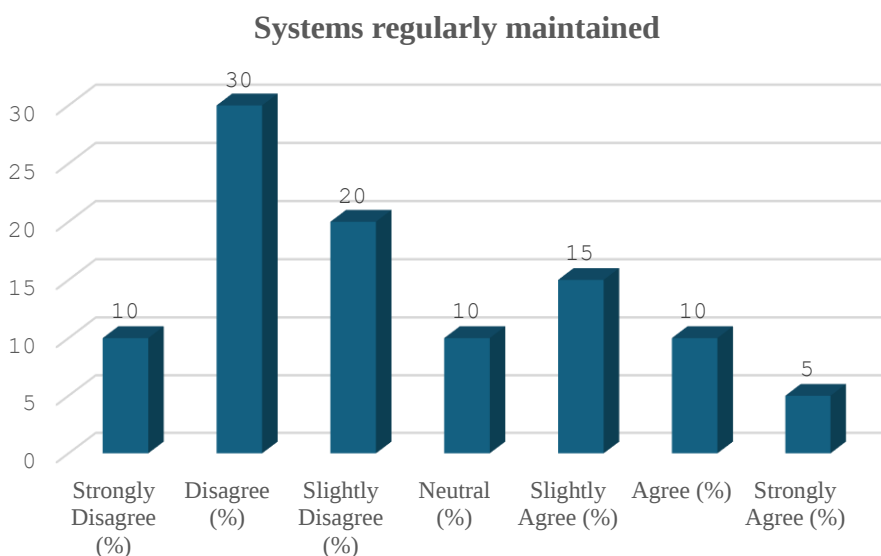


Figure 05: Results of agreement for maintenance of digital preservation systems

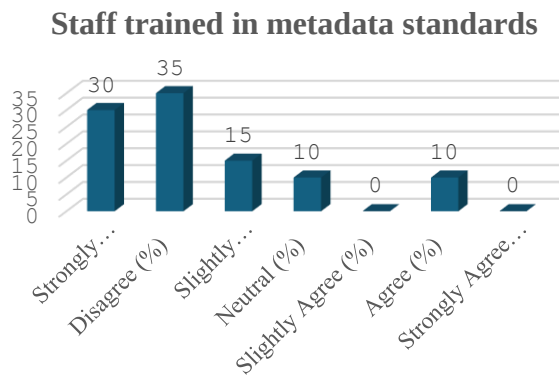


Figure 06: Results of agreement for metadata standards and data authentication

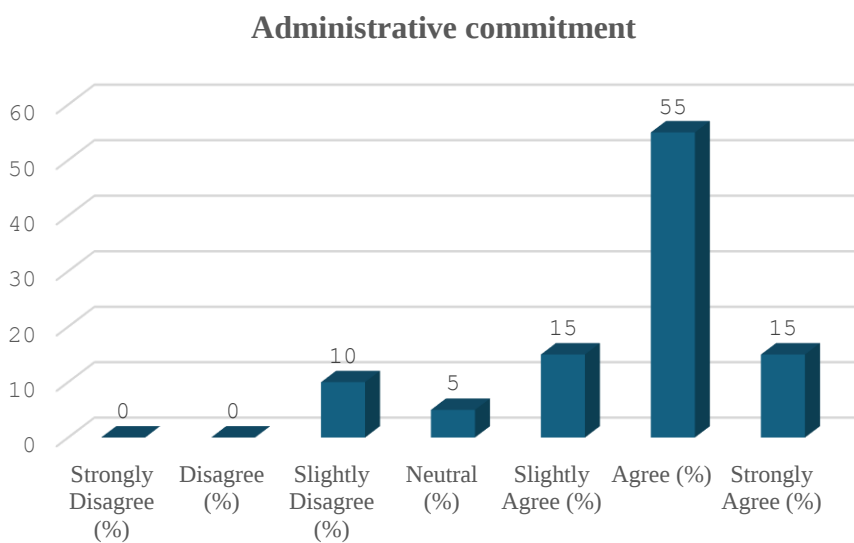


Figure 07: Results of agreement for administrative commitment to support digital preservation

Challenges

This section presents the barriers to digital preservation, highlighting technical, legal, and institutional constraints that limit effective implementation and long-term sustainability

Technical Barriers

Table 1: Technical Barriers

Technical Barriers	Yes (%)
Media deterioration	50
Technological obsolescence	65
Frequent power failures	45
Poor internet connectivity	55
Outdated hardware/software	60
Lack of backup/recovery systems	40

Description: The most prevalent technical challenges include technological obsolescence (65%) and outdated hardware/software (60%). Internet connectivity (55%) and media deterioration (50%) also emerged as significant barriers. These issues indicate the urgent need for hardware/software upgrades and strategies to address format obsolescence.

