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African Libraries and Information Services at the New Crossroads

Proceedings of Selected Papers from the

XXVII Standing Conference of Eastern, Central and Southern African Library and Information Associations (SCECSAL)

Livingstone, Zambia, 27 April - 1 May 2026

Editors:
Justin Chisenga, Perpetual M. Katsriku, Kaoma L. Daka and Christine W. Kanyengo

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We are grateful to our keynote speakers, Dr Edmund Balnaves from Australia and Prof. Ruth Hoskins from South Africa, for sharing their expertise and knowledge with Conference participants.

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We sincerely thank the reviewers for their time and expertise in ensuring the quality and scholarly standards of the papers included in these proceedings. We also thank all our sponsors, partners, paper presenters, session chairpersons and service providers, for their valuable contributions and participation.

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Mubanga Lumpa
President
Library and Information Association of Zambia (LIAZ)

PREFACE

The Standing Conference of Eastern, Central and Southern African Library and Information Associations has been held as a regular biennial event, hosted by SCECSAL member Associations, since 1974. The Conference serves as an open and inclusive platform for library associations, library and information service providers, library and information professionals, policy makers, development practitioners, and library and information science academics and students from within the SCECSAL region and beyond. It provides an opportunity to discuss the latest developments and trends in the field, exchange knowledge and best practices, share research findings and innovative approaches, and network with peers to facilitate collaboration on joint initiatives and research projects that advance library and information science and improve library and information service delivery in the region.

This volume presents the proceedings of selected papers of the XXVII SCECSAL Conference, hosted by the Library and Information Association of Zambia (LIAZ), held in Livingstone, under the theme "African Libraries and Information Services at the New Crossroads."

The theme provided the delegates with an opportunity to examine emerging opportunities and challenges facing the sector. These proceedings are organised into ten thematic sections corresponding to the Conference sub-themes, listed on the back cover and the Table of Contents.

These proceedings bring together selected papers presented at the Conference. They provide a record of the scholarly and professional contributions shared during SCECSAL XXVII and offer insights, experiences, research findings, and practical approaches relevant to the continued development of library and information services in Africa.

The quality of a Conference depends greatly on the contributions of its authors, reviewers, editors, organisers, and participants. We therefore express our sincere appreciation to all those who contributed to the success of the XXVII SCECSAL Conference and, in particular, to the authors and reviewers whose efforts made these proceedings possible.

We hope that this publication will serve not only as a record of the Conference but also as a useful resource for researchers, educators, practitioners, policymakers, and students. Most importantly, we hope it will stimulate further research, dialogue, collaboration, and innovation as African libraries and information services navigate the new crossroads.

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KEYNOTE PAPER

Harnessing AI and Data in African Libraries for Africa's Development

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Abstract

This paper explores the critical role African libraries can play in harnessing artificial intelligence (AI) and data to advance sustainable development across the continent. Positioned as trusted, equitable community institutions, libraries are uniquely equipped to mediate the adoption of AI technologies in ways that align with the public good, ethical standards, and local needs. The analysis moves beyond a narrow focus on generative AI to consider a broader ecosystem, including machine learning for image recognition, big data analytics, and, crucially, AI-powered translation tools. This linguistic dimension is particularly vital in sub-Saharan Africa, where extreme linguistic diversity presents a significant barrier to information access. By leveraging open-source platforms and cloud-based services, libraries can deploy AI to translate and localise content, thereby dramatically widening access to educational, governmental, and cultural resources in local languages. Realising this potential, however, requires African libraries to actively build their agency and local capacity to develop and apply AI solutions. This involves engaging in foundational work to develop regionally contextualised large language models, applying retrieval-augmented generation to enrich global models with local knowledge, and utilising AI for enhanced discovery and classification of cultural heritage materials. While challenges such as funding constraints, data silos, and nascent digitisation efforts exist, a pathway forward is demonstrated through emerging initiatives and international collaborations, such as the IFLA symposia held across South African universities. Ultimately, by adopting a framework of governance, education, and experimentation, libraries can ensure AI serves as a multiplier for the visibility and accessibility of Africa's rich research and cultural output, directly contributing to the continent's inclusive and equitable development.

Keywords: *artificial intelligence, big data, sub-Saharan Africa, large language models.*

1. AI Dimensions

When we discuss artificial intelligence (AI), it is easy to focus on the generative systems used in text, audio and image applications. These are important, and valuable, but they are by no means the only parts of AI that are relevant to libraries.

2. Libraries, AI, and the Sustainable Development Goals

Over the last 10 years, the United Nations has been building on the 17 Sustainable Development Goals (SDGs) which provides a foundation for development planning in all regions of the world (United Nations, 2025; United Nations development Programme, 2017).

For libraries specifically the International Federation of Library Associations and Institutions (IFLA) recognises the centrality of access to information within the SDGs (IFLA, 2025). This paper explores

the ways in which AI and big data can contribute to these goals in sub-Saharan Africa. The library is uniquely situated in this context with its historical centrality as a trusted resource for access to information. Artificial Intelligence has been evolving for over 20 years (Balnaves et al., 2025). AI, including its use for image recognition (and facial recognition), is becoming pervasive across many different applications, and its accessibility has grown apace as a result. Mobile device providers have moved rapidly to position products with embedded AI, leveraging its ability to describe and modify images. This has opened up many challenging ethical, cultural and legal issues, not least around copyright and intellectual property rights.

The pace of development has been very rapid, and libraries face both a challenge and an opportunity in leveraging AI to fulfill their missions for accessibility and access to information.

3. Trust, the Library and Artificial Intelligence

There are many contexts in which AI can enhance the work of libraries in supporting development in the African context. Libraries are a key source of trusted access to information. Numerous research studies point to the important place the library holds particularly in a world of complex information and misinformation (Fox, 2017). Public libraries have a key role in providing equitable access to information. Libraries in educational institutions provide access to important and trusted research portals. Libraries in government can provide access to rich archives of historical reports by government instrumentalities.

This trust uniquely positions libraries to support users in adopting artificial intelligence technologies. Libraries are widely regarded as neutral, public-interest institutions that prioritise intellectual freedom, privacy, and equitable access to information. When libraries introduce AI tools or services, users are more likely to engage with them because they trust that these technologies are being selected, implemented, and explained in ways that serve user needs rather than commercial or surveillance interests. This credibility allows libraries to act as safe entry points for AI exploration, particularly for users who may be sceptical of large technology companies or unsure about the implications of AI systems.

Trust also enables libraries to play a critical educational role in helping users understand how AI works and how it should be used responsibly. Because libraries are trusted sources of information literacy instruction, users are more receptive to guidance on topics such as algorithmic bias, data quality, transparency, and ethical use of AI-generated content. Librarians can frame AI not as an opaque or intimidating technology, but as a tool that requires critical evaluation, much like traditional information sources. This trusted instructional relationship empowers users to adopt AI thoughtfully, with an awareness of both its capabilities and its limitations.

Finally, trust in libraries supports inclusive and equitable AI adoption by ensuring that user interests remain central. Libraries' strong commitments to user privacy and confidentiality reassure patrons that their data will be protected when interacting with AI-enabled services. This is especially important for vulnerable or marginalised communities who may be disproportionately affected by misuse of AI or data exploitation. By embedding AI within trusted library services and values, libraries can reduce fear, build confidence, and foster informed participation in an AI-enabled information environment, helping users adopt these technologies in ways that are ethical, confident, and aligned with the public good.

4. Language and AI

AI-powered translation has significant value in the African context, where extraordinary linguistic diversity coexists with limited access to professional translation resources. With over 2000 languages spoken across the continent (Brenzinger & Batibo, 2010), many of which are under-resourced in digital

environments, AI translation tools offer a scalable way to bridge communication gaps. These systems can support everyday access to information in health, education, agriculture, and government services by making content available in local and regional languages. This helps reduce reliance on colonial or global lingua francas alone and enables more people to engage with information in the languages they use most confidently.

In education and knowledge dissemination, AI translation can play a transformative role by expanding access to learning materials and research. Academic content, training resources, and open educational materials can be translated into African languages more rapidly and affordably than through traditional methods. This supports multilingual education initiatives and helps preserve and legitimise local languages in formal and digital settings. In research and cultural heritage contexts, AI-assisted translation also enables African knowledge, stories, and scholarship to be shared more widely, both within the continent and globally, fostering greater cross-cultural understanding.

AI translation also has strong economic and social implications across Africa. By lowering language barriers, it can support regional trade, cross-border collaboration, and participation in the digital economy. Small businesses, NGOs, and community organisations can use AI tools to communicate across linguistic boundaries without prohibitive costs. Challenges nonetheless remain, such as uneven accuracy for low-resource languages and the need for community involvement to ensure cultural and linguistic integrity.

Much of the work in language integration by major vendors such as Zoom, Wordly and Grammarly is driven by the commercial imperative of market size. Regrettably, few have recognised the possibilities of the sub-Saharan African marketplace.

Zoom for instance has now integrated live transcription and captioning. Of the 37 languages currently supported by Zoom, none is an African language (English and European languages aside). Wordly has a longer history in translation systems and includes Swahili, Zulu and Afrikaans. Grammarly does not include any sub-Saharan African languages. Google Translate however includes an impressive range of African languages including Acholi, Alur, Baoulé, Bemba, Dinka, Dombe, Dyula, Ga, Kanuri, Kiga, Kikongo, Kituba, Luo, Nuer, N'ko, Rundi, Sango, Susu, Swati, Tiv, Tswana, Tumbuka, Venda, Wolof, among others.

AI translation represents a powerful tool for inclusion, empowerment, and linguistic equity when developed and deployed in partnership with African language communities.

Open-source systems are a key entry point for libraries. Systems such as Koha (for traditional library services) and DSpace (for digital libraries) provide an open platform for translation. Leveraging tools such as Google Translate and the open translation frameworks provided by open-source library systems represents a huge opportunity for African libraries to widen their accessibility. AI can play a key role in this transition by enabling the rapid addition of translated language and context-sensitive interfaces.

