

# Preservation and Management of Archival Records in the Digital Era: A Study of National Archives Practices in Sub-Saharan Africa

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## Abstract

*The digital age has presented immense reforms on conservation and management of historical documents, more significantly in the national archives in Sub-Saharan Africa. This paper describes the modern-day archiving practices, policies and technology of the national archives to preserve the physical and electronic records in the ever-growing digital world. It examines the challenges that face archival organizations, including the lack of financial resources, poor technical systems, the lack of skilled staff, and the issues of digital obsolescence and data security. The report noted the advantages of digital technologies, which include enhanced access to historical objects, enhanced preservation processes, and enhanced efficiency in record management. A mixed-methods approach included qualitative and quantitative research methodology, i.e., document analysis, policy review, and case studies of selected national archives in Sub-Saharan Africa, to acquire data. The results indicate that although the digital preservation programs are slowly under development, the implementation of the projects does not proceed uniformly in the entire region because of variation in funding, policy framework and technological preparedness. The paper has*

*highlighted the need to develop holistic digital preservation policies, capacity building, as well as regional partnerships, and conducive government policies to ensure the sustainability and accessibility of archival records in the long run. This research contributes to the body of knowledge on the management of archives in poor nations. It provides valuable insight into the policymaker, archivist, and information worker in enhancing the digital age archives.*

**Keywords:** Preservation and Management (P&M), Archival Records (AR), Digital Era (DE), National Archives Practices (NAP), Africa (AA)

## Introduction

As with the development of digital technologies, the management and preservation of academic archival records have been a significant topic of research for national and internal archives in Sub-Saharan Africa (Lawson, 2024). As we know, in the digital era, many societies, institutions, as well as government agencies significantly depend on the digital information systems for accountability, memory, and administration; therefore preservation and management system of archival records should be effective and consistent (KACHOTA, 2023). With the development of digital systems, the archival records system is no longer restricted to paper-based documents only, but it also involves digitally born materials, including digitized heritage collections, emails, audiovisual files, and databases

(Mnjama, 2023). While after collecting research from Africa we come to know that as digital technologies presents various opportunities for preservation and management of documentary heritage and enhance access, but it also presents more complicated organizational, technical, and other challenges related to policies for national academic archives (Ngoepe et al., 2024). So, we can say that an effective digital management and preservation system is not only a technical work but an institutional and strategic responsibility which demands skills development, long-term planning, as well as consistent, sustainable investment. Apart from this, documentary heritage in the African regions is weak, particularly due to the historical circumstances such as limited resources, climatic conditions, and administrative legacies, which increase the weakening of physical archival records (Erima and Garaba, 2024).

National archives are now demanding to preserve and manage a hybrid environment with the rapid development of e-government and digital governance initiatives, where digital records and analogue records exist at the same time. National archives in southern and eastern Africa were designed originally to manage only paper-based records, and that is why struggling to adapt their infrastructure, professional practice and mandates to digital realities (Zimu-Biyela, 2022). This condition has made digital management and preservation a significant issue among management and policy issues. Because the failure to preserve and manage electronic data effectively can cause permanent institutional memory and data lose as well as it will also weaken accountability and transparency mechanisms (Mutsagondo and Ngulube, 2023). National archival in Sub-Saharan Africa are rapidly engaging in digital preservation initiatives and digitization as a reaction of pressures. Mostly digitization is followed to enhance better access to the resources, increase public engagement, and protect fragile originals with archival collection (Ngoepe, 2023). National archival institutions of the public sector in South Africa are directed by regulatory and legislative frameworks that identify digital archival records as public official records, but the implementation still remained irregular because of fragmented and capacity constrains systems. Even though various legal framework is present in several Sub-Saharan African regions for the preservation and management of historical

