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CHALLENGES OF DIGITAL PRESERVATION OF CORPORATE ARCHIVES AT KENYA POWER LIMITED

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ABSTRACT

The aim of the study was to investigate the role of digitization in the preservation of corporate archives at Kenya Power Limited. The specific objectives of this study were to analyze security threats related to digital preservation and establish the role of digitization and identify the challenges of digital preservation of archives at Kenya Power Limited. The theoretical literature focused on Open Archival Information System. The research adopted a descriptive research design. A mixed method approach was used to incorporate both qualitative and quantitative research methodologies which gave a better understanding of the research problem. The target population comprised of 74 participants. The study employed stratified random sampling technique as well as purposive sampling. Semi structured questionnaire were used as the data collection instrument and analyzed using Statistical Package for Social Sciences (SPSS 23). KPL digital archive did not have security threats attributed to the security measures that the organization had put in place which include; data and database security, procedural security, system security and data back-up. The challenges surrounding digital preservation of archives included inadequate funding, obsolete hardware and software, insufficient ICT facilities, fragile storage media, inadequate expertise and shortage of DRM Skills. The study recommended that KPL should have effective implementation of security measures to secure its information system as well as digitally preserved archives. It was hoped that the study would serve as a catalyst in the modification and formulation of digital preservation strategies in the both private and public organizations in Kenya.

Key terms: Archives, Corporate archives, Digital preservation**,** Digitization, Preservation, Record

INTRODUCTION

With the advancement of digital technologies, computer-based apparatus have become dominant forces to shape and reshape record systems and services. The applications of information technologies in record management and services have become a key to satisfying ever-changing complex information demands and expectations of users. Accelerating growth of information technology has forced information professionals to rethink how to receive, process, store and retrieve information in a more user friendly way. One of the most advantageous ways of information management tool is digital preservation. Digital preservation is one of the new trends of present digital record management thus any organization has to cope with the rapid acceptance of digital preservation research and development for its survival.

Digitization is rapidly becoming one of the standard forms of preservation for libraries, archives and information centers' analog materials. The newer process of digitization allows preservationists to ensure information contained within fragile, organic materials will still be viewable to future generations. However, as technology changes there are concerns that the methodology used for preservation of these digital records are not going to be adequate and usable in the future. Software and formats changes faster and could be obsolete in a short period of time. This applies both to hard copy materials that are converted into digital copies, as well as born-digital items, or those which were created as digital copies initially. For this reason, digitization is not strictly a preservation activity, as the new files will require preservation as well (Conway, 2010).

The digitization plays a beneficial role because there are no physical limits for storage; can be accessed via the Internet; integrated online resource sharing; linking and networking possibilities; any number of times digital files can be duplicated with exactness and many can access a digital file at the same time. Getz & McKinley (1997) cited the benefits of digitization as follows: redundancy of collections is reduced since information sharing is enhanced; digital materials can be sorted, transmitted and retrieved easily and quickly; access to electronic information is cheaper than its print counterpart when all the files are stored in an electronic warehouse with compatible facilities and equipment.

Digital preservation is a terminology used to describe both the maintenance and the safe guarding of a digital resource into the foreseeable and the distant future. Digital preservation is the action required to maintain access to digital materials beyond the limits of media failure or technological change (Ronald & Michael, 2005). Hedstrom (2006) defined preservation as the process of planning, resource allocation and application of preservation methods and technologies necessary to ensure that digital information with continuing value remains accessible and usable. On the same note, Ronald & Michael (2005) are of the view that digital preservation is emerging as a trustworthy process, yet there is much on-going debate concerning the viability and even the meaning of this process. Given the nature of electronic storage technologies and the short-lived nature of web pages, many are doubtful that digital preservation will ever become a reality.

Corporate archives are archival departments within an organization or corporation that manage and preserve the records of that business. These repositories exist to serve the interest of company staff members and to advance business goals. Corporate archives allow varying degrees of openness to their materials depending on the organization's policies and record management staff availability (Bakken, 1982). Lor (2005) defines an archive as a place where people go to find information. Rather

than collecting information from books as you would in a conventional library, people who do research in archives often gather firsthand facts, data, and evidence from letters, reports, notes, memos, photographs, audio and video recordings, and other primary sources (Potter, 2003). Kasetsart University Archives (2010) defined archives as all original documents considered valuable to preserve in public and private sector offices that are usually referred to as archival materials and used for accountability, compliance, transparency and verification of the past administrative processes.

