

THE INTERNATIONAL JOURNAL OF BUSINESS & MANAGEMENT

Challenges of Digital Preservation of Information: A Case of Kenya National Archives and Documentation Service, Kenya

Nthoki Jane Muthoka

Master Student, Department of Information Science, School of Information Science and Technology,
Kisii University, Kenya

Dr. James Ochieng Ogalo

Lecturer, Department of Computing Science, School of Information Science and Technology,
Kisii University, Kenya

Dr. Jotham Wasike

Senior Lecturer, Department of Pure and Applied Sciences, Kirinyaga University, Kenya

Abstract:

Across the world an increasing number of organizations face national and institutional obligations in relation to collection and preservation of digital objects. Digital preservation is a major problem facing information centers all over the world. Most of information centers in the third world countries are faced with issues in digital preservation of information.

With the advancement of digital technologies, computer-based apparatus has become dominant forces to shape and reshape record systems and services. The application of information technologies in record management and services have become key to satisfying ever changing complex information demand and expectation of users at Kenya National Archives and Documentation Service (KNADS). The application of digital preservation has been confronted with a number of challenges such as, Media Deterioration, technological obsolescence, Funding, Computer Phobia, technical Expertise, Inadequate Technology Infrastructures, Information Security, Lack of National Information Policy (NIP) in Kenya, Copyright and Cost Issues, Virus Attacks. Therefore, the study sought to assess the implications of these challenges. The research study employed the use of a descriptive research design with a target population of 50 respondents from The Kenya National Archives Nairobi Office which included 10 Middle level managers and 40 operational managers at Kenya National Archives Nairobi Office. The study involved all 50 employees as its sample size since the number was small and representation of all was required, semi structured questionnaire was used to collect data from the respondents. Data was analysed through descriptive statistics and inferential statistics. From this result it implied that challenges faced in implementing digital preservation practice had influence on the ease of access and use of information at KNADS. The coefficient of determination was calculated, r square was 0.229, indicating that the two variables share 22.9 percent of their variance. This means that there was evidence of overlap between the two variables. The study therefore concluded that KNADS has quite a number of challenges to overcome for it to realize digital preservation. Insufficient funding in the organization was established to be a major setback since Digital Preservation technologies required huge capital and human investment. Lack of information policy was cited as another impediment for KNADS to accomplish digital preservation project.

Keywords: Digital preservation, information, technologies, resource center

1. Background of the Study

Across the world an increasing number of organizations face national and institutional obligations in relation to collection and preservation of digital objects. Digital preservation is a major problem facing information centers all over the world. Most of information centers in the third world countries are faced with issues in digital preservation of information (Moloi and Mutula, (2007). Omekwu (2009) aptly observed that the transient nature of many web resources calls for practice that ensure instrumental value is accessed, acquired and archived electronically to ensure their long-term availability and access in the digital age, preserving of information has become more complex task with many threats including technological obsolescence and deterioration of electronic storage media.

Digital preservation is informed by digital collection building but encompasses the acquisition, ongoing maintenance, periodic transformation, and persistent delivery of digital assets. Once digital resources are identified as having long-term value, then the technology systems and accompanying policy frameworks that preserve those digital assets must inspire the same level of trust and confidence in users and stakeholders as do traditional preservation and access services. Digital preservation is the conservation of all digital materials, whether they were born digital, such as emails, websites, video games, and other electronic files, or whether they have been digitized from analogue materials (Conway, 2010). In Kenya, and in the region, efforts are being made to achieve digitization. The latest reports made by

Qobo (2010), Matangira (2010) and Hamooya&Njobvu (2010) attest to the growing quest for digitization to succeed in the region.