records, the progress of digitization seems uneven and slow in Africa. Apart from this, if we talk about the national archives in Zimbabwe, constrains related to limitations of specific technical expertise and funding have limited the preservation and management of archival material and systematic digitization process (Balogun, 2023). All these challenges imitate a wide range of institutional and structural weaknesses which have continuous influences on the preservation and management of archival material and digital preservation policies across the African region. While donor supportive initiatives and international partnerships are positively impacting digital preservation and management efforts in various parts of Sub-Saharan Africa (Musyoka et al., 2023). Moreover, through external assistance, various national archival authorities, including Namibia, are now able to implement a modernized digitization process, enhancing digital preservation and management conditions and upgrading personnel competency in documentary preservation (Chowdhury et al., 2023). While these relationships show the possibilities of the collaborative approach to solving capacity-related and infrastructure challenges, and the reliance on external funding presents problems of sustainability when the cycles of donor-funded projects end. As a result, there is a growing focus on the need to create community-driven approaches to digital preservation that support institutional requirements, national policies, and long-term resource planning in recent African scholarship (Mosweu, 2023). The extensive use of digital technology in governmental institutions has produced an enormous number of electronic documents.

However, these documents are infrequently documented, evaluated, or relocated to national archives in an organized way. The insufficient adoption of electronic records management systems reduces the archival control and increases concerns of long-term authenticity, integrity, and reliability of digital records over time (Tsvuura, 2022). The same can be said about South and East Africa, where poor appraisal systems and inconsistent metadata standards are hampering sustainable digital preservation and management in Africa. Another persistent challenge that the archival record management has been facing nowadays is the shortage of skill development in staff training (Hofman and Katuu, 2023). Archival training and

education in many Sub-Saharan African countries have traditionally focused on the paper-based record management techniques. Which leave a little exposure to the introduction of digital curation, long-term management and preservation planning. Despite the presence of digitization technologies, this kind of gap in skills development restricts the capability of archival organizations to maintain and design comprehensive digital preservation and management programs (Bishi and Ngoepe, 2024). Therefore, there is an urgent need to strengthen professional competencies via curriculum reform, continuous training, and through regional knowledge-sharing techniques for the development of digital archival practice. Technological sustainability and infrastructure further pose various challenges to preservation efforts (Luthuli, 2022). Preservation and management of archival records is very important in preserving the administrative, cultural, and historical records of a country. The records of government activity, legal rights, collective memory, and socioeconomic progress are contained in national archives. The digital era has dramatically changed the nature of record creation, preservation, and access, posing new opportunities and problematic issues to the archival institutions across the globe. Due to the rapid development of digital technologies, records are created and maintained differently. The production of electronic records, including emails, databases, digital photographs, and audiovisual property, is rapidly growing among governments. Even though digital records have the advantages of being easy to access, store and allow more information to be shared, there are threats of technology obsolescence, data security, data validity and long-term preservation. The consequence is that the national archives have to change their preservation patterns, which were common before, to be able to take proper care of both physical and online documents. There are unique issues with digital change in national archives in Sub-Saharan Africa. Most archival organizations operate under low financial resources, poor technology infrastructure, and poor competent personnel. Environmental conditions, including humidity and temperature, harm the maintenance of the physical records, and the unstable digital systems pose a threat to electronic materials. Despite these challenges, digital technologies promise enormous potential to enhance access to archival collections, protect the disintegrating

records and enhance transparency and accountability in the government. High price of digital storage solutions, unreliable electricity supply, and limited internet connectivity make long-term maintenance of digital records more complicated. However, even with these limitations, digital transformation presents considerable changes to significantly improve archival preservation and management (M'kulama and Bwalya, 2024). The digitization has the potential to increase access to archival collections among researchers, as well as students and other members of the general public in areas in which physical access is restricted. Digital preservation is also more aligned with more inclusive and decolonized practices in capturing indigenous knowledge systems, oral histories and marginalized communities. These initiatives should always focus on ethical considerations and community engagement (Odhiambo, 2018).