Kenya Power Limited (2014) has a history dated back to 1875 when Seyyied Barghash the Sultan of Zanzibar procured a generator to illuminate his palace and nearby streets. This generator was acquired in 1908 by Harrali Esmailjee Jeevanjee, a Mombasa based merchant leading to the formation of the Mombasa Electric Power and Lighting Company whose mandate was to provide electricity to the island. In 1908, Engineer Clement Hertzel was given the right to supply electricity in Nairobi city thus leading to the formation of the Nairobi Power and Lighting Syndicate.

In the year 1922, the Mombasa Electric Power and Lighting Company (MEPLC) and Nairobi Power and Lighting Syndicate merged under a new company called East African Power and Lighting Company (EAP&L). The rapid expansion of EAP&L in 1932 led to widening of market outside Kenya when it acquired a controlling interest in the Tanganyika Electricity Supply Company Limited (now TANESCO) and later obtained a generating and distribution licenses for Uganda in 1936, thereby entrenching its presence in the East African region. In 1948, Uganda Electricity Board (UEB) was formed to take over administration of electricity in the country therefore EAP&L exited.

Objectives of the Study

The aim of the study was to investigate the role of digitization in the preservation of corporate archives at Kenya Power Limited in order to recommend practical strategies to be adopted to curb current and future digital preservation issues. The specific objectives were:-

- Analyze security threats related to digital preservation of archives at Kenya Power Limited
- Find out the challenges of digital preservation of archives at Kenya Power Limited

RELATED LITERATURE

Theoretical Framework

Open Archival Information System Model

The central concept in the OAIS reference model is that of an open archival information system (OAIS). The term open refers to the fact that the reference model was developed and released in open public forums in which any interested party was encouraged to participate. It does not refer to or make any inference about the level of accessibility associated with an archive. An archival information system is an organization which may be part of a larger organization of people and systems that have accepted the responsibility to preserve information and make it available for a designated community' (OAIS, 2012). OAIS-type archive has two major functions for an OAIS-type archival repository: first, to preserve information i.e., to secure its long-term persistence and second, to provide access to the archived information in a manner consistent with the needs of the archive's primary users or designated community.

OAIS-type archive is supplemented with a list of mandatory responsibilities that is expected to meet. The first responsibility is to establish explicit selection

criteria for determining which materials are appropriate for inclusion in the archival store. These criteria are based on factors such as subject, origin or format. Once the scope of the archival collection is defined, appropriate steps must be taken to motivate the producers/owners of the targeted items to transfer them along with accompanying metadata into the custody of the OAIS for preservation.

The second responsibility emphasizes that OAIS needs to obtain intellectual property rights to authorize the procedures necessary to meet preservation targets. For example, if the OAIS must create a new version of the archived item so that it can be rendered by current technologies, it must have the explicit right to do so. The reference model established three areas where challenges may occur in obtaining need levels of control over archived materials as follows: copyright and other legal restrictions; authority to modify archived information and agreements with other organizations to share or leverage their preservation activities.

The third responsibility of an OAIS-type archive is to determine the scope of its primary user community. Important point to note is that accurate characterization accurate characterization of the primary users of the archived information is a pre-condition for meeting another of the OAIS's responsibilities: ensuring that the information is preserved in a form that is independently understandable to these users. The forth reference model is responsible for preservation process and the means for making the archived information available to the user community. An OAIS should establish and document clear policies and procedures for carrying out the preservation of the information in its custody; these should be accessible to and understandable by user community in the OAIS alongside conforming to the defined preservation objectives.

Finally, an OAIS should be committed to making the contents of its archival store available to its intended user community through the implementation of access mechanisms and services which support to the fullest extent possible users' needs and requirements such as medium (e.g., print-on-demand, file formats) and access channels (e.g., Web access, transfer of physical media). Access restrictions attached to some or all of the archive's contents should be clearly documented (McDonough, 2006).