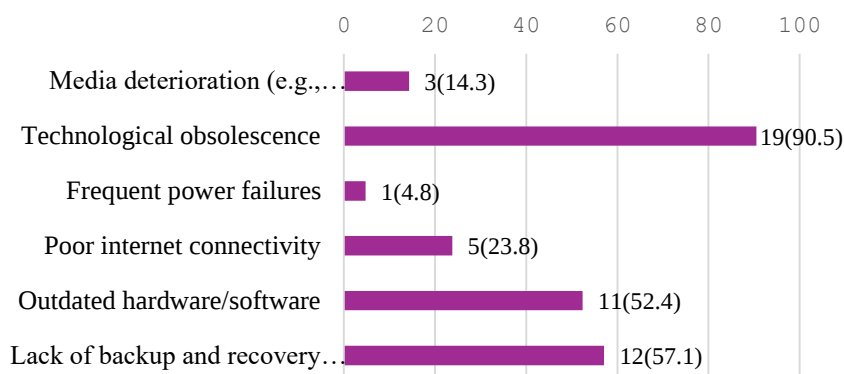


Figure 09: Mostly affected technical challenges for digital preservation

Legal Barriers

Table 4 summarizes the legal barriers affecting digital preservation.

Table 2: Legal barriers

Legal Barriers	Percentage (%)
Absence of national information policy	20
Unclear copyright for digital materials	25
Lack of institutional guidelines	20
Ownership rights issues	20
Others	15

Description: The most common legal challenge reported was unclear copyright regulations (25%), followed by the absence of a national information policy (20%) and lack of institutional guidelines (20%). These findings emphasize the urgent need for comprehensive legal frameworks to clarify ownership, access, and rights management.

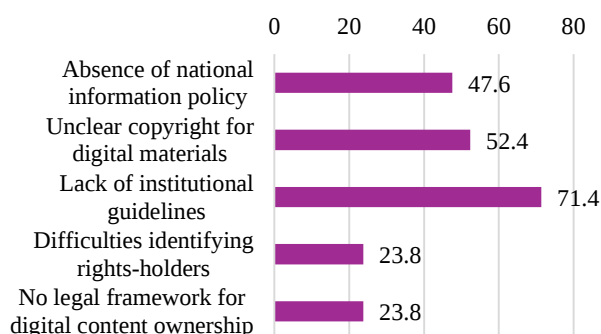


Figure 9: Mostly affected legal/policy related challenges for digital preservation

Skills Gap

Table 3: Skills Gaps

Skill Gaps	Percentage (%)
Metadata creation and management	15
Use of digitization software/tools	20
Data encryption/authentication	15
Virus and malware protection	5
Recovery and backup procedures	10

Description: Metadata creation (15%) and digitization tools (20%) were identified as the most significant skill gaps, followed by encryption/authentication (15%). Virus protection (5%) and recovery/backup (10%) were less common but still relevant. These findings highlight the importance of targeted training to close critical capacity gaps.