The study was conducted at Kenya National Archives and Documentation Service headquarters in Nairobi. The Kenya National Archives and Documentation Service (KNADS) is a state department within the Ministry of Sports, Culture and the Arts. The Kenya National Archives was established by an act of parliament, The Public Archives Act of 1965 (Commenced on 25th January 1966). "There shall be established, constituted and maintained a public department to be known as the Public Archives Service for which there shall be appointed a Chief Archivist, and such other staff as may be necessary for the purposes of this Act. Service Act, Cap 19 of the Laws of Kenya. There was a slight amendment in this Section 3 (1) to rename the Public Archives Service to the Kenya National Archives and Documentation Service. Besides the renaming, the position of the Director was created for that of Chief Archivist. Notable was also inclusion of Section 5A that distinctly setup the National Documentation Service and outlined its major roles of which majorly empowered the section to select, collect, process, house, control and preserve all bound documents created by any government ministry or department.

1.1. Statement of the Problem

With the advancement of digital technologies, computer-based apparatus has become dominant forces to shape and reshape record systems and services. The application of information technologies in record management and services have become key to satisfying ever changing complex information demand and expectation of users at Kenya National Archives and Documentation Service (KNADS).

Digital materials are especially vulnerable to loss and destruction because they are stored on fragile magnetic and optical media that deteriorate rapidly and that can fail suddenly from exposure to heat, humidity, airborne contaminants, or faulty reading and writing devices. Even if the media are preserved intact, digital materials become unreadable if the playback devices necessary to retrieve information from the media become obsolete or if the software that translates digital information from machine- to human-readable form is no longer available. Libraries, archives, and other repositories that traditionally have assumed responsibility of preserving information face technical, legal, and organizational challenges in responding to the new demands of digital preservation. The application of digital preservation confronts a number of challenges as, Media Deterioration, technological obsolescence, Funding, Computer Phobia, technical Expertise, Inadequate Technology Infrastructures, Information Security, Lack of National Information Policy (NIP) in Kenya, Copyright and Cost Issues, Virus Attacks. Therefore, it was the impetus of the study to assess the implications of these challenges.

2. Literature Review

2.1. Media Deterioration

The media on which digital contents are stored are more vulnerable to deterioration than other media such as paper. Previous studies have proved that traditional physical information sources such as books, maps, photos and artifacts can easily survive for years, decades or even centuries but not digital media. This is exemplified by the presence of old editions of books that are found in our libraries and archival institutions. (Dar & Ahmad, 2017)

The authenticity and integrity of digital objects are also at stake. It is easy to verify the authenticity and maintain integrity of analogue or physical media, whereas to safeguard trust that digital object is original, complete and unaltered deteriorate more rapidly. The old storage devices such as magnetic tapes are rarely used and now CD-ROMs and DVD's may also disappear in the near future due to their sensitivity and short life.

2.2. Technological Obsolescence

The rapid technological development is a great threat for the management of digital data. The latest technologies are replacing the old technologies. (Sambo, Urhefe&Ejitagha, 2017) Every two-to-three year sees the introduction of a new generation of hardware or software, with backward compatibility most often guaranteed for only a limited time thereafter (National Endowment for the humanities, 2011). The current hardware and software technologies may become obsolete in few years. Therefore, the records created with these tools are at great risk of loss and may no longer be accessible. For example, the old workstations and hardware devices are not supporting the advanced and complex computer graphics. (Kalusopa&Zulu, 2009; Adetunla& Osunride, 2016)

There is great risk of accessing and understanding our current data in the near future. Alegbeleye (2009) suggested that digital archives should be transcribed every ten to twenty years to ensure that they will not become technologically obsolete.

Technology absoluteness is a very serious issue in that every two-to-three year sees the introduction of a new generation of hardware or software, with backward compatibility most often guaranteed for only a limited time thereafter (National Endowment for the humanities, 2011). The current hardware and software technologies may become obsolete in few years. Therefore, records created with these tools are at great risk of loss and may no longer be accessible. For example, the old workstations and hardware devices are not supporting the advanced and complex computer graphics. There is great risk of accessing and understanding our current data in the near future. Alegbeleye (2009) suggested that digital archives should be transcribed every ten to twenty years to ensure that they will not become technologically obsolete. (Anyaku, Echedom&Baro, 2019).