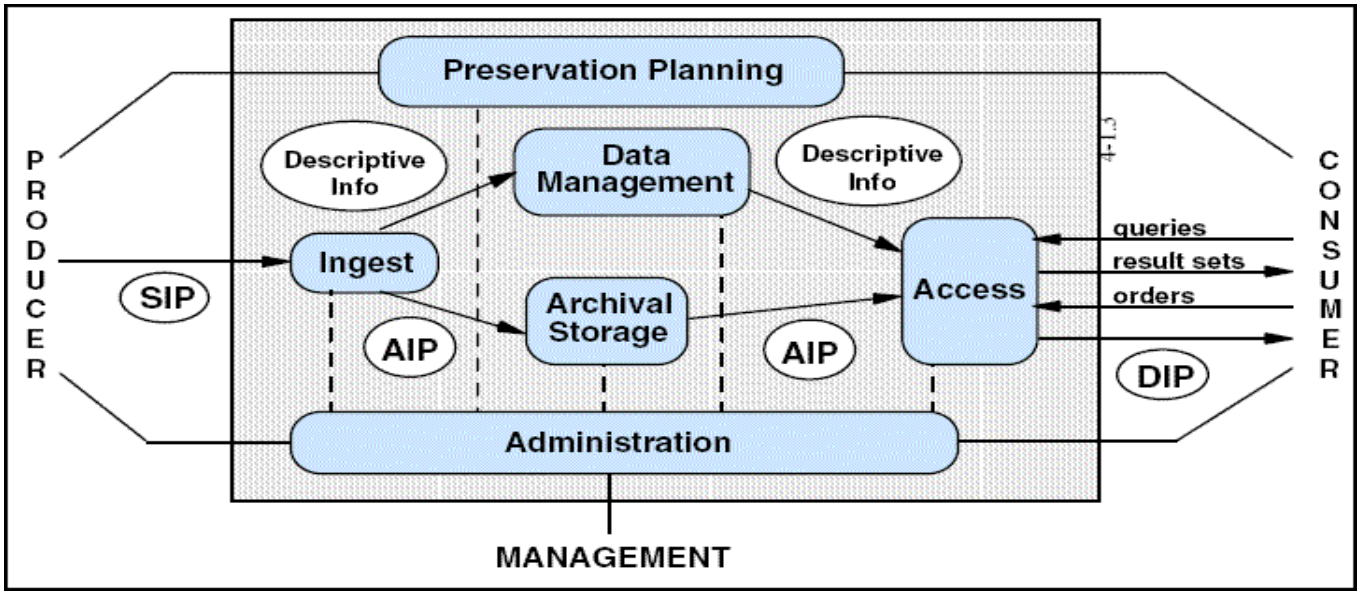


Figure 1: OAIS Functional Model. Adopted from Sawyer, D. & Reich, L. (2002)

Ingest Entity is the set of processes responsible for accepting information submitted by producers and preparing it for inclusion in the archival store. This entity provides the services and functions to accept Submission Information Packages (SIPs) from Producers (or from internal elements under Administration control) and prepare the contents for storage and management within the archive. The functions of the ingest include receiving SIPs, performing quality assurance on SIPs, generating an Archival Information Package (AIP) which complies with the archive's data formatting and documentation standards, extracting Descriptive Information from the AIPs for inclusion in the archive database and coordinating updates to Archival Storage and Data Management (CCSDS, 2002).

Archival Storage is the part of the archival system that manages the long-term storage and maintenance of digital materials entrusted to the OAIS e.g., online, near-line, offline.

The primary functions of data management include maintaining the databases for which it is responsible; performing queries on these databases and generating reports in response to requests from other functional entities within the OAIS.

The main tasked attached to preservation planning is that it is responsible for mapping out the OAIS's preservation strategy and making appropriate revisions recommendation to this strategy in response to evolving conditions in the OAIS environment.

Access is responsible for the management of the processes and services by which consumers and the designated community locate, request, and receive delivery of items residing in the OAIS's archival store. The main functions of access include communicating with consumers to receive requests, coordinating the execution of requests to successful completion, generating responses (Dissemination Information Packages (DIP), result sets, reports) and delivering the responses to Consumers. Finally, Access is responsible for implementing any security or access control mechanisms associated with the archived content. (Beedham et al, 2004).