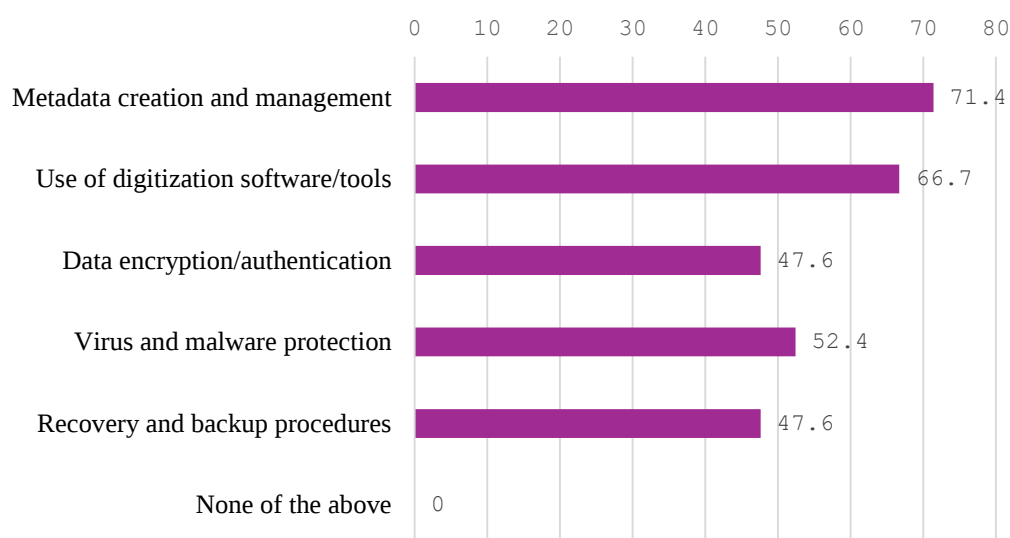


Figure 10: Lacking's of skills for digital preservation

Critical Challenges:

Table 6 presents the critical challenges to digital preservation, highlighting technological obsolescence, skills and training gaps, and poor infrastructure as the most pressing issues, followed by funding limitations and legal or policy constraints.

Table 4: Critical Challenges

Critical Challenge	Percentage (%)
Technological obsolescence	30
Lack of skills and training	25
Poor infrastructure	20

Lack of funding	15
Legal/policy issues	10

Description: Technological obsolescence (30%) was reported as the most significant challenge, followed by skills/training gaps (25%) and poor infrastructure (20%). Lack of funding (15%) and legal/policy issues (10%) were less frequent but still impactful.

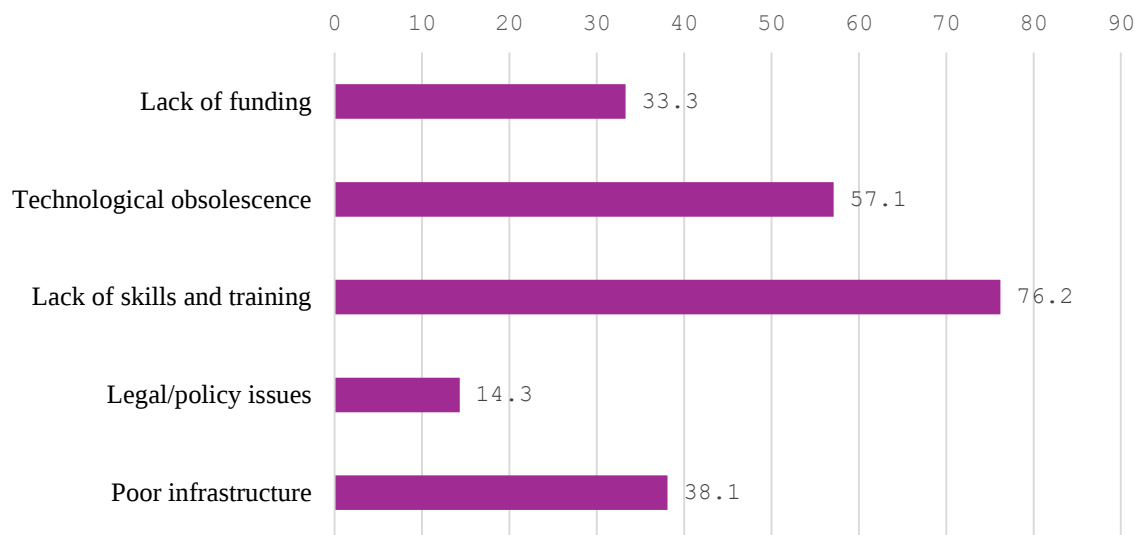


Figure 11: Most critical challenges for digital preservation

Institutional Practices and Suggestions

Recommended Support

Table 7 presents the recommended forms of support to enhance digital preservation, with technical training for staff and infrastructure improvement emerging as top priorities, followed by increased budget allocation, policy formulation, and external expert consultation.

Table 5: Recommended institutional support for enhancing digital preservation

Recommended Support	Percentage (%)
Technical training for staff	30
Improved infrastructure	25
Increased budget	20
Policy formulation	15
External consultation	10

Description: Technical training for staff (30%) and improved infrastructure (25%) emerged as the most highly recommended forms of support. Increased budget allocation (20%) and policy formulation (15%) were also identified as priorities. These recommendations outline a clear roadmap for strengthening institutional capacity.

