

Developing A Sustainable Information Management Plan for Digital Repositories in Libraries: Challenges and Best Practices

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ABSTRACT

Digital repositories have become essential components of academic libraries by providing organized, long-term access to institutional scholarly outputs, research data, digitized collections, and other digital assets. However, ensuring the sustainability of digital repositories remains a significant challenge due to evolving technologies, inadequate institutional policies, limited financial resources, insufficient technical infrastructure, and workforce competency gaps. This study explored the challenges and best practices in managing digital repositories among selected academic libraries in Zamboanga City as the basis for developing a sustainable information management plan. Employing a qualitative research design, data were gathered from twelve library personnel, including librarians, library staff, information technology personnel, and library managers, through interviews and validated questionnaires. Descriptive statistics and thematic analysis (Braun & Clarke, 2006) were used to analyze the data. Findings revealed that academic libraries continue to encounter challenges related to institutional policy development, financial sustainability, repository infrastructure, metadata management, staff competencies, and collaborative partnerships. Despite these constraints, best practices were identified, including the establishment of institutional repository policies, implementation of standardized metadata, continuous staff capacity building, collaborative networking, adoption of scalable repository platforms, and regular monitoring and evaluation. These findings demonstrate that sustainable digital repository management requires the integration of organizational commitment, technological capability, knowledge sharing, and continuous professional development. Based on the findings, a Sustainable Information Management Plan for Digital Repositories was developed to strengthen institutional governance, repository infrastructure, metadata quality, collaborative practices, and workforce competencies. The study contributes to the growing body of knowledge on digital repository management by providing practical strategies that academic libraries may adopt to ensure the long-term accessibility, authenticity, integrity, and sustainability of institutional digital collections.

Keywords: Academic Libraries, Best Practices, Digital Collection, Digital Repository, Information Management, Metadata Management, Sustainable Framework

1. INTRODUCTION

Academic libraries have undergone significant transformation in response to the increasing adoption of information and communication technologies (ICTs) and the growing demand for digital scholarly resources. This shift has expanded their traditional role from managing print collections to developing digital repositories that support the collection, organization, preservation, and dissemination of institutional scholarly outputs, thereby enhancing research visibility, knowledge sharing, and institutional memory (Conway, 2009). Consequently, effective information management has become fundamental to ensuring that digital repositories remain accessible, authentic, and sustainable over time.

Managing digital repositories involves more than storing digital files. It requires the integration of institutional policies, metadata standards, technological infrastructure, digital preservation strategies, and skilled personnel to

maintain the integrity and long-term accessibility of digital collections. Digital preservation, therefore, is a critical function of repository management, addressing challenges such as technological obsolescence, hardware and software failures, cybersecurity threats, and file format incompatibility (Johnston, 2020). The sustainability of digital repositories also depends on organizational commitment, continuous investment in technology, effective governance, and collaboration among library professionals and information technology specialists.

In the Philippines, academic libraries have increasingly adopted digital repositories to support research, online learning, and the preservation of institutional scholarly outputs. The demand for digital access to information became more evident during and after the COVID-19 pandemic, accelerating the digital transformation initiatives of many higher education institutions. Despite these developments, numerous academic libraries continue to encounter challenges, including inadequate institutional policies, limited financial resources, insufficient technological infrastructure, inconsistent metadata practices, and a lack of personnel with specialized competencies in digital repository management. These challenges often affect the long-term sustainability and effectiveness of institutional repositories.

Although previous studies have extensively examined digital preservation technologies and repository systems, limited research has explored how information management practices, organizational governance, knowledge sharing, and collaboration collectively contribute to the sustainability of digital repositories, particularly within Philippine academic libraries (Masenya & Ngulube, 2020). Addressing this gap is important for developing practical and context-specific strategies that strengthen digital repository management and support the long-term preservation and accessibility of institutional digital assets.

Recognizing these concerns, this study investigates the challenges and best practices in managing digital repositories among selected academic libraries in Zamboanga City. Specifically, it aims to develop a Sustainable Information Management Plan that integrates governance, metadata management, technological infrastructure, organizational collaboration, and workforce competencies to enhance the sustainability and effectiveness of digital repositories in academic libraries (Abbas & Michael, 2023).