5. Generative AI

The early stages of generative AI have favoured easily accessible information sources in the English language. While this has been is a point of criticism, this early evolution of large language models has served as a proving ground for establishing the value of AI. It is important to remember that this aspect of AI is in its relative infancy.

Large language models (LLMs) have expanded into multiple languages primarily using vast, multilingual training datasets that include text from many linguistic and cultural contexts. By training on diverse

corpora, ranging from books and news articles to web content and public documents, LLMs learn shared patterns across languages, such as grammar, semantics, and discourse structures. This approach allows a single model to support dozens or even hundreds of languages, including low-resource languages that previously lacked sufficient data for standalone language technologies. As a result, multilingual LLMs can translate, summarise, and generate content across languages with increasing fluency and contextual awareness.

Advances in model architecture and training techniques have further accelerated multilingual expansion. Techniques such as cross-lingual transfer learning enable knowledge gained in high-resource languages to improve performance in related or less-resourced languages. Subword tokenisation methods allow models to handle diverse writing systems and morphological structures efficiently, reducing the need for language-specific engineering. More recently, instruction tuning and reinforcement learning across multilingual prompts have improved the models' ability to follow instructions consistently across languages, making them more practical for real-world use in education, government, and research.

Beyond these technical advances, the expansion of LLMs into multiple languages has also been driven by growing demand for inclusive and globally accessible AI systems. Organisations developing LLMs increasingly prioritise linguistic diversity to reduce digital inequality and support local knowledge creation. This can lead to partnerships with cultural institutions, universities, and open-data initiatives to incorporate non-English and regionally specific content. While challenges remain, such as uneven performance quality and cultural bias, the multilingual growth of LLMs represents a significant step toward more equitable access to AI-powered tools and information worldwide.

6. Data Depth

All AI depends on big data to train models that can then be used to answer questions or undertake tasks (identify this image, answer this question, construct this image). The larger the data source, the greater the potential for training large language models and machine learning models. Generative AI systems have leveraged crawling systems to assemble content from across the vast resources of the internet.

Big data in libraries remains under-explored territory (Garoufallou & Gaitanou, 2021). Ironically, the broad crawling systems of generative AI have made better use of library data than libraries themselves. Data sources in research data systems include analytical usage data as well as a great depth of research results and publication information. Big data relevant to libraries is also situated in the wider context of demographic and government information relevant to decision making for libraries (Lee & Kwon, 2023; Lu et al., 2017). Libraries should not overlook the opportunities offered by big data in open government demographic and population resources.

The siloed nature of repositories in Africa, and the nascent digitisation of assets, combined with the great diversity of languages may appear to be a barrier to the evolution of these resources into big data. However, it is a hurdle that time and effort can overcome. African institutions are actively exploring the potential for AI by leveraging the benefits of the communities of effort already under way. Since 2020 the IFLA Information Technology Section has been promoting a series of symposia exploring various dimensions of AI and robots in libraries. This has included three symposia specifically in the African context. The Section has collaborated with South African universities in a series of these symposia. The second IT Section symposium was hosted by the Department of Library Services at the University of Pretoria in 2021 (University of Pretoria, 2021). The third IFLA Symposium on Artificial Intelligence was held at North West University in 2023 (IFLA, 2023). The fifth IFLA Symposium on AI was held on 16–20 June 2025 hosted by the University of KwaZulu-Natal (UKZN) Library in Pietermaritzburg, South Africa (IFLA, 2025). A further symposium is planned for September 2026. This sort of inter-

national collaborative engagement exemplifies the ways in which African libraries are engaging in the complex area of AI adoption.

A strong example of leveraging multiple facets of big data is the Zamani Project. Using laser scanning, photogrammetry, satellite imaging, GIS mapping and panoramic photography, the project builds 3D models of heritage site (Zamani Project, 2026). The resulting collection includes terabytes of 3D point-cloud and spatial data that can be repurposed in many ways (see Figure 1). Uses of this big data include:

- conservation modelling
- monitoring environmental damage
- digital tourism and virtual access
- research datasets for archaeology and architecture

Figure 1

3D Model of the Nelson Mandela Statue, Created by Xhanti Mpakama



Source: Zamani Project (2026)

7. African Reports and Research

Educational institutions and governments in Africa are a rich source of information. Stellenbosch University in the Western Cape was an early adopter of open-source software for its journal management and publishing frameworks. Its SUNScholar repository is now an excellent academic repository with over 57,000 publications. Parliamentary libraries have also been active in adopt repositories for legislative output. Health libraries are leveraging evidence-based research to enhance their discovery systems. Nevertheless, the adoption of AI in African libraries remains limited (Abba, 2024), and funding remains an impediment to AI adoption (Lee, 2023). This can be ameliorated using cloud-based and open-source systems (Balnaves, 2025).

8. Training AI in African-context Information

To use generative AI to enrich of African resources, institutions across sub-Saharan Africa will need to engage with Large Language Models (LLMs) across sub-Saharan Africa as tools to expand access to information, education, and public services. Vulavula is an example of a large language model built for the African context by Lelapa AI (Lelapa AI, 2025; Ravindran, 2023). Universities and research institutions are already leveraging major LLMs such as GPT and Llama to support teaching and learning through automated tutoring, research assistance, and academic writing support, particularly in contexts where staff-to-student ratios are high.

The next stage for African development is to engage in the work of language-specific enhancement of AI. Hussen et al. (2025), highlight the need for foundational linguistic work to enhance the development of African models.

By enabling interaction in widely spoken regional and local languages alongside English, French, and Portuguese, LLMs help reduce linguistic barriers and improve inclusivity for students and researchers who have historically been underserved by global digital platforms. In government agencies and public institutions, LLMs have the potential to improve service delivery, knowledge management, and citizen engagement. Chatbots and virtual assistants can help citizens navigate administrative processes, access health or agricultural information, and understand legal or regulatory requirements. For institutions with limited human resources, LLMs offer the potential to scale expertise cost-effectively, while also supporting internal workflows such as document summarisation, policy drafting, and data analysis. This can only be achieved by through strong investment in this area.

9. Agentic AI

The term agentic AI refers to the process of giving active agency to AI in workflow and task processing. The potential of agentic AI is only now emerging. It has implications for the library in a number of workflow tasks, including cataloguing, research services support and various library service delivery functions. The degree to which agentic AI represents an opportunity for enhanced service delivery or a risk to library staff is not clear currently. The ethical elements surrounding generative AI have even greater relevance to agentic AI. In particular, the unsupervised use of agentic AI operating autonomously with little or no human interaction should be carefully scrutinised.

10. Harnessing AI and Data in African Libraries for Africa's Development.docx

10.1 Cultural Heritage issues

Institutions are increasingly aware of the need to align their use of AI with local governance frameworks, data protection laws, and ethical guidelines. Cultural heritage institutions, libraries, and NGOs in sub-Saharan Africa are also leveraging LLMs to support digitisation, translation, and preservation of indigenous knowledge. By assisting with transcription, metadata creation, and multilingual translation, LLMs can help make local archives and research outputs more visible both regionally and globally. At the same time, institutions are actively engaging with questions of bias, data sovereignty, and sustainability, recognising that effective use of LLMs requires local capacity building, contextual training data, and partnerships that place African institutions in control of how these technologies are developed and deployed. IFLA has also established the IFLA Digital Heritage Network which officers a further forum in which the intersection of AI and digital cultural heritage can be explored.

11. Conclusion

There are many pathways to harnessing AI in a productive way. Many of the AI toolkits are open source, including those for machine learning, translation and model generation. Others are offered as cloud-based services quite low cost. These options enable early experimentation with AI even when the institution is not ready for full AI adoption. University libraries can partner productively with their IT departments to explore and discover AI services.

Some of the steps in the adoption of AI include:

- Governance: establishing the principles governing the use of AI in your institution.
- Education: providing digital literacy education that encompasses AI.
- Engagement: exploring the collaborative development of systems for your institution.
- Experimentation: engaging with AI systems by leveraging open-source and accessible cloud-based trial systems.
- Evaluation: continually reviewing the AI deployment to ensure that the investment is the right-sized for the institution.

The sub-Saharan African region has over 2,000 spoken languages across many linguistic groups. This paper has explored the opportunities for this region to actively engage in AI to support the goals of development in the region. Critical in this process is the development of regional tools for better language and cultural awareness, and the leveraging of existing tools to enhance the language translation of resources. This will be an enabler of the progressive expansion of the accessibility and visibility of the rich diversity of resources available in this region.

Leveraging AI offers the potential provide a significant multiplier for the reach of the legislative, reporting and research output of the region. There are many entry points to exploring this opportunity. They involve engaging with AI to explore its possibilities, as many institutions in Africa already are. This engagement can take place at many levels, including:

- Using existing LLMs with retrieval augmented generation (RAG) to enhance these models with institutional and regional content.
- Building local LLMs and training models on African content.
- Deploying AI language translation tools to extend the reach of African content.
- Deploying machine learning AI tools for image and text classification and discovery.
- Using AI in chat services to extend the reach of the institution.

The best way to manage the risks of AI is to exercise agency in its use and adoption; understanding its functionality and its utility in enhancing the discoverability of African research within and outside Africa, and broadening access to the region's rich cultural resources for the benefit of African development. Many aspects of AI, including generative AI, are still in their early stages, and the ethnocentricity of the current AI models can be ameliorated by the active agency that African institutions take in adopting AI.