Administration is responsible for overseeing the operation of the archiving and access systems, monitoring system performance, and coordinating updates to the system as appropriate.

Lavoie (2013) states that the use of the term OAIS implies an archival system dedicated to preserving digital information and making it available over the long term, as well as meeting, in some form, the six mandatory responsibilities and makes it available to its designated community.

In light of the above, OAIS model will be adopted as the theoretical framework of the study due to its universal acceptance as a standard and a framework designed specifically for digital preservation of archives. The model further suit the study since it focuses on the key aspects of access through which designated community locate the archival storage, preservation planning which encompasses the policy strategy formulation and finally the archival storage which has the key aspect of security both for physical and electronic archives. In summary, OAIS model seek to answer the research objectives and questions under study.

Empirical Literature Review

Kaniki (1999) asserts that no research exists in a vacuum but relies on previously done studies or writings that put research into perspective. The review of related studies presented below served to highlight gaps in the literature that needed exploration. In addition, as Leedy & Ormrod (2001) intoned, the literature review reveals investigations

similar to one's own and can show a researcher how collateral researchers handled similar situations.

Investigation into the state of Digital Records Management in the Provincial Government of Eastern Cape: a case study of the Office of the Premier.

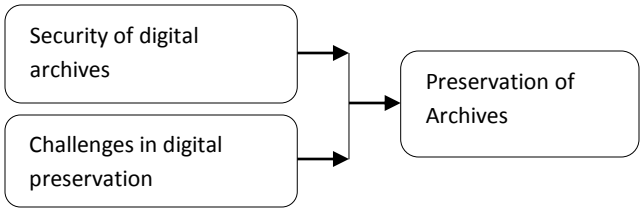
A study undertaken by Munetsi (2005), established that that there is a records management programme which caters for digital records management in the Office of the Premier (OTP). The majority of the respondents (90%) knew that the department had a records management programme which also supported digital records management. The study revealed that records such as the leave forms, employee wellness and records of benefits of employees and recruitment forms were being generated and accessed online using the new system. Although most of the respondents (76.7%) indicated that they received training on how to use the filing system, the records manager was of the opinion that less focus on digital records management training posed a challenge to the new system. Personal observation revealed that there is lack of skills in this area despite efforts to train staff.

A review of literature by IRMT (1999) indicated that lack of training in governments affects the operations for effective digital records management. The study adopted a case study approach. Further the study adopted a mixed method approach by using quantitative and qualitative methods to examine how digital records are managed in the Office of the Premier (OTP). Triangulation was achieved in this study by using interviews, questionnaires and nonparticipant observation as data collection techniques. Data analysis was by thematic categorization based on objectives.

The study recommends that there is a need for a dedicated section/unit with the responsibility for the management of digital records. The unit should also be responsible for the formulation of standards, coordination, monitoring and evaluation of all Digital Record Management (DRM) initiatives in the OTP. Also, the study further recommends tightening the current security and preservation practices of digital records in the OTP. There should be distinction between the physical and content security and preservation of digital records.

Finally, the study recommends that the office of the Chief Information Officer should spearhead the formulation and implementation of a policy as well as rules and regulations to govern the security and preservation of digital records. Therefore, the above recommendation of physical & content security and policy formulation forms part of the objectives that this study seeks to unearth the underlying reasons and thus this study examine the status of digital preservation of corporate archives at Kenya Power Limited.

Conceptual Framework



Independent Variables **Dependent variables**

Figure 1: Conceptual Framework

Source: Author (2018)

Security

Information Security is the process of being protected against the unapproved use of information, especially electronic data, or the measures taken to achieve this. It is a general term that can be used regardless of the form the data may take (e.g. electronic, physical). Information Security issues revolve around system security (e.g., protecting digital preservation and networked systems / services from exposure to external / internal threats); collection security (e.g., protecting content from loss or change, the

authorization and audit of repository processes); and the legal and regulatory aspects (e.g. personal or confidential information in the digital material, secure access, redaction).