2.3. Funding

Digital projects are expensive as it has been proved by those who have undertaken such projects before. Digitization of archival/library automation requires enormous funding due to frequent hardware and software upgrades, and increasing cost of subscription to electronic databases. (Yadav, 2016) Apart from inadequate fund to train archivists in Africa, training of archivists in digitization and preservation of electronic format creates a herculean problem. A well-funded digitization project assures new and improved services and sustainability of the project (Masenya & Ngulube, 2019).

The funding issue might be an issue to KNADS since its public institution that is funded by the government given that institutions that do provide information are not given priority when allocation of funds is being done during the budgetary process.

2.4. Computer Phobia

Due to inadequate skills in information technology in Africa, many traditional librarians and archivists are conservatives and have phobia for computers. Because of generation gaps between the new and old professionals, computers are perceived as a threat to their status as experts.

Thus, they find it difficult to cope or measure up with the requirements of the electronic/digital age, and are at the same time 'too reluctant to jettison the old practices for new one' (Ayoku & Ojedokun, 2008). Successful application of information handling technologies requires an ability to overcome staff and personal resistance to such innovation. (Ngoepe & Saurombe 2016).

2.5. Technical Expertise

Inadequate technical expertise is prevalent in many African countries. There is shortage of personnel/human capital. Few librarians with computer science qualifications (computer engineers) work in archives and libraries, hence the consequent frequent break down of ICT facilities and disruption of services in digitized libraries and archives. In many African countries, human resources with appropriate skills, competences and attitude are not readily available to initiate, implement and sustain digitization project, and most African states are still lagging behind in technological and telecommunications infrastructure. Constable (2008) argues, African trainers (archivists) lack expertise and are ill-equipped to train others in electronic preservation and digitization as was obtainable in America and other European countries.

Kenya as a developing country is not an exception. In Kenya people who are well versed in digitization and preservation are few. The lack of expertise in digital preservation appears to be a significant obstacle to developing digital preservation programs. The programs with the highest levels of staff expertise also tend to have significant holdings of digital materials. Those institutions with expert staff also are more likely to take advantage of outside experts by hiring consultants with expertise to supplement that available on their staffs. The professional skills needed include technical proficiency in areas such as encryption, metadata schema coding, and authentication, as well as traditional archiving skills which include cataloguing and classification (Sanett, 2013).

2.6. Inadequate Technology Infrastructures

Frequent power outage constitutes serious bottleneck to digitization in Africa. This has the effects in damaging digital equipment and where there is generating set the cost of running them is prohibitive. Added to this is the harsh environment of Sub-Saharan Africa which is not always friendly with technology equipment. Zulu (1994) reported that most countries in Africa that do not have adequate and reliable supply of electricity which consequently makes it impossible to maintain a conducive and sustainable technological environment suitable for digitization project in the continent. Again, telecommunications infrastructures in most African countries are either lacking or poorly developed, and few African states have modern digital and packet switching telecommunications facilities needed for data transmission. The problem of power outage is very common. Kenya is a country in the sub-Saharan Africa and also a developing Country and it cannot escape this kind of problem. Once KNADS will have fully digitized its records it will have to live with this problem. The take off the lap top project in 2013 as promised by the Jubilee Government was partly blamed on lack of connectivity electric power. To date the government is still handling the issue of infrastructure before it rolls out the project.

2.7. Information Security

Information security is the means and method of protecting data from unauthorized access, theft, alteration or deletion, and ensuring continued ability to access data whenever required (Kumar, 2004). Maintaining information security in a digital environment is one of the most demanding challenges for the KNADS. In the electronic environment, information is prone to many threats such as viruses, hackers and masquerades, among others. The average employee of KNADS is less empowered to confront this challenge.