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LIBRARIES, INFORMATION SERVICES AND SUSTAINABLE DEVELOPMENT

Telling Impact Stories in Support of SDGs: A Case of Selected Public Libraries in South Africa

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Abstract

South Africa is committed to both the United Nations' Agenda 2030 and the African Union's Agenda 2063. Public libraries play a crucial role in promoting sustainable development and are well-positioned to support the achievement of the Sustainable Development Goals (SDGs). This paper explores how success stories are used to support the achievement of the SDGs in selected South African public libraries. It focuses on how these libraries raise community awareness about the SDGs, the media platforms used to communicate impact, and how existing programmes align with SDG objectives. The study responds to the gap that, despite South Africa's progress in addressing decades of poverty, inequality and unemployment, more needs to be done to achieve the goals set by the former Millennium Development Goals (MDG) targets and, more recently, the SDG targets. Guided by an interpretivist research paradigm, the study adopted a qualitative approach, employing a multiple-case study design that included libraries from three local municipalities: uMshwathi in KwaZulu-Natal; Moretele in the North West Province (not available for data collection); and Theewaterskloof in the Western Cape. These libraries were purposefully selected for their consistent engagement in SDG-aligned community initiatives. Data were gathered through semi-structured interviews with library managers via Microsoft Teams and analysed thematically. The results reveal that none of the participating libraries offers formal SDG training for their users. However, they do share impact stories via municipal websites and social media platforms such as Facebook, although privacy concerns remain a notable challenge. The libraries actively support key SDGs, particularly gender equality, quality education, and decent work and economic growth. The study recommends stronger collaboration between libraries and relevant stakeholders to help advance the 2030 Agenda. The paper aims to inform SDG development in South Africa and in other countries with comparable institutional and governmental structures and may also be valuable for comparative studies.

***Keywords**: impact story, SDGs, public library, sustainable development, South Africa.*

1. Introduction

South Africa, as a developing economy, continues to grapple with the triple challenge of poverty, inequality and unemployment. The country remains one of the most unequal societies (World Bank, 2025). Approximately 40% of the South African population lives below the lower bound of the poverty line, and 18% lives below the poverty line. Youth unemployment is at 46,5% (Stats SA, 2022). In response

to these challenges, the government of South Africa, as part of the global community, is addressing its development challenges through the National Development Plan (NDP), which aligns with the United Nations Sustainable Development Goals (SDGs) under Agenda 2030. South Africa has adopted a decentralised approach to implement the United Nations (UN) Sustainable Development Goals (SDGs), and the SDGs are integrated into government planning across all three spheres of government through the Medium-Term Strategic Framework (Haywood et al., 2019; Lubinga & Mukuku, 2021). At the national and provincial levels, 5-year strategic plans are in place, and at the local level, Integrated Development Plans (IDPs) are prepared to inform resource allocation for community development initiatives (Local Government: Municipal Systems Act, 2000). In South Africa, within this governance structure, public libraries are located within local municipalities, with the provincial government responsible for the delivery of the function and the national department responsible for national policy coordination. Within this decentralised governance, public libraries emerge as critical local institutions that bridge national policy coordination with community level development, thereby positioning them as essential role players in advancing implementation and promoting awareness of the SDGs.

Sustainable development is broadly defined as development that meets present needs without compromising the ability of future generations to meet their own needs, while integrating and acknowledging economic, environmental and social concerns (Kosciejew, 2020; Mathiasson & Jochumsen, 2022). The definition of sustainable development has evolved beyond the relationship between humans and nature to include cultural aspects (Loach et al., 2017; Mathiasson & Jochumsen, 2022). Furthermore, Mathiasson and Jochumsen (2022) proposed a conceptual framework that can be used to examine the contributions and connections of public libraries to the SDGs. This framework is based on the framework proposed by Loach et al. (2017). This framework positions public libraries as resource rich institutions, explicit about their motivations, and as exemplary and proactive agents of change. Thus, sustainable development offers a multidimensional lens through which public libraries can be understood not only as cultural and information hubs but also as proactive institutional actors advancing the SDGs.

Access to information is a cornerstone of sustainable development, enabling individuals to become aware of their rights, acquire new skills to become economically active, and make informed decisions about their personal lives and the environment (Kosciejew, 2020). Public libraries play a crucial role in facilitating access to information, and serve as essential agents of sustainable development within their communities (Aregbesola et al., 2024; Connaway et al., 2023; IFLA & UNESCO, 2022; Islam et al., 2024; Kosciejew, 2020). Libraries create a better-informed citizenry and promote lifelong learning and literacy in communities. They empower people to participate in democracy and their own development (Kosciejew, 2020; Mathiasson & Jochumsen, 2022). Furthermore, libraries build connections between individuals, groups and government organisations (Aregbesola et al., 2024; Eweje et al., 2021; Fan & Ke, 2025). Public libraries actively support education, health, the reduction of inequalities, partnerships, climate awareness, and poverty (Connaway et al., 2023; Islam et al., 2024). Thus, public libraries function not only as repositories of knowledge but as transformative institutions that advance sustainable development by fostering informed, empowered, and connected communities across multiple dimensions of the SDGs.

Building on the transformative role of public libraries, they should be regarded as instruments for implementing the SDGs as reliable institutional mechanisms that underpin the delivery of SDGs through policy alignment, community engagement and strategic outreach (Kosciejew, 2020). Furthermore, public libraries are recognised as key partners in promoting sustainable development (Aregbesola et al., 2024). Libraries also play an essential role in fostering behavioural change through community-driven practices and public outreach programmes (de Leon & Flores, 2025; Panda & Das, 2022). In addition, public libraries provide access to resources related to the SDGs, which is essential for raising awareness of these goals (Aregbesola et al., 2024). Moreover, public libraries provide community spaces that facilitate

engagement and collaboration on SDG initiatives and promote SDGs (Aregbesola et al., 2024). Public libraries are indispensable institutional actors whose integration of policy alignment, community engagement, and resource provision advances awareness of the SDGs and embeds sustainable development practices within the communities.

Several studies have examined the role of public libraries in supporting the SDGs; notable contributions include the OCLC study by Connaway et al. (2023) and the systematic reviews by Khalid et al. (2021) and Mathiasson and Jochumsen (2022), which provide a global perspective. OCLC, an international library cooperative, conducted an online survey involving 1700 participants, of whom 31% were from public libraries. The purpose of Connaway et al. (2023) study is to determine the extent to which public libraries support the SDGs. The OCLC survey revealed that a significant number of librarians were familiar with the SDGs but had not incorporated them into their strategic planning. Most libraries contribute to SDG 4, quality education, and public libraries support the SDGs through focused community programming, including career services and initiatives that promote equity and diversity (Connaway et al., 2023). However, the study's limitations include that participants were primarily individuals with internet access and social media profiles, and that it relied on staff perceptions. Khalid et al. (2021) conducted a systematic review that found that, although libraries supported the SDGs, libraries themselves lacked sustainable policies, and a lack of awareness among users and library staff was a significant barrier to their implementation. Both Khalid et al. (2021) and Connaway et al. (2023) reported similar findings regarding the lack of awareness of the SDGs among library staff. However, a Bangladeshi study by Islam et al. (2024) found that a significant number of librarians were aware of SDGs. Khalid et al. (2021) attribute this lack of awareness to the training provided by Library and Information Services (LIS) and the transdisciplinary nature of sustainable development. Additionally, Aregbesola et al. (2024) found that limited funding, staff shortages, a lack of relevant resources, and limited community engagement also hindered public libraries' efforts to promote the SDGs. Similarly, Islam et al. (2024) found that insufficient funding and infrastructure, as well as low awareness among policymakers, constrained SDG implementation. Collectively, these studies provide evidence of libraries' contributions to the SDGs and highlight systemic barriers that constrain their impact in promoting them, as well as the need to examine strategic alignment.

An analysis of strategic plans of 28 public libraries from four continents, namely North America, Asia, Europe and Oceania, revealed that public libraries integrate environmental sustainability in their strategic plans, and they contribute to climate action (de Leon & Flores, 2025). Furthermore, Eweje et al. (2021) and Fan and Ke (2025) recommend a collaborative approach among governments, the private sector, and civil society to deliver systematic change toward the implementation of the SDGs. Library policies and strategies should also cater to inclusivity and equity to ensure that marginalised voices are represented (Eweje et al., 2021; Fan & Ke, 2025). De Leon and Flores (2025) further recommend that public libraries strengthen strategic alignment with the broader SDGs, institutionalise the SDGs in governance and policy, embed the SDGs in their programmes, and use SDG indicators to enhance institutional accountability. Moreover, the evaluation of SDG initiatives is essential. Islam et al. (2024) further noted that public libraries are underrepresented in national tracking of SDGs. Notably, South Africa is not among the countries reporting on the SDGs and on public libraries' efforts to promote them in their communities. Globally, libraries are embedding sustainability into their strategies. Nevertheless, the absence of South African Public libraries from SDG reporting underscores the need to examine their contribution within a decentralised governance context

Additionally, several studies have been conducted in South Africa on how academic libraries are promoting SDGs, but there are few recent studies, namely, Aregbesola et al. (2024); Connaway et al. (2023); Eweje et al. (2021), that have been conducted on the role of public libraries in promoting the SDGs.

2. Problem Statement

South Africa's commitment to the United Nations' Agenda 2030 and the African Union's Agenda 2063 reflects a national drive to address persistent socioeconomic challenges, including poverty, inequality, and unemployment. Despite progress in implementing the Sustainable Development Goals (SDGs) through decentralised governance structures and Integrated Development Plans (IDPs), systemic gaps remain in translating these objectives into tangible community-level outcomes. Public libraries, as local institutions embedded within municipalities, are strategically positioned to advance SDG objectives by promoting access to information, lifelong learning, and social inclusion. Global research underscores libraries' contributions to the SDGs through education, equity, and community engagement; however, South African public libraries are underrepresented in national SDG reporting and lack formal mechanisms to integrate the SDGs into their strategies. Existing studies highlight barriers such as inadequate funding, limited staff capacity, and low awareness among both library personnel and users, which constrain libraries' ability to demonstrate impact. Furthermore, while libraries engage in community-based initiatives aligned with SDGs, there is little evidence on how these contributions are documented and communicated through success stories. This gap in impact storytelling not only limits institutional visibility but also undermines opportunities for collaboration and resource mobilisation. Therefore, it is critical to examine how selected public libraries in South Africa narrate and share success stories to showcase their role in supporting sustainable development within a decentralised governance context.