### **Problem Statement**

The national archives in Sub-Saharan Africa are tasked with the responsibility of maintaining and managing documents that capture the activities of governments, legal entitlement, cultural heritage and the national memory. The rapid growth of the electronic records and digitalization programs in the digital age has posed significant challenges to the archival institutions. The national archives in many countries find it difficult to preserve, secure and make digital and physical resources accessible in a sustainable manner. Although the role of digital preservation is increasingly being recognized, occasionally, due to the constraint of finances, lack of technological resources and competency of staff, archival activities in Sub-Saharan Africa are faced with some challenges. Most of the archive institutions do not have advanced digital preservation tools, established metadata standards, and reliable storage facilities, which increases the chances of information loss, degradation, and technological obsolete. Moreover, the existence of the traditional archival documents is still threatened by climatic factors and insufficient physical storage facilities. The policy and regulatory systems of several Sub-Saharan African states are old and are not sufficient to handle electronic data. Difficulties in carrying out digital archival programs are caused by the absence of clear national regulations of digital preservation and the lack of institutional coordination. Moreover, the issues of data safety,

credibility and access to digital documents in the long term are largely unanswered. Despite the opportunities presented by digital technologies to enhance the availability of information, transparency, and efficiency in archives, there are still several national archives in the region that are not fully fulfilling their potential. Empirical studies that investigate the responsiveness of national archives in Sub-Saharan Africa in a systematic manner, the challenges they face or the strategies that they employ towards managing digital data, are scarce. Consequently, inadequate and imbalanced ability of the national archives in Sub-Saharan Africa to preserve and manage historical records effectively during the digital age is the major problem to be tackled by this research. This is one of the problems that should be addressed to maintain cultural heritage, further governance, and guarantee the long-term availability of archive records.

## Literature Review

Preservation and management of archival records in the digital era have become one of the most emerging research topics from recent years. In this research literature researcher investigated the preservation and management of Archival records in the Digital Era. Recent research on the archival records management and preservation in Sub-Saharan Africa emphasize on the fast transformation in the archival landscape in the digital era. This paper investigates both persistent structure challenges and opportunities created by digital technologies within national archival institutions in Sub-Saharan Africa. Several research has been collected over Eastern, Western, and South African contexts, which highlight how legal frameworks, digitization, skill gaps, governance issues, and infrastructure deficiencies shape digital records preservation and management practice in Sub-Saharan Africa. An increasing amount of literature collected from South Africa has focused on the urgent need of developing comprehensive digital preservation and management policies within institutions of the public sector (Uutoni, 2024). Researchers highlighted that the development of digital information within corresponding competencies and policies has left many archives in government sectors susceptible to loss, compromised integrity, and fragmentation of records over time. Researchers have found that even though the increasing prevalence of digital records due to the

enlarged application of information and communication technologies, national departments usually do not have adequate preservation knowledge (Shajitha, 2020).

Formal frameworks are either inadequate or lacking in most cases, and this limits the capacity of archival authorities to ensure long-term availability, authenticity and accountability of the public records in a digital environment. Scholars of South African academic and heritage collections have demonstrated the connection between digital preservation, institutional policies and infrastructure (Mosweu, 2022). A study conducted in South African academic libraries discovered that the majority of the institutions are aware of the role of digital preservation and have introduced formal programs. However, they are still facing the challenges of limited resources, staff skills, and technology. It was observed that despite the existence of commitments, practical implementation lagged due to the weak in-house policies, little management support and ineffective cooperation with the external partners (M'kulama et al., 2023). These problems were reflected by wide-ranging archival issues within the government sector, where digital-preservation commitments are made on paper but do not have any real operational underpinning. To these observations, a study conducted on the digitization of records in state universities of Zimbabwe highlighted the same institutional problems. Researchers concluded that digitization requires firm organizational support, technology, and leader commitment (Soita et al., 2024). It also showed that ambiguous legal frameworks, inadequate budgets, and underdeveloped technology infrastructure were the biggest challenges to digitization of the process and subsequent management of the records. Researchers have examined that the process of digitization without supporting laws and work training results in fragmentation of work, which reduces the sustainability and integration of digital records with the larger archival framework (Matlala and Maphoto, 2022).