Numerous types of electronic material selected for posterity may contain confidential and sensitive information that must be protected to ensure they are not accessed by non-authorized users. In many cases these may be legal or regulatory obligations on the organization. To ensure reliability and authenticity of digital records; data encryption and security management strategies should be ensured (IRMT, 1999). Thus the security environment can be regarded as being composed of the following elements:

Challenges in preservation of digital archives

Despite the benefits ensued in digitizing analog materials and preserving the same, it is not without challenges. The main challenges include human error, data loss, fading memory, lack of effective education, and technological obsolescence (Kastellec, 2012). The greatest limitations to digital resources are both human and machine dependent despite the availability of mobile technology and hardware devices (Moghaddam, 2010).

Knowing what to preserve and the best method to use, is a major concern for professionals and one that requires specialized training.

METHODOLOGY

The study adopted a mixed approach. This is because the study was used to gain an understanding of underlying reasons, opinions and motivations behind the status of digital preservation of archives at KPL. It provided insights into the problem and helped to develop ideas or hypotheses for potential quantitative research.

RESEARCH FINDINGS

Digital Preservation Security

The study sought to analyze security threats related to digital preservation of archives at Kenya Power Limited. The respondents were asked whether their digital archive had any security threats. Majority of the respondents 81.8 percent stated that their digital archive did not have security threats while 18.2 percent stated that their digital archive had security threats.

The findings of the study revealed that KPL had proper procedures and mechanisms in place to ensure security, long-term preservation and accessibility of digital records for effective governance. Technical measures to prevent unauthorized access and alteration had been considered such as assigning RM staff with username and password thus integrity, reliability and confidentiality of digital records could not be compromised.

Further, the study noted that security policy for the management and storage media of digital records was conspicuously missing thus urgent formulation of policy and implementation is required.

On security measures, the respondents were asked to state the security measures that KPL had with regards to digital records and archives. Majority of the respondents 40 percent reported that their organization ensured data and database security by allowing authorized access and modifications only, 29.1 percent stated that their organization provided procedural security through aggressive user training programs that would enable their employee detect any hick-up on the system, 18.2 percent stated that their organization provided system security that protected its software applications as well as their operating systems while 12.7 percent stated that

their organization had data back-up. Table 1 illustrated the findings of the study.

Table 1: Security Measures

Security Measures	Frequency	Percentages
Data back up	7	12.7
System security	10	18.2
Procedural security	16	29.1
Data and Database security	22	40.0
TOTAL	**55**	**100**

The study established that the organization has put in place different level of security measures for digital records though the measures are not exhaustive since the study has inadequately addressed environmental and physical security.

On security systems, the respondents were asked to state whether KPL had a system in place to ensure security and protection of digital records. Majority of the respondents 43.6 percent stated that their organization had a system in place, 30.9 percent stated that their organization had no system in place while 25.5 percent of the respondents had no idea whether KPL had a system in place to ensure security and protection of digital records. From the findings, the study revealed that the organization had security systems such as character combination and lock mechanism system that manage and store digital records. Also, maximum length and password ageing is a measure that KPL has adopted to deter any unauthorized access in their DRM system.

Also, staffs in RM department are provided with login credentials (usernames and passwords) to access records. Inadequate ICT skills for the records personnel were highlighted as a major problem in promoting the use of digital records in the department.

The Role of Digitization in Preservation

The respondents were asked what role digitization process played in the preservation of digital archives. The findings of the study revealed that the respondents were aware of the role of digitization in the preservation process.

Increased productivity**:** Using retrieval tools such as databases and indices, it possible to have faster access to the information than the traditional eye-on-paper scrolling through a hard-copy finding aid. Therefore KPL adopted digitization process so as to allow the stake holder ability to share, collaborate, exchange and access documents in seconds, reducing the turnaround time further increasing the efficiency for your business.

Easy to access and always accessible: The study established that KPL has focused on security grading and classification of information and records hence the different levels of access provided by the organization. Therefore, records that have digitized can be easily accessed through the cloud or system using any device that has internet, anywhere or anytime. Indexing helps in building a high level classification for so that records can easily be retrieved by refining search results.

Enhanced security: The study found out that KPL has put in place different level of security measures for digital records. Digitized records are track able document. Classification ensures that only certain users can access the records and workflows can be set up along with permission groups for an individual which enhances the security and maintains the confidentiality of the records.