3. Purpose and Research Questions

This study investigates how selected public libraries in South Africa are telling success stories in support of the SDGs by answering the following research questions:

- How do selected public libraries educate their communities about the SDGs?
- What media channels do libraries employ to share impact stories?
- How do the chosen public libraries' programmes contribute to advancing the SDGs?

4. Methodology and Methods

This paper was guided by the interpretivist paradigm and adopted a qualitative research approach. Interpretive research is exploratory in nature, as the researcher interprets the realities and meanings presented by the participants (Flick, 2023; Connaway et al., 2023; Lincoln et al., 2018). The qualitative approach is best suited to the study, as it seeks to understand the public libraries' contributions to the country's objectives for meeting the SDGs. A multiple case study design is applicable to this study to enable the researchers to explore differences within and between cases (Nieuwenhuis, 2019). Cases with similar features, such as population size, demographics, rural and location from economic hubs, were purposefully selected for this study to allow the researchers to compare across and within the cases.

The study employed a multiple-case study design based on purposefully selected libraries from three local municipalities: uMshwathi (KwaZulu-Natal), Moretele (North West Province), and Theewaterskloof (Western Cape). The study purposefully selected these Municipal libraries based on their ongoing track record of community-based projects aimed at addressing the SDGs. The municipalities are similar in size. Qualitative data were collected from Library Managers at uMshwathi and Theewaterskloof Municipal Libraries, respectively, through interviews (using a semi-structured interview schedule) and document analysis, in which reports were scrutinised to establish what the libraries have done in the communities in which they are situated. Notably, participants from Moretele were unavailable during the data collection period. Hence, data were analysed using thematic content analysis (with reference to the uMshwathi and Theewaterskloof local municipalities), which led to a discussion of the findings.

4.1 Demographics of the Selected Library Services

This section provides a brief outline of the context of the selected municipal library services, including the one that was not available during the data collection period.

Moretele Library Services

Moretele Library Services are provided by the Moretele Local Municipality in the North West Province. The Municipality is part of the Bojanala Platinum District. It has a population of 186,947. The population is predominantly black African, with 99% identifying as such, and 88% of the population resides in rural areas under traditional leadership. The youth unemployment rate is 57%, and the share of the population aged 20 and over with higher education is only 4.6% (Stats SA, 2022).

Moretele Library Services has four libraries serving 24 wards, each comprising 66 villages. In the Municipal IDP plan for 2022/23, 11 wards identified the library as a top priority. In its planning, the municipality also recognises the need to provide for educational and library services to meet the needs of its young population (Moretele Local Municipality, 2022, p. 38).

uMshwathi Library Services

uMshwathi Local Municipality is located in the uMgungundlovu District of KwaZulu-Natal Province. It has four towns and five rural settlements under the traditional leadership. It has a population of 106,374, of whom 48% reside in tribal areas, 39% on farms, and 12% in towns (Stats SA, 2022).

Agriculture, mainly timber and sugar cane farming, is the main economic activity (uMshwathi Municipality, 2022). The unemployment rate is 25%, and youth unemployment is 32% (Stats SA, 2011). In their IDP, they recognise the need to focus their services on the needs of youth, children, and elderly persons. These include healthcare, education, and economic opportunities (uMshwathi, 2022, p. 56). uMshwathi Local Municipality has five community libraries, of which four are located in towns and one in the traditional authority area. The municipality has clearly articulated how it plans to contribute towards the attainment of SDGs in its IDP for 2023/24 (uMshwathi, 2022, p. 18, 44).

Theewaterskloof Library Services

The municipality is located in the Overberg District of the Western Cape province. It has a population of 108,790 (Theewaterskloof Municipality, 2022).

The main economic activities are agriculture and tourism (Theewaterskloof Municipality, 2022). The unemployment rate is at 15%. The municipality is also experiencing a decline in revenue while simultaneously seeing an increase in the indigent population. The municipality faces demand for basic services and community development. The municipality has developed a strategy to address the challenges of youth unemployment, drug abuse, and school dropout (Theewaterskloof Municipality, 2022). Libraries play a prominent role in this strategy, which aims to respond to these challenges. They are identified as a central referral point for information about job opportunities, and they are also identified as the spaces where the "Human Library" project, entrepreneurial hubs in libraries (Theewaterskloof Municipality, 2022).

5. Discussion of the Findings

The findings related to the libraries in uMshwathi and Theewaterskloof highlight common themes concerning the municipalities' contributions to achieving the SDGs. The discussion is structured around five key themes: Education, Awareness and Training; SDG alignment and Programmatic Contributions;

Communication, Media Channels, and Success Story Documentation; Challenges and Constraints; and Collaboration and Partnerships.

5.1 Education, Awareness and Training

The libraries approach the concept of formal SDG training differently, often integrating SDG objectives into existing skills development and awareness programmes:

- Theewaterskloof (TWK): The library does not necessarily use the term "SDGs" for all training sessions. They offer various trainings, such as computer training and specific awareness programmes (e.g., disability, cancer, men's health). A significant initiative, the "1000 stories" provincial programme, trained 23 youth in basic library skills to prepare them for employment. Staff are supported through bursaries to obtain formal qualifications.
- uMshwathi: The library does not offer formal SDG training or short courses to patrons but focuses heavily on making patrons aware of the SDGs and the AU 2063 agenda. They promote the SDGs during programme introductions and have designed their own SDG posters (printed in colour), which are displayed in public locations, including the main office, shops, and taxi ranks.

5.2 SDG Alignment and Programmatic Contribution

Both municipalities demonstrate programmes that advance several Sustainable Development Goals, particularly those related to education and livelihoods:

- Theewaterskloof: Programmes align specifically with several goals, including gender equality, quality education, decent work and economic growth through the "1000 stories" initiative. Furthermore, library gardens address poverty alleviation, food security/zero hunger. The library engages with Early Childhood Development (ECD) centres via cross-pollination and toy libraries.
- uMshwathi: Contributions span goals related to health, education, and access. They support SDG 4 (Quality Education) and SDG 8 (Decent Work and Economic Growth) by providing internet access for job-seeking and information. They assisted in establishing libraries in local schools and a Department of Correctional Services (DCS) facility. The library also addresses Substance Abuse (SDG 3 and 4) and promotes equality (SDG 1) by offering free access to services.

5.3 Communication, Media Channels and Success Story Documentation

Libraries utilise various platforms, often relying on municipal infrastructure, but face challenges in formally capturing user impact:

- Theewaterskloof: The library uses the municipal website. Libraries have established their own Facebook pages and YouTube stories. Facebook is explicitly used for "bragging" about events. A municipal employee is assigned to extract content from the libraries, edit it, and create polished posts. However, library users generally do not share success stories; the library shares the content, sometimes receiving verbal feedback from ECD teachers. Success stories from major programmes, such as the "1000 Stories" initiative, are documented in evaluation reports that highlight personal development. A significant challenge is that reports are often "extremely factual" and fail to show the actual impact.
- uMshwathi: The library lacks its own website or social media accounts. Information is shared via the municipality website and by live-streaming events on the municipal Facebook account.

Librarians also use personal social media accounts and a WhatsApp group to communicate with members and promote programmes. Documenting success is challenging due to privacy concerns, as patrons prefer to share stories face-to-face and are not keen to be named, although they may permit photographs.

5.4 Challenges and Constraints

Financial limitations and staff engagement are common challenges, although specific promotional obstacles vary:

- Theewaterskloof: Budget constraints affect training opportunities and limit funding for operational costs. Staff often lack time and are apprehensive about writing their own success stories. Promoting programmes faces the challenge of reaching larger audiences, although smaller, more personal engagements are considered more effective.
- uMshwathi: Insufficient funding is a primary obstacle. The effectiveness of outreach is hampered by some staff members who are "not interested in the programmes" and the fact that some patrons do not truly understand the SDGs. They also experience the practical issue of promotional posters disappearing.

5.5 Collaboration and Partnerships

Both libraries leverage partnerships to maximise limited resources and expand their reach:

- Theewaterskloof: Limited budgets stimulate creativity and emphasise the value of partnerships for sharing resources. They provide opportunities for patrons through partner organisations and capitalise on capacity by working with other units within the Sustainable Development Division.
- uMshwathi: The library has built strong relationships with educational institutions like the University of Pretoria (UP) and NGOs such as Project Exodus (focused on drug abuse). They also collaborate closely with the Msunduzi municipality on outreach to collectively achieve the SDGs, benefiting from a supportive structure that includes the General Manager.

6. Connecting Literature Review and Findings

The literature review highlighted global evidence that public libraries contribute to achieving the SDGs through education, access to information, and partnerships (Connaway et al., 2023; Kosciejew, 2020). However, systemic barriers, such as limited funding and staff awareness, remain prevalent (Khalid et al., 2021; Islam et al., 2024). The findings from the uMshwathi and Theewaterskloof libraries confirm these trends and illustrate practical contributions to specific SDGs. For instance, programmes supporting SDG 4 (Quality Education) include computer literacy training and Early Childhood Development (ECD) initiatives. The provision of internet access for job seekers and the '1,000 Stories' youth employment programme directly advances SDG 8 (Decent Work and Economic Growth). Library gardens and food security projects align with SDG 1 (No Poverty) and SDG 2 (Zero Hunger), while health awareness campaigns on cancer and substance abuse contribute to SDG 3 (Good Health and Well-being). Despite these achievements, challenges such as insufficient funding and difficulties in documenting qualitative impact echo global findings, reinforcing Aregbesola et al.'s (2024) argument for more substantial policy alignment and resource mobilisation. Partnerships observed in these cases validate Eweje et al.'s (2021) emphasis on multi-stakeholder collaboration as a catalyst for achieving the 2030 Agenda.