In addition to institutional policies, the broader research context in Sub-Saharan Africa demonstrates the fact that the research on archives and records management has developed at a slow pace, that is lagging behind other areas in the field of information science. An interpretive study of archival research trends in the region has shown that scholarly work in archival and records-management

is still understated, particularly in terms of digital transformation projects (Shepherd, 2012). The authors believe that such a lack of focus on research does not contribute to developing theories or strategies that are more specific to the regional context, and thus insist on the need to develop research training, networking, and sharing of perceptions between African archival professionals and African scholars. When considering particular types of materials, studies of archival audiovisual collections in Botswana reveal that technological constraints and staff shortages are the main barriers to efficient management (Akabwai et al., 2023). The research paper finds a lack of strong legislative support, a lack of capacity in staff, limited storage space and perceptual biases against audiovisual materials as compared to other types of records.

Although the research was carried out before large-scale digitization, the researchers argue that these initial concerns will always inform future events to digitize and preserve these types of materials in digital forms. The policy gaps have been associated with continuing skill and training shortage of archival authorities. As various studies emphasise traditional archival training programs in most Sub-Saharan African contexts focused on the management of analogue records, have left archivists unprepared to perform the various functions of digital curation, metadata management, and digital forensics and long-term digital preservation planning (Deschaine and Sharma, 2015). The authors note that the lack of these skills hinders the development and implementation of sustainable digital preservation policies, especially in the context where technological investments have exceeded the capacity for development. In regional literature, limitations of infrastructure remain a major challenge. It was highlighted that limited broadband connectivity, unstable power supply, and expensive digital storage solutions reduce the preservation sustainability (Kiplang'at and Keah, 2024).

As a result, researchers propose the idea of investing in scalable and resilient infrastructures, which are supported by formal policy commitments and the overall risk-management plan. Scholars also believe that digital preservation efforts could help in decolonizing archival histories through the incorporation of marginalized perspectives, so long as ethical and community-based practices inform digital practices. In short, the literature review on the issue of archival preservation and management

in the digital age in Sub-Saharan Africa demonstrates that the region has been facing an extreme pace of technological change in the face of continuing structural limitations (Ngoasheng et al., 2022). Researchers regularly claim that digital preservation has powerful potential to preserve documentary heritage and provide wider access. However, long-term success is preconditioned by the combination of measures focused on a solid legal framework, development of professional capacity, investment in infrastructures and contextualism. This literature highlights the importance of big organizational change, strategic partnership and long-term commitment by institutional leaders, policymakers, and archival communities throughout the region in order to develop long-term digital preservation in national archives.

## Methodology

This paper utilizes the mixed-method research design to explore how archives are preserved and administered in the digital era with reference to the national archives in Sub-Saharan Africa. The mixed-methods paradigm involves the integration of qualitative and quantitative interventions in order to give an in-depth insight into the quantifiable tendencies, as well as small-scale practices that have been related to digital archive preservation. The research design is a descriptive and explanatory research design. The extent of digital preservation plans, presence of infrastructure, human resources and funding trends in sampled national archives are assessed through the use of quantitative methods. In these institutions, experiences, attitudes, difficulties, and policy implementation processes are investigated with the help of qualitative approaches. To select national archives in a variety of countries across the region and to guarantee regional diversity, as well as the level of technological change, a purposeful sampling strategy is applied, thereby selecting national archives of several countries within the Sub-Saharan African region.

## Data Collection Methods

The quantitative data on the completion of structured questionnaires are collected among archivists, records managers and ICT professionals in the national archival institutions. The data gathered in the questionnaires is related to

digitization endeavors, digital storage systems, preservation instruments, personnel preparation, funding distribution, and access protocols. Quantitative data are analyzed using descriptive statistical techniques to identify trends and patterns among institutions, e.g. frequencies and percentages.

The collection of qualitative data is based on semi-structured interviews and analyses of documents. Interviews offer ample knowledge regarding institutional initiatives, regulatory frameworks, decision-making, and real-life challenges such as digital obsolescence, data security, and sustainability. Document analysis

involves the review of the policies of archives, regulations, strategic plans, annual reports and global best-practice guidelines on digital preservation.