Disaster recovery**:** The study established that KPL has a disaster recovery plan in place thus retrieval of information should the system crash. There is always a risk of disaster, whether it is natural or manmade. Fire, flood, earthquakes or other destructive phenomenon may cause a major disaster for paper records seriously affecting the organization's business. Digitization offers a safe repository of records which can be shared on cloud or electronic document management systems (EDRMS) enabling recovery of precious documents with a simple click.

Enhanced information preservation: The study established that KPL embracing the various formats for preservation such as data files, image files, text files and databases because information stored in paper formats is degradable information and degrades further every time it is handled manually. Digitization ensures that organization's most important data is saved and preserved for the future.

Digital Preservation Challenges

Finally, the study sought to identify the challenges surrounding digital preservation of archives at Kenya Power Limited. The results of the study were as follows; 29.1 percent of the respondents stated inadequate funding, 21.8 percent said obsolete hardware and software, 18.2 percent declared insufficient ICT facilities and fragile storage media that break easily leading to loss of data while 12.7 percent opine inadequate expertise and shortage of DRM Skills. Table 2 summarized the findings of the study.

Table 2: Digital Preservation Challenges

Digital Preservation Challenges	Frequency	Percentages
Inadequate expertise and shortage of DRM Skills	7	12.7
Insufficient ICT facilities	10	18.2
Inadequate funding	16	29.1
Fragile storage media	10	18.2
Obsolete hardware and software	12	21.8
TOTAL	**55**	**100**

The study revealed that inadequate expertise and shortage of DRM Skills (12.7%) was a result of staff retention since highly skilled personnel often leave the organization for greener pastures.

Insufficient funding (29.1%) in the organization was established to be the major setback since latest RM technologies required huge capital and skilled human resource. This resulted into inability to locate documents which often leads to delays in finding documents and responding to requests from internal and external clients. These factors negatively impact on the level of service delivery offered by the RM staff.

CONCLUSION

The study concluded that digitization plays a significant role in the preservation of corporate archives. The findings of the study confirmed that the respondents were aware of the role digitization play in the preservation process. The study revealed that digitization is beneficial because it possible to have faster access to the digitized information than the traditional eye-on-paper scrolling through a hard-copy finding aid. Also, KPL has embraced digitization because it enhances simultaneous access because when using a database one could search for a record using a creator's name, file name or date of creation.

The findings of the study revealed that KPL had adequate security measures. This was attributed to measures put in place by the organization such as; data and database security, procedural security, system security that protected its software applications and operating systems as well as having data back-up.

Finally, the study identified numerous challenges surrounding digital preservation as follows; inadequate funding, obsolete hardware and software, insufficient ICT facilities and fragile storage media that break easily leading to loss of data as well as inadequate expertise and shortage of DRM Skills.

RECOMMENDATIONS

Digital Preservation Strategies: The study found out that KPL is grappling with the obsolescence of hardware and software. Therefore, digital preservation strategies are needed to ensure digital records and archives remain authentic and usable for archival development. They must ensure preservation of digital records in the simplest way possible. It is recommended Senior Records Officer (Reformatting) adopts migration and emulation as the key strategies of preservation.

Migration: strategy enables given formats such as WordPerfect's, Microsoft Excel's, and Microsoft word among others to be migrated to other formats and stored. It helps to preserve the integrity and usability of digital records and to retain the ability for the users of digital records and archives to be able to retrieve, display, and use them in the face of constantly changing technology. Migration provides periodic transformation of files to new digital formats to ensure continuing compatibility between file formats and applications. They also design utilities to migrate data types. On the other hand migration set up a chain that must be extended over time, because every format will eventually become obsolete. Therefore, KPL ought to develop and implement a migration strategy regulated through an institutional migration policy.

Emulation: is also another recommended method for digital records and archives preservation. It allows RM department to keep records and archives in their original digital formats. It also enables obsolete systems to be run on future unknown systems, making it possible to retrieve, display and use digital records and archives with their original software. Emulation strives to maintain the ability to execute the software needed to process data stored in its original form.

Suggestions for Further Studies

Future research should be conducted on the capacity building strategies to manage digital records in government departments and to establish how both private and public organizations identify cost model factor in digital preservation projects.

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