2.8. Lack of National Information Policy (NIP) in Kenya

National Information Policy (NIP) has been defined in many ways by different scholars. To accommodate all aspects of information field, Ayoo and Otiye (2002), regard National Information Policy as a set of decisions made by the government through appropriate legislations and regulations to coordinate the harmonious development of information transfer activities so as to meet the information needs of the country. NIP could also be set of guidelines made by a government to streamline information generation, acquisition and dissemination activities. The main aim of the NIP is to ensure harmony of information activities in order to be more accessible and effective, reduce duplication of information

activities with a view to improve existing resources to be effective in meeting the needs of users and to ensure proper utilization of the limited resources in the country. Gray (1988), quoted by Ayoo and Otiye (2002), further asserts that the main goal of NIP ought to be the identification of the information requirements of the country and ensuring that they are satisfied fully, promptly, cheaply and conveniently by the use of scarce resources.

Due to lack of a national policy, information professional operates in a free space without necessary guidelines on how to handle the information field. This gives room to information professionals including archivists to handle information in a haphazard manner. Without proper guidelines archivists can fail to know how to handle the preservation of digital information.

2.9. Copyright and Cost Issues

In keeping with other library and information issues, copyright is always a concern. There are many uncertainties in the copyright laws both nationally and internationally, and it is a very grey area. There are complicated questions when examining the copyright of digitized items. Is the material that has been digitized considered published or unpublished? Does the original creator own the rights, or the preservationist?

These questions are difficult to answer (Kastellec, 2012). Time can be a factor with copyright issues, especially for special collections or rare items. Trying to find a rights-holder can be time consuming and expensive, and is often an unsuccessful exercise, particularly when working with older materials (Gracy& Kahn, 2012).

2.10. Virus Attacks

Computer virus is a program code which has a capacity to replicate recursively by itself. Computer viruses may include operations, which are typical for trojan horses and malicious toolkits. A file virus attaches itself to a file, which is usually an executable application generally, file viruses don't infect data files. But data files can contain embedded executable code such as macros, which can be exploited by computer virus or trojan horse authors. Recent versions of Microsoft Word and Excel are particularly vulnerable to this type of threat. Text files such as batch files, postscript files, and source codes that contain commands which can be compiled or interpreted by another program are potential targets for malware (malicious software). These virus attacks can be internal or external and can clear digital data in minutes crippling an organization.

3. Research Methodology

The research study used a descriptive research design. The descriptive design was chosen because it is more precise and accurate since it involves description of events in a carefully planned way (Oso and Onen, 2009). The study targeted 50 respondents from The Kenya National Archives Nairobi Office. The target population included 10 Middle level managers and 40 operational managers at Kenya National Archives Nairobi Office. The study involved all 50 employees as its sample size since the number was small and representation of all was required. That represented 100% of the total population. The research used semi structured questionnaire to collect data from the respondents. Questionnaire was preferred because it was efficient, cheap and easy to administer. A pilot study was conducted using the questionnaire on 6 respondents from Nakuru station which is a branch of KNADS.

The quantitative data collected from the questionnaire were analyzed through descriptive statistics and inferential statistics. Descriptive statistics involved frequencies, percentages, mean and standard deviation. Descriptive statistics was used because it provided the description of the phenomenon of the study. On the other hand, inferential statistics that was used was a correlation analysis.

3.1. Presentation of finding and Analysis

From the study challenges of digital preservation initiatives and suggest possible measures to improve the practice at the Kenya National Archives and Documentation Service, Nairobi Kenya, were presenting in the table below;

Challenges	N	Mean	Std. Deviation
Lack of funds	40	4.48	.784
Technological obsolescence	40	4.08	1.347
Lack of adequate skills	40	3.75	.899
Lack of information policy in Kenya	40	4.05	.986
Intellectual and copyright issues	40	3.80	.939

Table 1:Challenges Faced in Digital Preservation at KNADS

Key: 1.0-1.4 Strongly Disagree; 1.5-2.4 Disagree; 2.5-3.4 Neutral 3.5-4.4 Agree; 4.5-5.0 Strongly Agree

Source: Research Data (2020)

The findings of the study in Table 4.13 showed that the respondents agreed that there was lack of funds in implementing the digital preservation initiatives at KNADS (mean=4.48; std.dev=.784). Another challenge in implementing the digital preservation initiatives was the technological obsolescence (mean=4.08; std.dev. =1.347). The respondents also pointed out that lack of adequate skills (mean=3.75; std.dev.=.899) was a challenge in implementing the digital preservation initiatives at KNADS. Moreover, the respondents agreed that lack of information policy in Kenya (mean=4.05; std.dev. =.986) was a challenge in implementing the digital preservation initiatives at KNADS. Another, challenge in

implementing the digital preservation initiatives at KNADS was the intellectual and copyright issues (mean=3.80; std.dev=.939).