7. Conclusion and Recommendations

The operational realities in both municipalities suggest that while formal SDG messaging may be limited (as seen in TWK) or reliant on basic posters (as seen in uMshwathi), the practical implementation of SDG goals (especially related to education, employment, and poverty) is integrated into core library services. However, both face the systemic challenge of translating this valuable community impact into quantifiable and narrative success stories due to resource limitations, documentation demands, and privacy concerns.

For education, awareness and training, the study recommends that municipal libraries develop structured SDG workshops for patrons in both municipalities, expand partnerships with NGOs and schools, and introduce community-driven projects, such as gardens in uMshwathi, to mirror Theewaterkloof's success. It is also recommended that libraries align programmes with clear SDG indicators, introduce impact measurement tools to track progress and display SDG alignment visually in libraries (e.g., posters, dashboards).

Given the lack of documentation and reporting of libraries' contributions, the paper recommends that libraries train staff in digital storytelling and content creation, develop privacy-friendly templates for success stories, and encourage user-generated content through incentives and recognition.

In response to the highlighted challenges and constraints, libraries should advocate for dedicated library budgets, utilise low-cost digital tools for reporting and storytelling, foster staff motivation through recognition and training, formalise collaboration frameworks between municipalities, establish shared resource pools for training and content creation, and implement capacity-building workshops for librarians.

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Unpacking the Empowerment Effects of Telecentres Beyond Users: Evidence from Malawi

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Abstract

For over three decades, developing countries have been implementing Information Communication and Technology for Development (ICT4D) projects such as telecentres to facilitate development and community empowerment. Despite this, the value of telecentres in fostering empowerment effects is still unclear simply because the analysis of benefits of these facilities focuses on users. Therefore, this study unpacks the empowerment effects of telecentres beyond users by investigating how the empowered telecentre users empower their communities in Malawi. It also examines the factors that hinder empowerment effects of telecentres. The study adopts a qualitative approach to collect data from two telecentres in Malawi. Specifically, data were collected from telecentre managers, telecentre users and non-users through focus groups and semi-structured interviews. Gioia methodology was used to analyse the data. The study reveals that telecentre empowered users empower individuals (micro-empowerment) as well as community (macro empowerment). At individual level, users lead to intrapersonal empowerment by, for example, increasing non-user's psychological skills and cognitive frame; and interactional empowerment through creating employment opportunities and increasing critical awareness for others. For macro empowerment, users enhance community organisation. However, the empowerment effects of telecentres though are hindered by a number of factors such as people's attitudes, limited resources and psychological factors. The findings clearly show that telecentres do not only empower users but also their communities by engaging in activities that empower both individuals and the community at large. The paper, therefore, suggests that when understanding the impact of ICT4D projects such as telecentres on empowerment and development, studies should go beyond users. The study further suggests that policy makers and practitioners should focus on addressing factors that inhibit community empowerment.

Keywords: *ICT4D, telecentres, empowerment, Malawi, developing countries.*

1. Introduction

It is common knowledge that Information and Communication Technologies (ICTs) facilitate development. For example, ICTs such as the internet enhance agricultural production (Chavula, 2014) and help farmers increase their finances by providing access to agricultural and market information (Chege et al., 2019); and facilitates access to health information leading to having healthy citizens who can ably

contribute to development of their respective countries (Noor, 2021). In addition, diffusion of ICTs reduces poverty (Das & Chatterjee, 2023); and that ICTs have potential to develop rural communities by, for example, bridging the digital divide (Gulati, 2012). Furthermore, lately, ICTs have been perceived to be crucial for empowerment.

Empowerment is a concept that is routed in psychology (Rappaport, 2002) and is defined differently in different fields; and that, sometimes, empowerment is used interchangeably with development (Vuningoma et al., 2020). However, the common definition of empowerment is that it is "the process by which individuals or groups gain control over decisions and actions that affect their lives" (Rachmad, 2022). It is when people are in charge of their lives. In this paper, empowerment is considered as doing things something that one was unable to do previously (Kapondera, 2021). Moreover, it is about gaining a new ability to perform an action (Alao et al., 2017). ICTs facilitate empowerment in several ways. For example, ICTs such web browsing and computer education lead to increased perceived control because e it helps people be aware of the trends in the world and no longer feel isolated (Kleine, 2010; Osman & Tanner, 2017; Noruwana et al., 2018); and lead to better communication and improved social life (Alao et al., 2017). ICTs such as computer education also help in increasing individual's self-esteem and confidence such that they are able to express themselves and become mentors; and able to do things on their own (Attwood, 2013; Osman & Tanner, 2017).

Since ICTs are perceived to have potential to contribute towards empowerment, for over three decades, developing countries have been implementing Information Communication and Technology for Development (ICT4D) projects such as telecentres to facilitate development and community empowerment. Telecentres are facilities that provide public access to ICT services. Telecentres are considered crucial in the empowerment due to their ability to offer services such as access to computers connected to internet, computer tutorials, spaces for discussion, printing, scanning and photocopying services. Telecentres are mainly established in marginalised areas such as rural areas and the urban disadvantaged where individual access to ICTs is limited with an aim of empowering individuals in such communities. Despite their existence, the value of telecentres in fostering empowerment effects is still unclear simply because the analysis of benefits of these facilities focuses on users. This paper argues that the best way to understand the empowerment effects of telecentres is to understand how the impact of telecentres extends to communities at large. Therefore, this study unpacks the empowerment effects of telecentres beyond users by investigating how the empowered telecentre users empower their communities in Malawi. It also examines the factors that hinder empowerment effects of telecentres.

2. Methods

Results reported in this paper were part of a study done to understand the role of telecentres in empowering communities conducted with an aim of understanding the role of telecentres in empowering. The study employs qualitative interpretive methodology. As already alluded to, different people interpret empowerment differently (Shuhaimi, et al., 2023) hence the application of this methodology in the study.

2.1 Study Design

Data were collected from two cases of telecentres in Malawi. The study adopted the case study design because it offered several benefits in relation to the topic. For example, the approach helped in understanding the complex phenomenon of empowerment in its natural setting and in detail; it helped in being close to real-life situations during the fieldwork; helped in getting contextual information which was essential in the study; and offered the opportunity of using multiple data collection methods (LIS Academy, 2024). All these eventually helped in having an in-depth understanding of the phenomenon under study.

2.2 Case Description

As already mentioned, the study was done in Malawi. Malawi is a developing country and one of the low-income countries in the world in Southern Africa. The country has a population of over 22 million (Worldometer, 2025). At least 84% of this population lives in rural areas (Macrotrends, 2022) where basic necessities such as good roads, electricity and water are limited. Majority of people do not have individual access to ICTs such as computers, phones and internet leading to digital exclusion (Kapondera 2021). To reduce this digital exclusion, the Government of Malawi with funding from international organisations such as the ITU and World Bank started establishing telecentres. Some of these telecentres being the ones targeted in this study: Telecentre 1 and Telecentre 2. Both of these telecentres were established by Malawi Government through Malawi Communications Regulatory Authority (MACRA).

Telecentre 1 is in Kasungu District of the Central Region of Malawi. The telecentre which is 25 Kilometres from the hub of the district, has been in operation since 2010. The area is characterised by bumpy and poor roads, lack of electricity and clean water. The catchment area of the telecentre has about 180,000 people; and is composed of 30 primary schools and eight secondary schools. Telecentre 1 serves the people from within the area as well as those from outside. The Telecentre is a multipurpose centre because, in addition to ICT services which include printing, photocopying, scanning, the telecentre has a kiosk and library services that people use as a study space or to borrow. The telecentre was choses for mainly two reasons: i) it is managed by the community hence considered appropriate in providing insights on effectiveness of telecentres on empowering rural communities; and ii) the previous studies (such as Kapondera & Chigona 2017) as well as preliminary interviews with MACRA staff showed that the telecentre is the widely used telecentre in Malawi. On the other hand, Balaka Telecentre is located in the Southern region of Malawi and is 207 Kilometres from the Capital City of Malawi, Lilongwe. It is at the hub of the township in which it is established. The township is characterised by supermarkets, bottle stores, two story houses and earth roads. Telecentre 2 is owned by two businessmen. The telecentre was established by MACRA but handed over to the two entrepreneurs. The Telecentre started operating in 2010 and offers basic ICT services including computer tutorials, internet access, photocopying, printing and scanning. As such, this can be categorised as a basic telecentre.

2.3 Data Collection Methods and Target Groups

The target groups in this study included empowered telecentre users, their indirect beneficiaries (those that had benefited from the empowered users in one way or the other) and telecentre managers. There was a total number of fifty-seven (57) participants. Table 1 shows the distribution of these participants based on the stated categories. The data collection methods included semi-structured interviews, focus groups and observations. Some of the participants participated in all focus groups, interviews and observations whilst some participated in either two or just one of these.

Table 1

Number of Participants Based on Research Method and Relationship with the Telecentre

	Telecentre 1		**Telecentre 2**		
Method(s)	**Users**	**Indirect beneficiaries**	**Users**	**Indirect beneficiaries**	**Total participants**
Focus groups only	6	-	5	-	11
Interviews only	4	14	4	7	29
Focus groups and interviews	6	-	5	-	11

	Telecentre 1		Telecentre 2		
Method(s)	**Users**	**Indirect beneficiaries**	**Users**	**Indirect beneficiaries**	**Total participants**
Focus groups, interviews and observation	2	-	2	-	4
Interviews and observations	-	-	-	2	2
Total	18	14	16	9	57

In summary, at Telecentre 1, there were 14 participants for focus groups; 12 users participated in individual interviews; and 14 indirect beneficiaries took part in individual interviews; and that 2 users were observed on. For Telecentre 2, 12 users took part in focus groups; 10 users participated in individual interviews; and 9 indirect beneficiaries participated in individual interviews; and that there were observations with 2 users and 2 indirect beneficiaries

As already alluded to, the data collection methods included semi-structured interviews, focus groups and observations. Data collection started with semi-structured interviews with telecentre managers. Focus groups were the first means of contact with users. Through the focus groups, the first author was able to get collective view of empowerment and to identify those who were empowered and could engage in semi-structured interviews. There were two focus groups at each centre-one with males and the other one with females. At Telecentre 1, each group had seven (7) participants while at Telecentre 2 each group had six (6) participants. Focus group discussions took between 60 and 80 minutes.