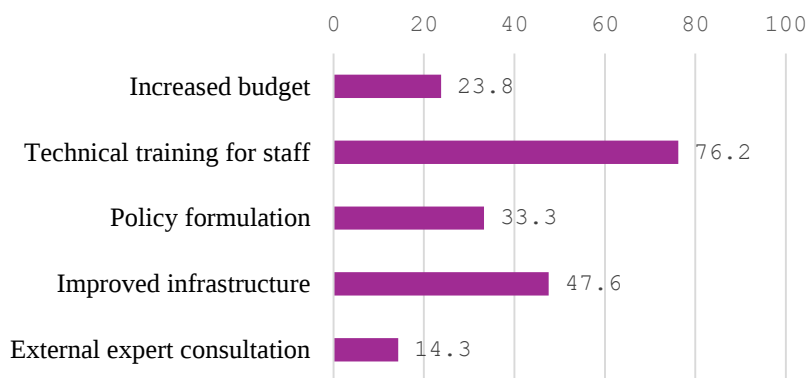


Figure 12: Recommendations to improve digital preservation

Strategies for effective digital preservation

Table 8 outlines the prioritized strategies for effective digital preservation, emphasizing training and recruitment of skilled personnel, the development of institutional policies, and regular upgrades of hardware and software, supported by improved security and backup systems, and collaboration with external bodies.

Table 6: Prioritized strategies for effective digital preservation.

Strategy	Percentage (%)
Train and recruit skilled personnel	30
Develop institutional policies	25
Upgrade hardware/software regularly	20
Improve security and backup systems	15
Collaborating with other bodies	10

Description: Training and recruitment of skilled personnel (30%) and developing institutional policies (25%) were top strategic priorities. Hardware/software upgrades (20%) and improving backup/security systems (15%) were also considered essential measures.

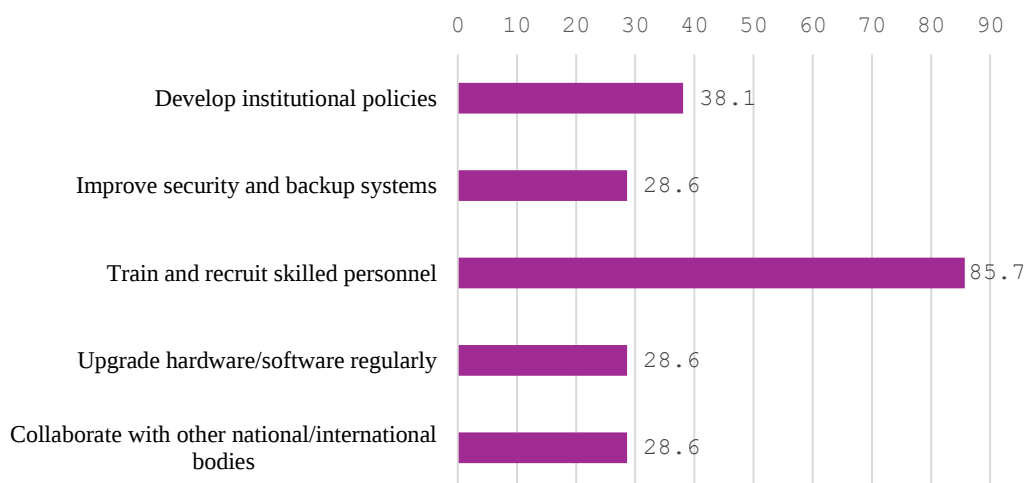


Figure 14: Recommendations to improve digital preservation

DISCUSSION

The results show that the National Archives of Bangladesh (NAB) has ongoing problems with both getting ready for and doing digital preservation on a daily basis.

Even though respondents said they saw administrative support; this hasn't led to enough operational capacity. Similar discrepancies between policy intent and execution have been noted in other developing contexts, characterized by institutional commitment that is hindered by scarce resources and inadequate infrastructure (Kalusopa, 2018; Muthoka et al., 2021).

A primary concern in this research is the deficit of qualified personnel. More than 76% of those who answered said that not having enough training was their biggest worry, and more than 80% said that they don't have the skills needed long-term digital preservation.