The phenomenon of case studies in selected national archives is applied to combine both qualitative and quantitative findings. The case studies are centered on digital infrastructure, preservation, metadata standards, digitization projects and access systems by users. The process of data integration occurs at the stage of interpretation; the quantitative and qualitative results are compared to obtain a complete overview of the archival management procedures (Figure 1).



Figure 1: Digital Preservation.

### Smart PLS Algorithm Model

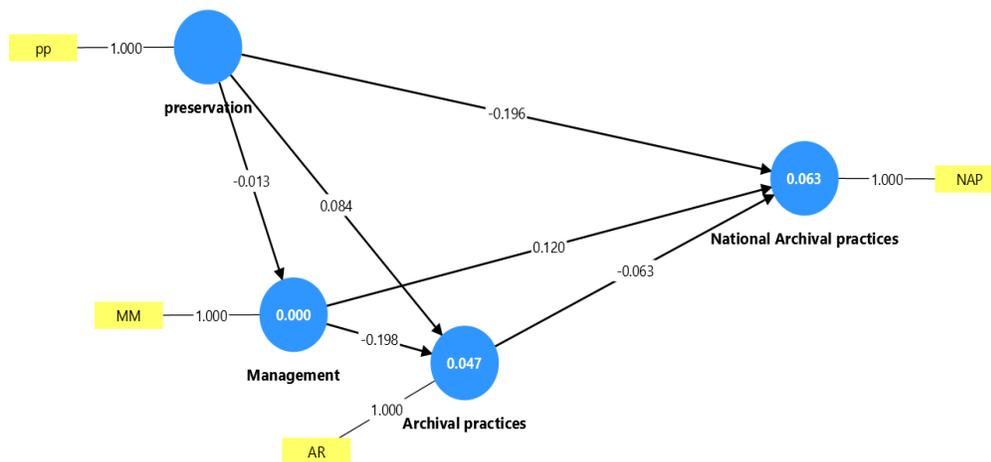


Figure 2: Smart PLS Algorithm Model.

The above model of figure 2 represents the smart PLS Algorithm model in the preservation and management of archival records in the digital era.

The preservation shows that -0.013 is negative, but its significant link with management.

The management shows that 12% positive and the most significant relation with national archival practices. Similarly, the archival practices also show that 8% positive and significant link with preservation.

## Descriptive Statistic Analysis

**Table 1: Results of Descriptive Statistic Analysis.**

| Name | Mean  | Median | Scale Min | Scale Max | Standard Deviation | Excess Kurtosis | Skewness | Cramér-Von Mises P-Value |
|------|-------|--------|-----------|-----------|--------------------|-----------------|----------|--------------------------|
| pp   | 1.540 | 1.000  | 1.000     | 3.000     | 0.607              | -0.453          | 0.672    | 0.000                    |
| MM   | 1.640 | 2.000  | 1.000     | 3.000     | 0.686              | -0.701          | 0.622    | 0.000                    |
| AR   | 1.640 | 2.000  | 1.000     | 3.000     | 0.656              | -0.641          | 0.553    | 0.000                    |
| NAP  | 1.660 | 2.000  | 1.000     | 3.000     | 0.620              | -0.612          | 0.395    | 0.000                    |

The above result of table 1 represents that descriptive statistic analysis result shows that mean values, median rates, and the standard deviation value also explain the skewness value of each variable. The PP shows that the mean value is 1.540 the standard deviation rate is 60%, respectively. Similarly, the mean value of management is 1.640, the standard deviation rate is 68% result shows that

the overall significant value of 0.000, shows 100% significant levels between them.

The AR stands for archival records result shows that the mean value is 1.640, and the standard deviation rate is 65% deviate from the mean. The NAP represent that the mean value is 1.660, the standard deviation rate is 62% deviate from the mean.