2. LITERATURE REVIEW

Digital Repositories in Academic Libraries

Digital repositories have become an essential component of academic libraries as higher education institutions increasingly generate and manage large volumes of digital scholarly resources. Institutional repositories provide a centralized platform for collecting, organizing, preserving, and disseminating a wide range of digital assets, including theses and dissertations, faculty publications, research datasets, digitized historical collections, conference proceedings, and multimedia resources. These repositories not only increase the visibility and accessibility of scholarly outputs but also support knowledge sharing, research collaboration, and the preservation of institutional memory (Conway, 2009; Lavoie, 2014; Yakel et al., 2013).

Unlike conventional digital storage systems, digital repositories are designed to ensure the long-term management of digital objects through structured information organization, metadata application, preservation planning, and controlled access. The Open Archival Information System (OAIS) Reference Model emphasizes that repositories should preserve digital objects in ways that maintain their authenticity, integrity, reliability, and usability despite continuous technological changes (Lavoie, 2014). Consequently, effective repository management requires the integration of organizational policies, technological infrastructure, metadata standards, and professional expertise.

Information Management in Digital Repositories

Information management provides the organizational foundation for the effective operation of digital repositories. It encompasses the systematic processes involved in acquiring, organizing, describing, storing, preserving, retrieving, and disseminating digital information throughout its lifecycle. Within digital repositories, effective information management ensures that digital resources remain discoverable, accessible, and usable by current and future users.

Metadata plays a critical role in this process because it enables the organization, identification, retrieval, and preservation of digital materials. Standardized metadata improves interoperability among repository systems,

facilitates resource discovery, and supports long-term preservation planning (Baca, 2016). Similarly, Stein et al. (2017) emphasized that maintaining high-quality metadata requires consistent standards, quality assurance procedures, and sustainable workflows. Integrating knowledge management processes into repository systems further strengthens organizational learning and improves information sharing among stakeholders, thereby enhancing repository sustainability (Roknuzzaman et al., 2009).

Challenges in Sustainable Digital Repository Management

Although digital repositories have become increasingly important in higher education, many academic libraries continue to encounter challenges in maintaining sustainable repository services. Existing studies consistently identify governance, financial sustainability, technological infrastructure, metadata management, and workforce competency as the major factors affecting repository success.

Institutional governance is fundamental because digital repository initiatives require clear policies, strategic planning, and administrative support. Without comprehensive institutional policies, digital repository management often becomes fragmented and inconsistent, limiting long-term sustainability (Masenya & Ngulube, 2020). Sustainable funding likewise remains a major concern, as repositories require continuous investment in storage infrastructure, software maintenance, cybersecurity, and professional development. Beagrie et al. (2019) noted that long-term storage costs significantly influence preservation strategies, while Houghton and Creaser (2022) identified financial limitations as one of the primary barriers to digital preservation initiatives in academic institutions.

Technological infrastructure also presents significant challenges. Repository platforms require reliable servers, secure storage systems, regular software updates, and effective disaster recovery mechanisms. Institutions with limited technological capacity often struggle to maintain repository performance and preserve digital collections effectively (Kim, 2018; Johnston, 2020).

Metadata management is another critical issue. Inconsistent metadata standards reduce interoperability, limit resource discovery, and compromise long-term preservation. Baca (2016) emphasized that standardized metadata improves access, while Stein et al. (2017) highlighted the importance of sustainable metadata workflows for maintaining repository quality.

Human resource capacity further influences repository sustainability. Effective repository management requires librarians and information professionals with competencies in metadata creation, digital curation, repository administration, information technology, and digital preservation. Continuous professional development is therefore necessary to enable personnel to adapt to evolving technologies and preservation standards (Yakel, 2007).

Best Practices in Digital Repository Management

The literature identifies several best practices that contribute to the successful management of digital repositories. One of the most frequently recommended strategies is the establishment of institutional policies that clearly define repository objectives, governance structures, preservation responsibilities, and resource allocation. Institutional commitment provides the organizational foundation for sustainable repository operations and ensures that repository initiatives are integrated into the strategic goals of the institution (Digital Preservation Coalition, n.d.; Masenya & Ngulube, 2020).