After focus groups, semi-structured interviews were conducted with empowered users and indirect beneficiaries. Semi-structured interviews helped in gaining subjective yet detailed understanding of the topic. The interviews lasted about 30 to 60 minutes. Observations were done with users and indirect beneficiaries with an aim of appreciating the activities that they are engaging in after being empowered by the telecentre and by the telecentre users respectively.

2.4 Data Analysis

The study adopted Gioia methodology for data analysis. The first author coded data set using Nvivo 12. Following Gioia's methodology, firstly the first author engaged in a first-order analysis with the aim of identifying concepts from quotes by participants and grouping them together (Gioia, 2014). In this case, participants are being treated as knowledgeable agents. This was followed by second-order analysis which involved acting as knowledgeable agent by searching for similarities and differences grouping them in higher order categories and themes as well as labelling them. Lastly, there was a third-order analysis. This involved construction of aggregate dimensions also known as themes that formed the data structure.

2.5 Ethical Issues

The first author remained in contact with telecentre managers before data collection started. Permission to conduct the study was sought from the telecentres and the managers granted the permission verbally. Anonymity of participants in this paper is maintained by using codes to identify the participants instead of using their names. For example, for users, T1UN represents Telecentre 1 user number and for T2UN represents T2UN. For indirect beneficiaries, for Telecentre 1, code T1IB is used while for Telecentre 2, T2IB is used. During data collection, participants were informed of confidentiality, and consent was sought to record the conversations. Participation in the study was voluntary, and participants were told that they could withdraw at any stage of the interviews of focus group discussions (Research Ethics Guidebook, 2015).

3. Results

This section presents findings on the empowerment effects of telecentres beyond users. specifically, it presents results on how telecentre users empower their communities and the challenges that users face in empowering their communities.

3.1 How Telecentre Empowered Users Empower Communities

Findings on telecentre empowered users influence on community empowerment show that telecentre empowered users empower their communities at micro (individual) level and macro (community).

Telecentre Users' Influence on Community Empowerment at Micro Level

Evidence indicates that users have an influence on community empowerment at micro level by empowering individuals that they are connected to including family and friends within their communities as explained in the paragraphs below. Specifically, users lead to intrapersonal and interactional empowerment.

Intrapersonal empowerment is about how people view and think of themselves (Zimmerman, 2000). Telecentre users played a significant role in how others in the community viewed themselves. Specifically, the findings shows that telecentre users lead to intrapersonal empowerment by improving psychological skills of indirect beneficiaries; leading improved cognitive frame of others; and contributing towards leadership and development skills of indirect beneficiaries.

Users improved psychological skill of others by helping others in the community. Psychological skills are considered as skills or tools of the time including self-esteem, confidence and competence (Eastern Washington University 2020). Telecentre users helped in improving psychological skills by helping others gain confidence. For example, one user from Telecentre 2 narrated a story in which he and others who were not using the telecentre decided to deliver a petition to the District Commissioner (DC) to bar Malawi Parliament from passing a bill on homosexuality in Malawi. Initially, his friends were not confident enough to take part in the demonstrations but only gained confidence after he had explained to them the downside of homosexuality. He said:

> *"When we were doing those things [petition to the DC], some people could feel [got interrupted by someone]. As I have already said, at first, some were afraid to do that but because of my support, their confidence was high. In addition, they actively participate because of the knowledge I gave them they realised that, that particular thing was possible. And the whole group, before we delivered the petition, we read it loudly which made them know that understand and know how things work" (T2UN13).*

Secondly, findings show that users lead to intrapersonal empowerment by improving cognitive frame of others. There was evidence especially at Telecentre 1 that users helped in changing the mindset of people towards computers within the community. It seems people within rural communities have negative attitudes towards computers. One user narrated a story of how people used to dislike computers because, when government officials visit the communities and write their names for social services like fertiliser subsidy programme, the same officials could come back in the community and tell them that their names got deleted by the computer. As a result, people developed negative attitude towards computers which only changed when, after acquiring computer and other ICT skills from the telecentre, she enlightened others within the communities about computers and helped in changing their mindset. She said:

> *"Because we have different perceptions of Internet because these things came late in Malawi. Some are born before computers while others are born after computers…like our*

> *parents. Even some educated ones but the elderly. They do not know about computers… Now, because we have acquired computer skills, they know that we are resourceful and ask us… So, this changes their mind-sets. That aah we used to say that these computers delete names at the DC's offices, so this is the computer? This is how it is used? Their mind-sets have changed" (T1UN1).*

Lastly, users had influence on intrapersonal empowerment by improving learning and development skills for others in their communities in two ways. Firstly, this was possible as users were teaching family and friends computers and other ICT skills such as photocopying and printing as evident in the following comments: Some users claimed:

> *"….my younger sister. I am able to teach her…. Telling her that this is how we operate computers. She had no computer knowledge at first. Even how to click, she did not know…" (T1UN2).*

> *"I have a friend who is at the same time a colleague. I have helped him as regards to his work which is in the reprographic section of the library where I used to work. That was not my job but I used to teach him that this is how we operate ICTs. Like printing, this is how we do it" (T1UN10).*

Users taught others on how to use computers in different places which included homes for those who owned computers and workplaces for those who relied on computers at their workplaces. Eventually, the process helped even those who did not have the capability of paying for computer lessons at the telecentre because of "limited financial resources" (T2UN5). Users also helped in learning and development skills for others by helping them improve their performance in school. It seems this was a result of users informing others of the benefits of telecentres and; and recommended the use of the library in Telecentre 1. For example, T1IB7, used the library before she sat for her Malawi School Certificate of Education examinations after T1UN10 had encouraged her to be using the library indicated that her performance greatly improved. She said that she "benefited a lot because of studying [in the telecentre]. I performed well because I was using the telecentre [for my studies]" (T1IB7).

The findings show that telecentre users have an influence on interactional empowerment, which is about how people relate with their surrounding environment (Zimmerman, 2000). This takes place mainly in two ways: creation of employment opportunities for others and increasing critical awareness. Users created employment opportunities for others by starting up businesses after using the telecentre. In these businesses, they employed others who improved their lives. For example, a user from Telecentre 1 indicated that he opened a cybercafe and later employed some people within the community. The person who got employed echoed this by saying that "when he [T1UN17] employed me, he gave me a job which gives me things to do and I earn something at the end of the month to take care of things in my life" (T1IBN1). Creation of employment opportunities was also reflected in user's ability to help indirect beneficiaries get jobs elsewhere. This was due to the fact that when users taught others on how to use computers and helped them gain computer skills, indirect beneficiaries were able to apply for the jobs that required computer skills. One user at Telecentre 2 said that "…Some guys are unemployed but just because they were involved that period, they are able to come and apply for jobs. Some are successful in getting the jobs…" (T2UN13). Another interesting finding is that indirect beneficiaries also helped in creating employment opportunities for others. For example, at Telecentre 2, upon acquiring vocational skills from an organisation that was opened through the help of a telecentre, he started business which employed others within the community and, eventually, contributed towards creation of employment opportunities. This implies that benefits of telecentres even go beyond the users' indirect beneficiaries.

Users helped in increasing critical awareness for others in the communities two ways. Firstly, users helped their family and friends to be aware of the existence of the telecentre, its services and the benefits. This was crucial in the sense that some people within the communities "do not know that there is a telecentre within the community let alone its benefits" (T1UN12). Evidence further shows that users raised awareness of benefits of the telecentre with an aim of attracting them to the telecentre. For example, one user indicated that upon "seeing the benefits of using the telecentre which helped me gain computer skills, I told some friends to also start patronising, some still use the telecentre," (T2UN8). Indirect beneficiaries confirmed these sentiments. When one of them was asked about how the telecentre had impacted his life, he indicated that he his daughter taught him the basics of computers and later he decided to start patronising the telecentre to learn more. He said:

> *"She [my daughter] taught me how to operate it [computer]. Yes she was doing here [at home] using the laptop. And thereafter I went there …at the telecentre yes. After some time I could go there and told them my daughter taught me this, this and that. They are like ok you are in the right channel. We operate like this and we do this and I said it's good" (T1B13).*

Empowered Users Influencing Empowerment at Macro Level

Evidence shows that users influence community empowerment at macro level mainly by leading to organisational empowerment. Organisational empowerment can mean how things are organised within the community. For example, transparency in electing leaders such as counsellors (Gigler, 2011). The concept could also mean establishment of groups or organisations. Evidence in this study shows that empowered telecentre users led to organisational empowerment in twofold: in changing how things were done as well as forming organisations.

On changing how things are done within the community, evidence especially at Telecentre 1 shows that the use of telecentres enabled users to voice out and contribute towards decisions within the community. One user said:

> *"As youth, we are able to make contributions not just sticking to what the chiefs are saying. When the chief says something that is not good for the community, we are able to point it out [thanks] to the telecentre disseminating information. Before using the telecentre, people could just agree with everything that chiefs said" (T1UN15).*

In Malawian rural communities like the one where Telecentre 1 is located, decisions are made by chiefs (Kita, 2019). Therefore, involving youth in making decisions is of paramount importance.