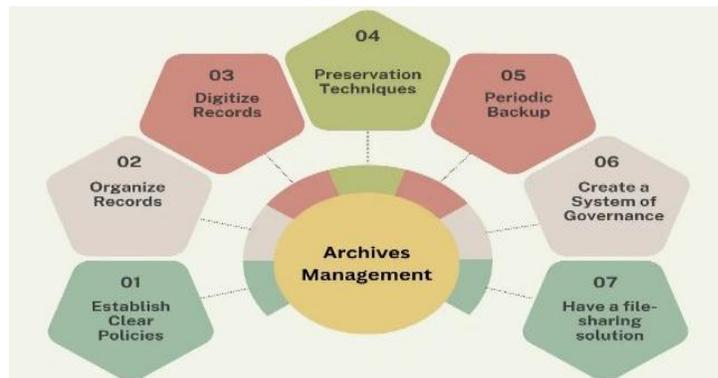
## Correlation Coefficient

**Table 2: Results of Correlation Coefficient.**

|     | pp     | MM     | AR     | NAP    |
|-----|--------|--------|--------|--------|
| pp  | 1.000  | -0.013 | 0.086  | -0.203 |
| MM  | -0.013 | 1.000  | -0.199 | 0.135  |
| AR  | 0.086  | -0.199 | 1.000  | -0.104 |
| NAP | -0.203 | 0.135  | -0.104 | 1.000  |

The above result of table 2 demonstrates that correlation coefficient analysis between them overall result shows some positive and some negative links of preservation and management of archival records in the digital era. Archival record preservation and management have become increasingly significant in the digital age to facilitate conducting research, education, cultural identity, and democratization. Good online archival systems enable researchers and the general population to get historical and administrative information beyond geographical barriers, which encourages the sharing of knowledge and civic engagement. Digital

archives that are well managed could assist governments in making evidence-based decisions and ensuring continuity of the institution. In this study, the author is interested in national archives in Sub-Saharan Africa to explore the existing practices, challenges, and opportunities in the field of digital archives preservation and management. The research would enhance the comprehension of the potential of archive institutions in developing nations to increase their ability to preserve and manage records sustainably in the digital age by examining institutional strategies, policies, and technology methods (Figure 3).



**Figure 3: Management of Archival Records.**

## **Applications of Digital Preservation and Management of Archival Records:**

### **Enhanced Access to Archival Information**

The increased access to archival records is one of the most significant uses of digital preservation in national archives. Digitized archives make it possible to access historical documents, government documents, and cultural heritage materials remotely without being constrained by geography and space. In Sub-Saharan Africa, where distance and infrastructure often limit access to national archives, digital platforms enable academics, students, policymakers, and the general population to find information online. This increased access brings about scholarly research, policy-making based on facts and general knowledge of national history.

### **Long-Term Preservation of Cultural Heritage**

The digital preservation technologies are valuable in safeguarding the decaying and fragile archival items. Several national archives in Sub-Saharan Africa have records that are sensitive towards environmental conditions, including humidity, heat, pests, and ineffective storage conditions. With digitization, there is no need to touch an original paper regularly, which reduces its physical damage. Digital archives, when properly handled, hold invaluable cultural, historical and administrative information that generations to come can use to define the country and develop a sense of national identity.

### **Improved Records Management Efficiency**

Management of digital records enhances the effectiveness of the archival activities. Digital cataloguing tools and electronic document management systems (EDMS) facilitate the operations that are carried out in streamlining the process of record classification, indexing, retrieval and disposal. These solutions enhance the management of the workflow within national archives and save time on the search for records. Effective management of records facilitates transparency as well as accountability in government institutions, as records are well-

maintained and easily accessible whenever required.

### **Support for E-Government and Public Administration**

Digital archive systems are useful in the projects of e-government since they provide a reliable platform to store electronic information that government agencies produce. The national archives play an important role in guaranteeing the integrity and validity of digital government information safety. In Sub-Saharan Africa, where a large proportion of governments are switching to digital administration, electronic documents are archived, which facilitates legal processes, audits, policy reviews, and continuity of administration. This application is a democratic government and institutional memory.

### **Disaster Recovery and Disaster Risk Reduction**

One of the tools that can be used in managing the risk of disasters in the presence of archive institutions is digital preservation. Natural disasters, political unrest, fire and flooding mostly threaten physical archives across Sub-Saharan Africa. On-site and digital backup systems are also great options for securing records in case of a complete loss. Digital records can help archives rapidly regain access to vital information in the event of a calamity and provide assurance that the services will continue and that important documents will be preserved.