Another widely recognized best practice is the implementation of standardized metadata and internationally accepted repository frameworks. Metadata standards improve interoperability, facilitate information retrieval, and support long-term preservation by ensuring consistency in the description and management of digital resources (Baca, 2016; Stein et al., 2017).

Collaboration has likewise emerged as a key factor in repository sustainability. Partnerships among academic libraries, information technology units, government agencies, and professional organizations promote resource sharing, knowledge exchange, and collaborative problem-solving. Communities of practice encourage continuous organizational learning and enable institutions to share expertise and innovative solutions for repository management (Carroll & Mallon, 2021). Professional development also contributes significantly to repository sustainability. Continuous training in repository technologies, metadata standards, digital curation, and preservation

strategies enhances staff competencies and improves institutional capacity to manage evolving digital environments (Yakel, 2007). Furthermore, sustainable technological infrastructure, including scalable repository platforms, secure storage systems, regular backups, and cybersecurity measures, strengthens the long-term reliability and accessibility of digital repositories (Walters & Skinner, 2015).

Theoretical Perspectives Supporting Sustainable Digital Repository Management

This study is anchored in the Socio-Technical Theory and the Knowledge-Based Theory of the Firm, which collectively explain the interaction between organizational and technological factors in repository management. Socio-Technical Theory posits that organizational effectiveness is achieved when social systems, such as people, organizational structures, and work processes, are aligned with technological systems (Trist & Bamforth, 1951). Abbas and Michael (2023) further explained that modern socio-technical systems require continuous coordination between human capabilities and technological innovation to achieve sustainable organizational outcomes. In the context of digital repositories, sustainability depends not only on repository technologies but also on institutional governance, staff competencies, collaborative practices, and organizational culture.

The Knowledge-Based Theory of the Firm emphasizes that knowledge is a strategic organizational resource that creates value through its effective creation, sharing, and application (Grant, 1996). Complementing this perspective, the operationalization of Nonaka's SECI model highlights that knowledge sharing and organizational learning are facilitated through continuous interaction among individuals, teams, and technologies (Farnese et al., 2019). These theories reinforce the importance of collaboration, professional development, and knowledge exchange in strengthening repository management and sustaining institutional digital assets.

Synthesis of the Literature

The reviewed literature demonstrates that sustainable digital repository management extends beyond technological implementation. Effective repositories require the integration of governance, information management, metadata quality, digital preservation, organizational collaboration, technological infrastructure, and workforce competencies. Although previous studies have examined these dimensions individually, relatively few have explored how they collectively contribute to the sustainability of digital repositories within the context of Philippine academic libraries. This gap provides the rationale for the present study, which seeks to develop a Sustainable Information Management Framework that integrates these essential organizational and technological components to strengthen digital repository management in academic libraries.

3. METHODOLOGY

This study employed a qualitative multiple case study design to gain an in-depth understanding of the challenges and best practices in digital repository management among selected academic libraries in Zamboanga City, Philippines. The multiple case study approach enabled the researcher to examine institutional experiences, practices, and perspectives within their real-world contexts while facilitating cross-case comparisons to identify common patterns and unique practices.

The study was conducted in six selected academic libraries representing both public and private higher education institutions that maintain digital repositories and implement varying levels of digital repository management practices. A total of twelve (12) key informants, consisting of library managers and information technology personnel directly involved in repository management, participated in the study. A total enumeration sampling technique was employed to include all qualified personnel responsible for digital repository initiatives within the participating institutions.

Data were collected through semi-structured interviews and document analysis. The interview guide explored institutional practices related to governance, financial sustainability, technological infrastructure, metadata management, staff development, and collaborative initiatives supporting digital repository management. Relevant institutional documents, including repository policies, annual reports, digitization guidelines, and technical documentation, were also reviewed to validate and enrich the interview findings through data triangulation.