On forming organisations, evidence especially at Telecentre 2 shows that the telecentre empowered users helped in forming organisations. Specifically, there were three groups/organisations which emanated from the use of the telecentre: Interfaith Organisation which focuses on paying school fees for the needy; Balaka Debate Club whose aim is holding debates on various issues affecting the community; and Malawi Prison Fellowship. The users were influential in these organisations in several ways. For example, one active user of the telecentre indicated that he was active in the formulation of Balaka Debate Club and that he actively engages with the youth and advises them using the knowledge gained from the telecentre. He said:

> *"When it comes to changing [things in the community]….mostly I do interact with young people especially students. These have nothing to do [after school]. I usually meet them during the forums I do hold [through Debate Clun]. They come and ask me on how they can do their things. As I am speaking now, there is a group of young people, they are saying concerned youth, they want to be doing dramas, in short. They want to form the*

> *group now. They found me home and told me [about their aims]. So, I told them that that is a good idea and told them they need to discuss as a group. I asked them if they do use Internet…… So, its mostly the youth who approach me on various reasons and I do guide them. They do benefit through that. It means those people are relying on me, right?" (T2UN8).*

During observation, it was indeed as the user was seen interacting with and offering advice to the Club.

3.2 Challenges in Empowering the Community

Users were asked about challenges that they face in the process of empowering the community. A number of issues came out. These included limited space, unreliable power supply, slow internet connectivity and psychological barriers.

There was evidence that one of the challenges that users faced was limited space within the telecentres. It seems like telecentres did not provide space for users to easily interact and make social connections. For example, one user from Telecentre 2 said that "there is limited space within the telecentre. Sometimes I meet people to discuss issues with and also build friendships. However, I cannot do so within the telecentre as I will be interrupting other" (T2UN5). There were similar sentiments at Telecentre 1. Eventually, this affected how users can empower others especially that "interacting with fellow users [one] can benefit more by asking them how they empower the community," (T1UN7).

The second challenge was unreliable power supply. Findings showed that telecentres in Malawi experience power outages which affected users access to telecentre services and eventually, had a negative impact on how users can empower their communities. One user complained that "the main problem we experience here is power outage. Sometimes customers come and find that there is no power. This is an inconvenience because sometimes these customers go back without being helped" (T1UN15). It is essential to always have power in telecentres because most of the services can only be delivered when there is power.

Evidence shows that unreliable internet connectivity is another challenge that users face in empowering the community as the internet was sometimes slow and sometimes not available. This affected access to the services as some could resort to just go "back home [because there is] no internet connection" (T2UN11). The last form of challenges that users face when empowering the community is psychological barriers. It seems some users lacked confidence in empowering the community which, in the end, made their impact to be on lower side. One user said that she wishes she was doing a lot but sometimes she feels that maybe she has not "really reached the stage that I can share with others" (T2UN5).

4. Discussion

The aim of the study was to understand how empowered telecentre users empower their communities. Specifically, the study examined the empowerment effects of users on their communities; and the challenges that users face when empowering their communities.

On the empowerment effects of users, the study finds that users empower individuals and the community at large. At individual level, the study is in line with the previous studies that when users of ICTs learn something, they teach others such as use of mobile phones (Oreglia & Srinivasan 2016; Abubakar & Dasuki 2018). The current study extends this to the use of ICT4D projects as it shows that users that benefit from such, extend beyond their families to include friends and others especially in traditional communities. The study further shows that telecentre users lead employment opportunities and career development for others. Career development and creation of job opportunities is essential in developing countries where unemployment rates are high (Kapondera, 2021). This implies that studies that assess community empowerment should be focusing on both micro and macro community levels. The study

also reveals that telecentres lead to organisational empowerment. However, the study provides insights that the type of organisational empowerment varies based on the communities that the telecentres serve. In the study, at Telecentre 1, organisational empowerment was about how things are done while at Telecentre 2 it was about formulation of clubs. The difference is because Telecentre 1 is in a community where decisions are made by people and chiefs hence people have a voice when it comes to making decisions unlike Telecentre 2 which is in relatively urbanised community. The implication of the findings is that when researchers are examining the empowerment effects of telecentres on the community, they should also consider the contexts as they play a role on the aspects of empowerment.

The study makes a valuable contribution in understanding the impact of telecentres on community empowerment. Firstly, the study serves as a foundation on how telecentres empower their communities through their users. The study shows that telecentres' empowerment effects go beyond their users to include those that do not use but benefit from the empowered users. Further studies should be done on the same in other developing countries.

Furthermore, there was evidence that some immediate beneficiaries of users were also empowering others within the community although this was not captured in detail as the study was not longitudinal. The implication is that future research studies should not just focus on users' immediate beneficiaries but also those who benefit from user's indirect beneficiaries.

Community empowerment in ICT4D projects has been mostly viewed at macro level (Gigler, 2011). The current study has clearly shown that community empowerment also takes place at individual level by including other community members in the community as indirect beneficiaries and immediate beneficiaries of users. This implies that studies that assess community empowerment should be focusing on both micro and macro community levels.

5. Conclusion

The study examined how users empowered by the use of telecentres empower their communities. Empowerment in this study is conceptualised as being able to do something they were unable to do before using telecentres. The study discovered that telecentre empowered users influence community empowerment at both micro and macro levels. At micro level, users empower people they are connected to as family, friends and colleagues. The forms of empowerment at this level are intrapersonal and interactional empowerment. For intrapersonal empowerment, this includes psychological skills by increasing confidence of indirect beneficiaries; increased cognitive frames of others and improved learning and development skills. For interactional empowerment, users influence community empowerment by leading to increased learning and development skills of others; and critical awareness for indirect beneficiaries. At macro level, which is community level, users lead to empowerment by contributing towards organisational empowerment through establishing clubs and organisations and changing the way things are done in the community. Despite this, the influence of users on community empowerment is hindered by a number of issues including slow internet connectivity, unreliable power supply, psychological factors and limited space within telecentres.

The findings clearly show that telecentres do not only empower users but also their communities by engaging in activities that empower both individuals and the community at large. The paper, therefore, suggests that when understanding the impact of ICT4D projects such as telecentres on empowerment and development, studies should go beyond users. The study further suggests that policy makers and practitioners should focus on addressing factors that inhibit community empowerment.

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Enhancing Youth Entrepreneurship in Namibia: An Integrated Analysis of Financial Inclusion and Information Access Barriers

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Abstract

In Africa, the energy and ideas of young people represent a critical, underutilised resource for achieving the vision of Agenda 2063, yet in Namibia, 44.7% of youth remain unemployed. This study examined the interconnected financial and information barriers constraining youth entrepreneurship in Namibia, using a cross-sectional, convergent mixed-methods design. Structured questionnaires were administered to 44 youth-led small and medium enterprise (SME) owners and 8 service-provider institutions across the Khomas, Kavango East and Kavango West regions. The findings reveal a pronounced disengagement from formal financial systems: 65.9% of youth entrepreneurs had never applied for a formal loan, and of the 15 who had applied, six were rejected outright, with lack of collateral and being perceived as too new or risky the most common reasons for rejection or difficulty. Rather than approaching banks or government offices for guidance, respondents relied predominantly on friends and family (72.1%) and social media (86.4%), sources that are accessible but often unreliable. A notable training gap emerged: while 86% of youth sought financial management training, fewer (55.8%) requested support with loan or grant applications, the specific skill most directly linked to accessing capital. These findings indicate that the current entrepreneurial support system is fragmented and poorly aligned with youth information-seeking behaviour. The study concludes that addressing youth financial exclusion requires an integrated information ecosystem that combines co-designed digital tools with trusted physical intermediaries, such as libraries, repositioned as accessible hubs for business knowledge. Such an approach would help translate the ambitions of the Sustainable Development Goals and Agenda 2063 into tangible opportunities for Namibia's youth, and offers librarians, information professionals, and policymakers a concrete entry point for intervention.

Keywords: *youth entrepreneurship, information access, financial inclusion, sustainable development, Agenda 2063.*

1. Introduction

Youth unemployment has become a pressing challenge in many countries. In Namibia, youth unemployment stands at a staggering 44.7%, a figure that represents far more than a statistic: it reflects nearly half a generation struggling to build a livelihood in their own country (Namibia Statistics Agency, 2025). In response, empowering young entrepreneurs has become a central promise and a cornerstone of both global and African aspirations. It is a pledge embedded in the United Nations' Sustainable Development Goals (SDGs), specifically Goal 8 on decent work and economic growth, and at the heart of the African Union's Agenda 2063, which envisions "a prosperous Africa, driven by its own citizens" (African Union

Commission, 2015). In Namibia and across much of the continent, there remains a painful gap between this inspiring vision and the daily struggles of young people trying to start businesses.

The problem, as it has come to be understood, is not solely about money, though finance is a significant part of it. The financial vicious cycle is well documented: a loan is needed to grow a business, but obtaining one requires collateral and a credit history that most young entrepreneurs lack (Beck et al., 2005; Thomas, 2022). Scholars have mapped this domain extensively; however, a concurrent crisis that has received far less attention is information itself. Navigating the path to a loan requires knowing the rules, the paperwork, the right person to approach, and how to present an idea; this knowledge is the lifeblood of entrepreneurship. When such information is missing, difficult to find, or available only to a select few, the effect is not merely an additional obstacle: it actively deepens financial exclusion. It traps talented young people in a cycle in which remaining small and informal feels like the only viable option, directly undermining the inclusive growth that both the SDGs and Agenda 2063 champion.

This paper, therefore, starts from a simple but crucial assumption: the financial crisis facing youth entrepreneurs cannot be solved without also addressing the information crisis; the two are two sides of the same coin. The study moves beyond a narrow focus on finance to conduct an integrated diagnosis of Namibia's entrepreneurial support ecosystem. Using a mixed-methods approach, the responses of young entrepreneurs and service providers were compared using separate questionnaires administered to each group. The study was guided by three objectives:

- Quantify the level of disengagement from formal financial systems and identify the primary barriers driving this exclusion.
- Map out the information-seeking behaviours and channels used by youth entrepreneurs.
- Analyse the perceived gaps and mismatches in the entrepreneurial support ecosystem from both demand-side (youth) and supply-side (service provider) perspectives.