The study also carried out correlation analysis to test whether there was relationship between the challenges facing digital preservation practice and the contribution (ease of use and access). The results were summarized in the Table 4.14.

		Challenges	Contribution
Challenges	Pearson Correlation	1	.479**
	Sig. (2-tailed)		.002
	N	40	40
Contribution	Pearson Correlation	.479**	1
	Sig. (2-tailed)	.002	
	N	40	40

Table 2: Challenges Faced in Digital Preservation at KNADS

** Correlation Is Significant at the 0.01 Level (2-Tailed)

The results of the correlation analysis revealed a positive moderate ($r=.479$; sig. Value=.002) relationship between the challenges faced in digital preservation practice and the contribution (ease of use and access) as indicated in the SPSS output in Table 4.14. Since the p value was less than 0.05, we do therefore conclude that there was significant relationship between the challenges faced in implementing digital preservation practice and the contribution (ease of use and access) at KNADS. From this result it implied that challenges faced in implementing digital preservation practice had influence on the ease of access and use of information at KNADS. The coefficient of determination was calculated, r square was 0.229, indicating that the two variables share 22.9 percent of their variance. This means that there was evidence of overlap between the two variables.

The finding above concurred with Adetunla and Osunride (2016) who established that deterioration of information resources has been one of the greatest challenges facing libraries today. Also, the findings of the study were in agreement with According to Jain and Mnjama (2016) who stated that preservation of digital records included the following problems and challenges: lack of knowledge, shortage of adequately trained personnel to handle digital records, insufficient funding for human and physical resources required to establish and maintain the programmes and the technological obsolescence and fragility of storage media. It is known that the long-term digital preservation of resources in the archives is the preferred strategy for curbing the decay of materials and addressing the problems of hardware, software obsolescence, and backup issues (Sambo et al. 2017).

4. Summary of the Findings and Conclusion

The finding of the study showed that the respondents agreed that there was lack of funds in implementing the digital preservation initiatives at KNADS (mean=4.48; std.dev=.784). Another challenge in implementing the digital preservation initiatives was the technological obsolescence (mean=4.08; std.dev. =1.347). The respondents also pointed out that lack of adequate skills (mean=3.75; std.dev=.899) was a challenge in implementing the digital preservation initiatives at KNADS. Moreover, the respondents agreed that lack of information policy in Kenya (mean=4.05; std.dev. =.986) was a challenge in implementing the digital preservation initiatives at KNADS. Another, challenge in implementing the digital preservation initiatives at KNADS was the intellectual and copyright issues (mean=3.80; std.dev=.939). The correlation analysis revealed a positive moderate ($r=.479$; sig. Value=.002) relationship between the challenges faced in digital preservation practice and the contribution (ease of use and access) as indicated in the SPSS output in Table 4.14. Since the p value was less than 0.05, we do therefore conclude that there was significant relationship between the challenges faced in implementing digital preservation practice and the contribution (ease of use and access) at KNADS. From this result it implied that challenges faced in implementing digital preservation practice had influence on the ease of access and use of information at KNADS. The coefficient of determination was calculated, r square was 0.229, indicating that the two variables share 22.9 percent of their variance. This means that there was evidence of overlap between the two variables.

The study therefore concluded that KNADS has quite a number of challenges to overcome for it to realize digital preservation. Insufficient funding in the organization was established to be a major setback since Digital Preservation technologies required huge capital and human investment. Lack of information policy was cited as another impediment for KNADS to accomplish digital preservation project.