Prior to data collection, permission was obtained from the administrators of the participating institutions. Interviews were conducted with the participants after securing their informed consent and were audio-recorded with permission before being transcribed verbatim. Qualitative data from the interviews and document review were analyzed using thematic analysis following the approach of Braun and Clarke (2006). The data were systematically coded, categorized, and synthesized to identify recurring themes representing the major challenges and best practices in digital repository management. The use of multiple data sources enhanced the credibility, trustworthiness, and richness of the findings, which served as the basis for developing the proposed Sustainable Information Management Framework.

Ethical principles were observed throughout the study. Participation was voluntary, and all participants were informed of the purpose of the research, their right to decline participation, and their right to withdraw at any stage without consequence. Written informed consent was obtained from all participants, while confidentiality and anonymity were maintained through the use of codes for both respondents and institutions. All data were used solely for research purposes, securely stored, and accessed only by the researcher in accordance with established ethical standards for research involving human participants.

4. RESULTS AND DISCUSSION

4.1 Challenges in Digital Repository Management among Academic Libraries

The study identified six major themes describing the challenges encountered by academic libraries in digital repositories. Although the participating institutions varied in size, governance, and available resources, the findings revealed common concerns affecting the sustainability of digital repository management initiatives. These challenges include policy development and institutional commitment, financial and resource management, information technology infrastructure and storage, metadata and standardization, training and capacity building, and collaboration and networking.

Table 1 Emerging Themes on the Challenges in Digital Repository Management

Theme	Description
Policy Development and Institutional Commitment	Lack of comprehensive policies and institutional support
Financial and Resource Management	Insufficient and unstable funding for preservation initiatives
IT Infrastructure and Storage	Outdated hardware, software, and limited storage capacity
Metadata and Standardization	Inconsistent metadata practices and lack of preservation standards
Training and Capacity Building	Limited technical competencies and inadequate professional development
Collaboration and Networking	Weak institutional partnerships and limited resource sharing

Table 1 summarizes the major themes that emerged from the interviews conducted with library managers, librarians, and information technology personnel. These interconnected challenges influence the effectiveness and sustainability of digital preservation programs across academic libraries.

Policy Development and Institutional Commitment

The findings revealed that the absence of comprehensive institutional policies remains one of the most significant barriers to sustainable digital preservation. Most participants acknowledged that while policies governing printed collections are well established, equivalent guidelines for digital repository management are either absent or inadequately implemented. Consequently, digital repository management activities are often carried out inconsistently and depend largely on individual initiatives rather than institutional frameworks.

Participants likewise emphasized that digital repository has not yet become a strategic priority in many institutions. Budget allocations, infrastructure development, and long-term planning continue to favor traditional library operations, leaving digital repository with limited organizational support. This lack of institutional commitment restricts the development of standardized workflows and coordinated preservation practices.

These findings support previous studies emphasizing that effective digital repository management requires formal governance structures that clearly define institutional responsibilities, preservation standards, and long-term strategic objectives (Masenya & Ngulube, 2020; Digital Preservation Coalition, n.d.). Without organizational commitment, repository management often becomes fragmented and vulnerable to administrative and technological changes. Similarly, Walters and Skinner (2015) argued that institutional governance provides the strategic direction necessary for sustaining digital repositories by ensuring policy continuity, accountability, and long-term resource allocation.

Financial and Resource Management

Financial sustainability emerged as another critical challenge affecting the participating academic libraries. Respondents reported that digital repository management initiatives frequently depend on limited institutional budgets or external funding sources. While grants provide opportunities to initiate digitization projects, they rarely ensure the continuous maintenance of digital repositories, software licenses, cybersecurity systems, and storage infrastructure.

Budget limitations also influence decisions regarding hardware acquisition, software upgrades, and repository expansion. Several participants explained that financial constraints force institutions to prioritize selected collections for preservation rather than implementing comprehensive preservation strategies. Such limitations reduce the capacity of libraries to respond effectively to technological change and increasing volumes of digital materials.

These findings are consistent with previous studies identifying sustainable funding as one of the essential prerequisites for long-term digital repository management (Beagrie et al., 2019; Houghton & Creaser, 2022). Beagrie et al. (2019) emphasized that digital preservation involves recurring costs associated with storage infrastructure, technology refreshment, and repository maintenance rather than one-time expenditures. Likewise, Houghton and Creaser (2022) found that insufficient financial investment remains one of the principal barriers preventing academic institutions from sustaining digital repository management initiatives.