This indicates a substantial human resource deficiency and corresponds with Masenya and Ngulube (2019). My study finds that infrastructural issues are another big concern for digital preservation. The same findings are identified in another study of (Muthoka et al., 2021). My study results show that lack of metadata practices suffering a lot in digital preservation. Lack of policy makes the digital preservation of archives much more complexity. Ngoepe and Saurombe (2016) finds the same issues. Interestingly, in my study around 70% of those who answered said they got help from the administration. But my practical observation is different. Moreover, this study is important since it not only finds problems but also gives useful information that can change practice and policy right away. This study can help government agencies and archival institutions figure out what to focus on when it comes to digital preservation by giving them real-world examples of staff opinions, institutional capabilities, and legal gaps. You can use the results to make digital workflows and metadata standards, encourage a thorough approach to digital preservation, and offer training sessions that are tailored to your needs. Other Bangladeshi public institutions that want to analyze or improve their digital preservation efforts could also use this study as a guide.

RECOMMENDATIONS

Based on the findings of this study, the following recommendations are proposed to address the challenges of digital preservation in the National Archives of Bangladesh:

Implement Formal Training Programs:

Immediate investment in staff training on digital preservation standards, metadata creation, data authentication, and digital curation is essential. Training should align with global frameworks like OAIS, UNESCO guidelines, and IFLA/ICA principles.

Upgrade Digital Infrastructure:

The government and relevant authorities should prioritize upgrading servers, ensuring stable internet connectivity, reliable power supply, and deploying secure backup and recovery systems.

Develop a National Digital Preservation Policy:

A clear, standardized digital preservation policy is needed, incorporating legal frameworks, copyright guidelines, and records management protocols tailored to the Bangladeshi context.

Establish Regular System Maintenance Protocols:

The National Archives should institute regular audits and maintenance schedules for digital systems to prevent data loss and ensure long-term accessibility.

Promote Inter-Institutional and International Collaboration:

Collaborative efforts with national academic institutions, ICT agencies, and international bodies can help share knowledge, standardize practices, and access new technologies.

Introduce Emerging Technologies:

Explore and gradually adopt AI tools for digital sorting and access, blockchain for record integrity, and cloud-based systems for scalable storage, guided by pilot projects and feasibility studies.

Study Limitations

While this study gives us vital information about the problems with digital preservation in the National Archives of Bangladesh, it also has certain problems. First, the study included data from 21 archival professionals. This group was carefully chosen through purposive sampling, although it is still a small part of the total population. Because of this, the results may not be able to be applied to other institutions outside of the one that was researched. Second, the study only looked at the National Archives and didn't include any other records management or archive institutions in Bangladesh. This made its findings less useful. The study also only used numbers by using a standardized questionnaire. This made it possible to do consistent statistical analysis, but it limited the amount of qualitative knowledge that could have come from interviews or focus group discussions. Another problem is that the study relies on self-reported data, which could be affected by people's own views or biases, especially when it comes to judging how ready and supportive an institution is. Lastly, the study talked about new technologies like AI and cloud computing, but it didn't actually test how feasible or useful they would be in the local archiving setting.

Future direction

The results of this study point to several new areas of research and practical actions that can be taken in the field of digital preservation in Bangladesh and other underdeveloped nations. A mixed-methods technique, which combines quantitative surveys with qualitative interviews, could be used in future studies to learn more about problems related to context and policy. Including university libraries, museums, and other government repositories in addition to the National Archives would give us a better idea of how ready the country is to preserve its digital information. Also, in-depth appraisals of new technologies like artificial intelligence, blockchain, and cloud computing in the context of the local infrastructure could help people decide whether to use them. It would also be possible to do longitudinal studies to see how training programs, policy changes, and system upgrades affect things over time. Also, studies that compare nations with similar social and economic conditions may assist in finding the best ways to do things and encourage cooperation between countries in the same region for long-term digital preservation projects.

CONCLUSION

The results of this study show how urgent it is for the National Archives of Bangladesh to develop ways to better preserve digital records. Even though more people are aware of the problem and there is administrative support, the institution has trouble because of limited infrastructure, staff who aren't trained well enough, and a lack of a consistent national strategy. Lack of metadata knowledge, inconsistent system maintenance, and outdated technology were all seen as serious obstacles to long-term digital continuity. Using international standards like OAIS and new technologies like AI, blockchain, and cloud-based solutions could greatly improve the ability of institutions.

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