### **Fostering Research and Academic Development.**

Major contributions to research and teaching are made by digitized collections of archives. Historians, social scientists, lawyers, and development scholars make significant use of archival materials. Digital access to African archive resources facilitates multidisciplinary research and collaboration between scholars all over the world by enabling international researchers to access those resources. Digital archives allow universities and other research institutions in Sub-Saharan Africa to develop curricula, theses, and knowledge without being constrained by physical access.

### **Capacity Building and Professional Development.**

The application of digital preservation steps

provides new opportunities to archivists and information professionals to develop their skills. Professional skills are enhanced through training in digital curation, metadata standards, digitization processes, and information technology. Digital technologies regularly have national archives collaborate with other foreign organizations to offer training and technical assistance. This program assists in creating qualified personnel who will be able to operate the modern archiving systems and will be able to respond to the technological changes.

### **Economic and developmental Applications.**

Digital archives aid in the growth of the economy because they support sectors such as tourism, journalism, publishing, and the creative industries. Documentaries, exhibitions, and educational material can be made out of digitized historical pictures, papers, and audiovisual resources. Sub-Saharan Africa is known to be a region where digital heritage resources promote cultural tourism and get the attention of the world. Moreover, good archival management will lead to the planning of development by availing historical data that is needed to make sound decisions.

### **Law and Human Rights Publications**

National archives are useful in preserving legal documents and records on human rights. The judicial documents, land ownership and historical legal texts that are digitally stored can give power to

the justice systems and protect the rights of the citizens. Archives are also used in Sub-Saharan African post-conflict or transitional cultures, where archives act as warehouses of truth in the form of evidence during the truth process, restitution, and legal claims. Digital preservation helps to secure such records, ensuring that they are authentic and available easily over time.

### **Local and Global Cooperation**

The cross-border access of archival collections is possible on shared digital platforms and standardized metadata. The cooperation on the regional level facilitates the sharing of knowledge, harmonization of the archive standards, and joint preservation. International collaborations also help in providing funds, technical experience and policy orientation, hence improving the digital archiving ecosystem.

### **Publicity and Community Relations**

Digital archives enhance participation of the people as they help in making archived information more visible and interactive. The digital storytelling, online exhibitions, and educational portals encourage the community and their historical knowledge. It is due to digital media that archives are becoming more relevant and appealing to the younger generations. It is an application that promotes civic education, cultural awareness and national pride in history (Figure 4).



**Figure 4: The Digital Archival Lifecycle.**

## **Discussion**

The results of this study demonstrate both

gains and challenges of the digital preservation and management of the archival records within national archives in Sub-Saharan Africa. The application of

digital technologies has started to transform the archiving process by improving the process of record access, performance and permanence. However, the level of implementation between institutions is highly diverse, as the inequalities are manifested in the resources, policy provision, and technical capacity. Among the main issues that have been brought up is the divide in digital infrastructure between national archives. Some institutions have constructed digitization units and electronic records management systems, but others still use mainly the old paper-based methods. This difference decreases the efficiency of the development of regional archives and highlights the necessity of combined national and regional digital preservation projects. Results of the study are in tandem with the past studies, which have proposed inadequate funding and infrastructure as critical challenges to sustainable digital preservation in developing nations.

The discussion also shows how policy/regulatory frameworks affect the practices of archiving. In most places, old regulations of the archives do not deal well with the management of digital records, which creates a ambiguity in accountability, authenticity, and long-term preservation strategy. In the presence of enabling policies and national digital programs, archives rely more on formal methods of managing electronic records. This means that the change in legislation and the alignment of policies is essential to achieve better digital archive systems. The other factor that seems to be pertinent in attempts made to preserve digitally is human capacity. The study has indicated that there is a shortage of trained archivists and information technology experts to facilitate the effective adoption of digital programs. Though training programs and international alliances have served to develop skills in some of the archives, they are not enough to support the growing technological needs. Ongoing professional development and inclusion of digital preservation training in archive training are hence critical. Digital obsolescence and data security are among the key issues.