Information Technology Infrastructure and Storage

Another major concern identified in the study involves the adequacy of technological infrastructure supporting digital preservation. Respondents reported that existing servers, storage devices, and repository systems often struggle to accommodate the growing volume of digital collections. Several institutions continue to rely on aging hardware and software platforms that no longer meet current preservation requirements.

Although cloud-based storage solutions were recognized as viable alternatives for improving scalability and accessibility, many institutions considered their implementation financially challenging. Participants also identified difficulties associated with migrating digital collections to newer storage environments because of incompatible file formats, outdated software applications, and limited technical expertise.

These findings reinforce previous research demonstrating that reliable technological infrastructure is fundamental to sustainable repository management (Kim, 2018; Johnston, 2020). Kim (2018) noted that repositories require scalable storage, secure servers, and regular system upgrades to remain functional over time, while Johnston (2020)

highlighted that technological obsolescence and inadequate infrastructure significantly increase the risk of permanent information loss.

Metadata and Standardization

The interviews further revealed that inconsistent metadata practices continue to hinder effective digital repository. Participants explained that different departments frequently adopt varying cataloguing procedures and metadata standards, resulting in inconsistencies that complicate information retrieval, interoperability, and long-term management of digital collections.

Respondents emphasized that the absence of standardized metadata frameworks makes it difficult to integrate collections across institutional repositories. Inadequate documentation likewise affects the discoverability and authenticity of preserved digital resources.

These observations are supported by existing literature recognizing metadata as an essential component of digital repository management (Baca, 2016; Stein et al., 2017). According to Baca (2016), standardized metadata facilitates resource discovery and interoperability, while Stein et al. (2017) emphasized that sustainable metadata workflows improve repository quality and support long-term preservation planning.

Training and Capacity Building

Human resource capability emerged as another major challenge influencing preservation effectiveness. Participants consistently reported that many library personnel have limited technical knowledge of digital preservation, particularly in metadata creation, repository management, digital archiving, and preservation planning.

Respondents also noted that opportunities for specialized professional development remain limited because of financial constraints and competing institutional priorities. As digital preservation technologies continue to evolve, existing competencies quickly become outdated unless supported by continuous training.

These findings emphasize that sustainable digital repository management depends not only on technological infrastructure but also on knowledgeable professionals capable of implementing repository and preservation strategies (Yakel, 2007). Carroll and Mallon (2021) further observed that continuous professional development and communities of practice strengthen institutional learning and enable library personnel to adapt to emerging technologies and evolving user needs.

Collaboration and Networking

The final challenge identified by participants concerns limited collaboration among academic libraries and other stakeholders involved in digital preservation. Although respondents acknowledged the benefits of collaborative partnerships, formal mechanisms for knowledge sharing, joint preservation initiatives, and resource sharing remain relatively limited.

Participants observed that stronger collaboration could facilitate the exchange of technical expertise, development of common preservation standards, and sharing of technological resources, thereby reducing institutional costs while improving preservation quality.

These findings align with previous studies demonstrating that collaborative preservation networks significantly enhance institutional resilience by enabling libraries to pool expertise, share infrastructure, and establish common preservation strategies. Strengthening collaborative partnerships therefore represents an important strategy for promoting sustainable digital preservation within academic libraries.

These findings align with previous studies demonstrating that collaboration enhances repository sustainability by promoting knowledge sharing, technical assistance, and resource sharing among institutions (Carroll & Mallon, 2021; Roknuzzaman et al., 2009). Integrating knowledge management practices into repository systems enables organizations to strengthen institutional learning while maximizing limited technological and financial resources (Farnese et al., 2019).

4.2 Best Practices in Digital Repository Management among Academic Libraries

Despite the challenges encountered by academic libraries, the findings revealed several best practices that have contributed to strengthening digital repository management. These practices demonstrate the institutions' commitment to ensuring the long-term accessibility, authenticity, and integrity of digital collections despite financial, technological, and organizational constraints. Six major themes emerged from the qualitative analysis: institutional policy and governance, sustainable resource management, technological innovation and infrastructure, metadata management and standardization, professional development and capacity building, and collaboration and strategic partnerships.