5. References

- i. Adetunla, G. B. O., & Osunride, A. A. (2016). Preservation and conservation of library materials in university libraries in South-West, Nigeria. *International Journal of Online and Distance Learning*, 1(1), 12-25.
- ii. Alegbeleye, G.O. (2009). *Avoiding Technological Quicksand: Coming to Grips with the Preservation of Digital Information in Nigeria*. Paper Presented at the 47th National Conference and Annual General Meeting of the Nigerian Library Association.
- iii. Anyaoku, E. N., Echedom, A. U. N., & Baro, E. E. (2019). Digital preservation practices in university libraries. *Digital Library Perspectives*.

- iv. Ayoku, A. O. (2008). *Transition to automated library information systems and the challenges for libraries in Africa*. Ibadan: Third world of information Service.
- v. Ayoo&Otiike (2002). *Factors hampering the formulation of national information in Kenya*. United Kingdom: Emerald group
- vi. Constable, T.F. (2008). *Current development in preserving and making accessible the intellectual and cultural heritage of South Africa*. Available online www.Liasa-new.org.za Accessed on 27th June 2016
- vii. Conway, P. (2010). Preservation in the age of google: Digitization, digital reservation, and dilemmas. *Library quarterly*, vol, 80, no.1. Pp.61-79.
- viii. Conway, P. (2011). Selecting microfilm for digital preservation: A case study from Project OpenBook. *Library resources & technical services*, 40(1), 67-77.
- ix. Gracy, K. & Croft, J. (2006) "*Quo Vadis, Preservation Education*. A Study of Current Trends and Future Needs in Graduate Programs."
- x. Gracy, K. F., & Kahn, M. B. (2012). Preservation in the digital age. *Library Resources & Technical Centre*, 56(1), 25-43.
- xi. Hammoya, C. and Njobvu, B. 2010. Digitization of archival materials: the case of Harvey, R. (2005). *Preserving digital materials*. München: K.G. Saur.
- xii. Kalusopa, T. (2018). Preservation and access to digital materials: strategic policy options for Africa. In P. Ngulube (ed). *Handbook of Research on Heritage Management and Preservation*. IGI Global Publishing, 150-170.
- xiii. Kastellec, M. (2012). Practical limits to the scope of digital preservation. *Information Technology & Libraries*, 31(2), 63-71.
- xiv. Kumar. 2004. Information security and disaster recovery. India. Unpublished.
- xv. Masenya, T. M., & Ngulube, P. (2019). Digital preservation practices in academic libraries in South Africa in the wake of the digital revolution. *South African Journal of Information Management*, 21(1), 1-9.
- xvi. Matangira, V. (2010) Understanding the basics of audio-visual archiving in Africa and the developing world: challenges for the archive lagging behind. *ESARBICA Journal* (29), pp. 223 –234
- xvii. Moloi, J. and Mutula, S. (2007). E-records management in an e-government setting in Botswana. 23(4). <http://idv.sagepub.com/content/23/4/290> (Accessed 10th December 2015)
- xviii. Ngoepe, M & Saurombe, A. 2016. Provisions for managing and preserving records created in networked environments in the archival legislative frameworks of selected member states of the Southern African Development Community. *Archives and Manuscripts* 44(1): 24-41.
- xix. Oso, W. and Onen, D. (2009). *A general guide to writing research proposal and report*. Jomo Kenyatta Foundation: Kenya
- xx. Qobo, C. K. (2010) Challenges of digitizing the endangered Lesotho royal archives.
- xxi. Sambo, A.S, Urhefe, E.A & Ejitaga, S. (2017). A survey of digital preservation challenges in Nigerian libraries: librarians' perspective. *International Journal of Curation* 12(1): 117-128.
- xxii. Sanett, S. (2013). Archival digital preservation programs: Staffing, costs, and policy.
- xxiii. Yadav, D. (2016). Opportunities and challenges in creating digital archive and preservation: an overview. *International Journal of Digital Library Services* 6(2): 63-73.
- xxiv. Zulu, S.F.C. (2008). *Intellectual property rights in the digital age*. Ibadan: Third World Information Service.