The use of untrustworthy storage technologies, the absence of regular backups, and a weak cybersecurity system increase the risk of losing data. These issues outline the importance of adopting internationally agreed standards and best practices of digital preservation. The discussion

reinforces the need to plan over the long term and to have sustainable funding structures for digital endeavours to prevent them from being a mere response to a short-term crisis instead of being a lasting system. In general, the paper demonstrates that digital preservation can offer immense opportunities to improve access, safeguard cultural resources, and advance governance in Sub-Saharan Africa. However, to harvest all these advantages requires a collective effort, which involves commitment by the government, reformulation of policies, investing in infrastructure and developing capacity. The discussion highlights the need to have a holistic approach integrating technology, policy, and human resources to ensure that historical data is maintained in the digital age.

## Conclusion

This paper examines the conservation and management of archives in the digital era and specifically national archives in sub-Saharan Africa. The results demonstrate that digital technologies can significantly enhance the practices in the archives with the opportunity of increasing access to records, enhancing long-term preservation, and improving the effective management of records. However, the article also concludes that the adoption and success of digital preservation project is not consistent throughout the region. The Sub-Saharan African national archives are faced with a heavy workload, scarce financial resources, poor technological infrastructure and evolving policy frameworks.

Although there are institutions that have made giant steps towards digitization and management of electronic records, there are still numerous institutions that use traditional methods due to funding issues and their inability to use technology. These disparities explain why investment and planning should be long-term so that the digital transformation of archival institutions is possible. The research paper proposes that the management of digital archive data depends on the implementation of policy and legislative support. Obsolete archival legislation and ineffective administrative systems hinder the capability of national archives to effectively preserve electronic records, besides their authenticity, integrity, and accessibility over time. With well-developed policies and national digital strategies, archives demonstrate better institutional coordination and preservation processes that are more sustainable.

The development of the human capacity is another key dimension that was identified in this study. This is because of the dearth of skilled archivists and information technology specialists that makes it harder to preserve documents digitally. It needs constant training, professional development, and integration of digital preservation skills in the education of the archives to ensure that the archives have a strong and stable system that can withstand changes in technology. Lastly, challenges and opportunities of preserving and managing historical records in the digital era are facing national archives in Sub-Saharan Africa. With sufficient funding and advance policies, trained staff and proper technology infrastructure, digital preservation projects are capable of preserving cultural assets, facilitating transparency, and research and administration. The paper presents the need to have a long-term and integrated strategy that incorporates governmental devotion, institutional cooperation, and international support to make archival systems sustainable and efficient in the digital era.

## Recommendations

1. Coming up with Comprehensive Digital Preservation Policies: Sub-Saharan African governments should formulate and revise archive policies and legislative frameworks to address the problem of digital record management. To these, these policies should set clear policies about digitization, metadata generation, storage, retrieval and long-term preservation. Conformity of the national policy to international standards of archives enhances consistency and sustainability.

2. Greater investments in funds and infrastructure: Digital preservation programs need to be implemented successfully and with sufficient and continuous funding. The governments and funding authorities must emphasize the investment in reliable digital infrastructure, i.e., servers, backup systems, and safe storage facilities. Financial assistance ought to cover maintenance costs in order to ensure the system is viable in the long run.

3. Capacity Building and Professional Training: Archivists and records managers are expected to receive continuous training on digital preservation and information technology. The development of the skills and the sharing of knowledge can be achieved with the help of partnerships with colleges, professional bodies, and foreign organizations. Digital archive techniques

will become more effective with the development of human capacity building.

4. Embracing Standardized Technologies and Best Practices: National archives must adhere to the international standards of digital preservation and metadata, as well as records management. The interoperability, data security and long-term access to the archive materials across the institutions will be enhanced through the utilization of standardized tools and workflows.

5. Facilitating Regional and International Cooperation: Ask national archives to have resources, knowledge and best practices. Technical support, funding, and policy guidance can be provided by international relations, which leads to the development of the digital age of archival preservation.

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