Table 2 Emerging Themes on the Best Practices in Digital Repository Management

Theme	Best Practices Identified
Institutional Policy and Governance	Development of institutional policies and preservation guidelines
Sustainable Resource Management	Strategic budgeting, resource prioritization, and funding initiatives
Technological Innovation and Infrastructure	Digital repositories, cloud storage, backup systems, and cybersecurity measures
Metadata Management and Standardization	Adoption of standardized metadata schemas and documentation practices
Professional Development and Capacity Building	Continuous staff training, workshops, and technical mentoring
Collaboration and Strategic Partnerships	Institutional collaboration, resource sharing, and professional networking

Institutional Policy and Governance

One of the most significant best practices identified was the establishment of institutional policies that provide direction for digital preservation activities. Participants emphasized that institutions with formal preservation guidelines demonstrated more systematic management of digital collections than those relying solely on informal procedures.

Respondents explained that preservation policies facilitate consistent decision-making regarding digital acquisition, storage, access, migration, security, and long-term maintenance. Institutional commitment was likewise reflected through the inclusion of digital preservation in strategic plans and administrative priorities.

These findings affirm that governance serves as the foundation of sustainable digital repository management. The Digital Preservation Coalition (n.d.) emphasized that preservation policies establish institutional accountability and ensure continuity of preservation activities. Likewise, Masenya and Ngulube (2020) found that governance structures significantly influence the sustainability of digital preservation initiatives.

Sustainable Resource Management

Participants identified strategic resource allocation as another important best practice. Although financial limitations remain a challenge, several institutions have adopted budgeting strategies that prioritize essential preservation activities such as storage upgrades, software maintenance, and equipment replacement.

Respondents also reported seeking external funding opportunities through government agencies, institutional grants, and collaborative projects to supplement limited operational budgets. Careful prioritization of high-value digital collections enables institutions to maximize available resources while ensuring the preservation of materials with significant academic and historical value.

These findings corroborate the work of Beagrie et al. (2019), who emphasized that sustainable repository management requires continuous financial investment to support evolving storage technologies and preservation activities. Similarly, Houghton and Creaser (2022) reported that institutions with long-term financial planning demonstrate greater resilience in maintaining digital repositories.

Technological Innovation and Infrastructure

The adoption of appropriate technologies emerged as another major best practice. Participants reported utilizing institutional repositories, cloud-based storage solutions, redundant backup systems, and cybersecurity measures to strengthen digital preservation.

Several libraries have implemented scheduled backups, antivirus protection, secure servers, and regular monitoring of digital collections to minimize the risks associated with hardware failure, cyber threats, and accidental data loss. Some institutions also perform periodic migration of digital files into current formats to maintain long-term accessibility.

These practices are consistent with Rosenthal et al. (2005), who recommended redundancy, integrity checking, and secure backup systems as fundamental requirements of trustworthy digital preservation systems. Walters and Skinner (2015) likewise emphasized that scalable technological infrastructure strengthens repository reliability and long-term accessibility.

Metadata Management and Standardization

The study further revealed that libraries employing standardized metadata practices experience more efficient organization and retrieval of digital resources. Respondents emphasized the importance of maintaining consistent cataloguing procedures and comprehensive documentation to facilitate long-term preservation.

Several institutions have begun adopting internationally recognized metadata standards to improve interoperability among digital repository systems. Standardized metadata not only supports efficient information retrieval but also strengthens the authenticity, integrity, and usability of digital collections.

These findings support the observations of Baca (2016), who identified metadata as the foundation for resource discovery and preservation, and Stein et al. (2017), who argued that consistent metadata workflows improve interoperability and repository sustainability.

Professional Development and Capacity Building

Continuous professional development emerged as one of the strongest institutional practices supporting digital repository management. Participants reported that seminars, technical workshops, mentoring activities, and professional conferences have significantly enhanced staff competencies in digital archiving, metadata creation, repository management, and information technology.

Respondents further acknowledged that digital repository management requires continuous learning because technological developments occur rapidly. Institutions that regularly invest in staff development demonstrate greater adaptability in responding to emerging preservation challenges.

These findings are supported by Yakel (2007), who emphasized that digital curation requires continuous professional learning, and Carroll and Mallon (2021), who found that communities of practice strengthen organizational knowledge and staff competencies in academic libraries.

Collaboration and Strategic Partnerships

Collaboration among academic libraries and external organizations was identified as another essential best practice. Participants emphasized that partnerships facilitate knowledge sharing, technical assistance, joint training activities, and resource sharing, thereby reducing institutional costs while improving preservation effectiveness.

Several respondents noted that collaboration with government agencies, professional organizations, and other higher education institutions provides opportunities to exchange expertise, develop common preservation standards, and strengthen institutional capabilities. The findings support earlier studies demonstrating that collaborative repository

management networks promote innovation, increase institutional resilience, and encourage the adoption of standardized preservation practices. Strategic partnerships therefore play an important role in sustaining digital repository efforts, particularly among institutions operating with limited resources.

The best practices identified in this study demonstrate that sustainable digital preservation is achieved through the integration of organizational commitment, financial planning, technological innovation, professional competence, and collaborative engagement. Although individual institutions differ in available resources and organizational structures, successful preservation initiatives consistently combine these elements into a coordinated institutional strategy.

The findings further indicate that no single best practice is sufficient to ensure long-term preservation. Rather, sustainability depends on the interaction of effective governance, continuous investment in technology and human resources, standardized preservation procedures, and active collaboration among stakeholders. This integrated approach reflects the principles of Socio-Technical Systems Theory, which emphasizes the interdependence of organizational and technological components in achieving sustainable organizational outcomes.

The best practices identified in this study provide practical guidance for academic libraries seeking to strengthen their digital repository management initiatives. Integrating these practices into institutional policies, strategic planning, and daily operations can improve the accessibility, authenticity, and long-term preservation of digital resources while supporting teaching, research, and knowledge management higher education institutions.

These findings agree with Roknuzzaman et al. (2009), who emphasized that integrating knowledge management processes into digital library systems promotes organizational learning and collaboration. Likewise, Farnese et al. (2019) explained that knowledge sharing strengthens institutional capability by facilitating continuous learning and innovation.

Proposed Sustainable Information Management Plan for Digital Repository in Libraries

The findings of this study indicate that sustainable information management plan for digital repositories in libraries requires an integrated approach that addresses institutional, financial, technological, and human resource dimensions. The challenges identified across the participating academic libraries demonstrate that isolated digital repository management initiatives are insufficient to ensure the long-term accessibility, authenticity, and integrity of digital collections. Consequently, a sustainable information management plan is proposed to guide academic libraries in strengthening their digital repository management activities through coordinated institutional strategies.

The proposed plan is anchored on the principles of sustainability, continuous improvement, institutional collaboration, and capacity building. Rather than functioning as a short-term intervention, the management plan is intended to support the continuous enhancement of digital repository management initiatives within academic libraries.

Table 3 Proposed Sustainable Information Management Plan for Digital Repository in Libraries

Strategic Area	Key Strategies	Responsible Office/Personnel	Expected Outcomes	Performance Indicators
Institutional Policy and Governance	Develop and institutionalize comprehensive digital repository management policies aligned with institutional goals.	University Administration, Library Director	Standardized digital resource preservation practices and stronger institutional commitment	Approved digital repository management policy; annual policy review conducted
Financial Sustainability	Allocate regular institutional funding and seek external grants for digital repository	Finance Office, Library Administration	Stable financial support for preservation programs	Annual budget; externally funded projects secured

	management initiatives.			
Technology Infrastructure	Upgrade digital repositories, implement secure cloud storage, establish routine backup and cybersecurity protocols.	Information Technology Office, Library Systems Unit	Reliable, secure, and scalable preservation infrastructure	Repository uptime; successful backup and recovery tests; reduced system downtime
Metadata Management	Adopt internationally recognized metadata standards and establish institutional cataloguing guidelines.	Librarians, Technical Services Unit	Improved interoperability and resource discoverability	Percentage of collections compliant with metadata standards; improved retrieval efficiency
Human Resource Development	Conduct continuous professional development through training, mentoring, and certification programs.	Human Resource Office, Library Administration	Increased staff competency in digital preservation	Number of training activities; percentage of trained personnel; competency assessment results
Collaboration and Networking	Establish partnerships with academic institutions, government agencies, and professional organizations for resource sharing and knowledge exchange.	University Administration, Library Director	Expanded collaborative digital repository management initiatives and shared expertise	Number of active partnerships; collaborative projects implemented; joint training programs conducted
Monitoring and Continuous Improvement	Regularly evaluate digital repository management activities and update strategies based on emerging technologies and institutional needs.	Library Quality Assurance Committee	Continuous improvement of digital repository practices	Annual evaluation reports; implementation of corrective actions; user satisfaction ratings

The proposed Sustainable Information Management Plan integrates the major findings of the study into a strategic framework that addresses the interconnected challenges affecting digital resources preservation. The framework recognizes that effective preservation extends beyond technological solutions and requires coordinated institutional policies, adequate financial investment, competent personnel, standardized preservation procedures, and collaborative partnerships.

Institutional governance serves as the foundation of the framework by ensuring that digital repository management is incorporated into organizational policies and strategic planning. Formal policies provide clear guidance regarding preservation responsibilities, resource allocation, and operational procedures, thereby promoting consistency and accountability across library operations.

Financial sustainability is equally important because preservation technologies, storage systems, and cybersecurity measures require continuous investment. Integrating repository management into institutional budget planning while pursuing external funding opportunities enables libraries to maintain essential infrastructure despite financial constraints.

The framework also highlights the importance of technological modernization. Reliable repository systems, secure cloud-based storage, routine backup procedures, and cybersecurity protocols minimize risks associated with data loss, technological obsolescence, and unauthorized access. These technological measures enhance the integrity and long-term accessibility of digital collections.

Professional development remains a central component of sustainable preservation. Continuous education equips librarians and information technology personnel with the competencies required to manage evolving preservation technologies, metadata standards, and repository systems. Investment in human capital strengthens institutional resilience and improves the quality of preservation services.

Collaborative partnerships promote knowledge exchange, resource sharing, and joint preservation initiatives among academic libraries and other organizations. Such partnerships enhance institutional capacity while reducing operational costs through shared expertise and infrastructure.

The proposed Sustainable Management Plan provides a practical framework that academic libraries may adopt or adapt according to their institutional context. The coordinated implementation of governance, sustainable funding, technological infrastructure, workforce development, and collaborative partnerships can strengthen digital repository management and enhance the long-term accessibility, authenticity, and integrity of institutional digital collections.

5. CONCLUSION AND IMPLICATIONS

This study explored the challenges and best practices in digital repository management among selected academic libraries in Zamboanga City and developed a Sustainable Information Management Framework based on the findings. The results revealed that academic libraries continue to encounter challenges related to institutional governance, financial sustainability, technological infrastructure, metadata management, staff competencies, and collaborative partnerships. Despite these challenges, the participating libraries have adopted best practices such as establishing institutional policies, implementing metadata standards, investing in repository technologies, promoting continuous professional development, and fostering collaboration. These findings demonstrate that sustainable digital repository management requires the integration of organizational commitment, technological capability, and skilled personnel. The proposed Sustainable Information Management Plan provides a practical guide for academic libraries in strengthening repository management through coordinated institutional policies, sustainable funding, reliable technological infrastructure, standardized metadata practices, staff capacity building, and collaborative partnerships. The framework may assist higher education institutions in improving the accessibility, authenticity, integrity, and long-term sustainability of their digital repositories while supporting teaching, research, and knowledge sharing.

The findings also have implications for library administrators, higher education institutions, policymakers, and professional organizations. Strengthening institutional policies, investing in repository infrastructure, supporting continuous staff development, and promoting collaboration among academic libraries and other stakeholders can enhance the sustainability of digital repository initiatives. In addition, government agencies and professional organizations may support these efforts by providing policy guidance, technical assistance, and capacity-building programs. Future research may validate the proposed framework in other academic libraries and explore the influence of emerging technologies, such as artificial intelligence, cloud computing, and cybersecurity, on sustainable digital repository management.

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