The findings extend beyond academic interest to offer a practical blueprint. For librarians, information professionals, and policymakers, they provide a clear case for an innovative, human-centred information support framework, one that can serve as a missing link in translating the high-level goals of the SDGs and Agenda 2063 into tangible opportunities for Namibia's youth.

2. Literature Review

2.1 Theoretical Foundations

The study's conceptual framework integrates two complementary theoretical perspectives: information asymmetry theory and information ecosystem theory. Information asymmetry, a key concept in financial economics, captures the disconnect between formal financial institutions and young entrepreneurs (Beck et al., 2005). This deficit stems from limited credit histories, missing business records, and underdeveloped business plans, all of which make young entrepreneurs appear risky and lead lenders to demand collateral they often cannot provide.

Consider a young entrepreneur who approaches a bank with a promising idea but has no formal records, no credit history, and no audited financials, relying instead on a passion-filled pitch. Unable to assess the actual risk, the bank sees only uncertainty and, to manage this unknown, demands physical collateral that most young entrepreneurs do not have.

Thomas (2022) found that in Namibia, this often leads to a demoralising cycle of loan rejections, which in turn results in self-exclusion: young people stop applying because they expect to be rejected. This is not indifference on their part; it stems from fear of rejection and is a logical response to a system perceived as biased against them from the outset.

Gabriel (2003) added that the financial gap does not occur in isolation but rather as part of a broader information ecosystem, comprising a mix of sources, channels, intermediaries, and users that shape how knowledge is understood and shared.

In a well-functioning ecosystem, a young entrepreneur could readily find reliable information on writing a business plan, applying for a grant, or meeting loan requirements. When this ecosystem fails, however, and information is fragmented across government websites, bank brochures, and uncoordinated non-governmental organisation (NGO) workshops, entrepreneurs are pushed towards their immediate social networks.

This reliance typically begins with friends and family, who offer support, trust, and easy access. However, the advice they provide is often incomplete or inaccurate, which can lead entrepreneurs to make poor decisions.

The broader institutional environment also significantly influences whether entrepreneurship can succeed. According to institutional theory, both formal and informal "rules of the game", such as government policies, cultural norms, and regulatory frameworks, shape entrepreneurial activity (Scott, 2005). Where institutions are supportive, with clear regulations and norms that promote risk-taking, barriers to entry are reduced. Conversely, rigid bureaucratic structures and a culture that discourages risk can suppress innovation before it begins.

2.2 Empirical Evidence

Global and regional evidence shows that libraries and information centres hold substantial, yet largely untapped, value for entrepreneurship. Studies from Russia indicate that libraries are evolving into active business support hubs, offering digital literacy training, market information databases, and basic legal advisory services; this approach may hold value if adapted to the Namibian context (Krymskaya, 2025).

At the regional level in Sub-Saharan Africa, evidence from Kenya and Uganda reveals important gaps alongside this potential. Gichohi (2016) reported that entrepreneurs who used library services in Kenya experienced tangible business gains; however, many were unaware of these services or felt that available resources did not match their specific enterprise needs. Similarly, Buwule and Mutula (2017) document an ongoing mismatch in Uganda between the services that university libraries could provide to small and medium enterprises (SMEs) and those they actually offer, calling for more entrepreneurial, user-centred models of service delivery.

Most of the literature consistently indicates that finance is a binding constraint. In the South African case, Chinomona et al. (2020) found that access to finance is strongly associated with youth intentions to start businesses, while also highlighting an essential need for training and capacity-building. This creates a frustrating cycle: young people need capital to start a business, but without the skills to manage funds or present solid plans, they struggle to secure that capital.

This situation reflects Namibia's ongoing training challenge: youth often request general financial management support while overlooking the specific skills required to apply for loans and become investment-ready. Compounding these hurdles, the COVID-19 pandemic represented a further major setback.

Dlamini (2025) illustrates that the pandemic did not create these weaknesses but exposed and deepened them, as evidenced in South Africa's Umgungundlovu District. Young entrepreneurs reported business closures, drained start-up funds, and a sense of abandonment by institutions. Lockdowns and the economic downturn compounded matters further: the digital divide widened as education and business shifted online in areas with poor connectivity; informal support networks weakened under social dis-

tancing; and bureaucracy slowed further, with local structures perceived as unwilling to create opportunities or release promised funds.

A striking finding from that study is the extent to which entrepreneurs are aware of systemic gaps. They see opportunities in ICT, green energy, and agro-processing, yet find few practical ways to gain the necessary skills or financing. Many noted that graduates are not market-ready, revealing a disconnect between education programmes and real-world needs. Post-COVID recovery, therefore, is not simply about recovery, but about repairing the ecosystem so that training links to funding, policy connects to action, and opportunities match capabilities.

Research also shows that barriers to youth entrepreneurship are deeply interconnected. Financial exclusion often begins with information gaps: limited guidance on application processes, unclear evaluation criteria, and limited support for preparing bankable proposals. These gaps reflect a fragmented ecosystem in which resources are scattered, trusted intermediaries are absent, and digital outreach fails due to connectivity and literacy challenges.

3. Methods

3.1 Research Design and Participant Sampling

This study employed a cross-sectional, convergent mixed-methods design to capture both the scale and the nuanced nature of the barriers facing youth entrepreneurs. Data collection took place between 10 September and 10 November 2025, using structured online surveys administered to two distinct participant groups:

Youth-led SME owners: 50 questionnaires were emailed; 44 completed responses were received (88% response rate), comprising entrepreneurs aged 18–35 from the Khomas, Kavango East and Kavango West regions. Eligible participants were identified through youth business associations and snowball sampling to ensure representation across sectors.

Service providers: 10 questionnaires were emailed; 8 completed responses were received (80% response rate), representing development finance institutions, commercial banks, government ministries, and non-governmental organisations. A purposive sampling approach was used to ensure coverage of key institutional types in the entrepreneurial support system.

This multi-stakeholder approach enabled triangulation of demand-side (youth) and supply-side (institutional) perspectives on barriers and potential solutions.

3.2 Data Collection and Analytical Framework

The survey instruments collected quantitative data on financial access, digital service usage, and information channel preferences, alongside qualitative data from open-ended questions exploring information sources, challenges, and proposed improvements.

Quantitative data from youth respondents were analysed using Stata 18 (StataCorp, 2023), with descriptive statistics (frequencies and percentages) computed to identify patterns in financial behaviour and information preferences.

Qualitative data from open-ended responses from both participant groups were examined using thematic analysis, following Braun and Clarke's (2006) approach. This process included familiarisation with the data, generating codes, identifying themes, and refining the analysis to highlight emerging patterns in information-seeking behaviours, perceived challenges, and suggested interventions.

4. Results

4.1 Demographic and Enterprise Characteristics

The sample composition exhibited notable regional differences, with 68.2% of youth respondents from the two Kavango regions (Kavango East and Kavango West) and 31.8% from Khomas. Most businesses (81.8%) were located in urban areas, including 25 of the 30 Kavango respondents. Female entrepreneurs made up 61.4% of the sample. The majority of entrepreneurs were aged 30–35 (54.5%), suggesting that entrepreneurial activity tends to increase with age and the ability to accumulate resources. Of the 42 respondents who reported their sector, retail and service businesses together accounted for half (50%), followed by agriculture (19%); both sectors are known for low entry barriers but limited growth potential.

Enterprise sizes were generally small: half employed between two and five people, while 38.6% operated as sole proprietors. Start-up capital came mostly from personal savings (81.8%) and family and friends (18.2%), while only 6.8% had used a bank or microfinance loan, underscoring the limited access to formal financing.

4.2 The Financial Access Gap: Measuring Systemic Withdrawal

One of the most striking findings was the deep disconnect from formal financial systems: 65.9% of youth entrepreneurs had never applied for a formal loan. Of the 15 who had applied, six were rejected, four were partially approved, four were fully approved, and three were still pending. Among the 15 respondents who reported reasons for rejection or difficulty, the most common were lack of collateral (40%), the business being considered too new or risky (40%), incomplete paperwork (33.3%), and high interest rates (26.7%). Qualitative data from service providers indicated that informational and systemic barriers were the primary drivers, identifying a combination of structural and awareness-related obstacles that hindered youth access to formal finance.

Lack of collateral was among the most frequently cited barriers, reported by five of the eight service providers (62.5%), effectively excluding young entrepreneurs who lack assets. This challenge was compounded by skills gaps, with half of the providers (50%) citing insufficient or poor-quality business plans. Another major obstacle was the lack of credit history, mentioned by three providers (37.5%), which makes it difficult for youth with no formal financial footprint to access loans.

Equally concerning, lack of awareness among youth was cited as often as collateral, by five providers (62.5%): many young people are unaware of the services designed to help them. This highlights a deeper problem: information about support programmes is not reaching those who need it most, revealing a significant communication failure within the entrepreneurial ecosystem.

4.3 The Information Access Crisis: Channels, Sources, and Asymmetry

Analysis of information sources and channels revealed an ecosystem heavily reliant on informal and accessible networks, despite recognised issues with information quality (Table 1).

A deep digital divide widened this gap further. When asked about the challenges of rolling out digital services to youth in rural areas such as the Kavango regions, three of the eight service providers (37.5%) cited poor internet connectivity or network access, and two more (25%) cited limited access to smart devices and low digital literacy. Youth also faced significant barriers to using digital services, including customer preference for cash (45.5%), high transaction costs (43.2%), poor internet connectivity (36.4%), and lack of knowledge (20.5%).

Table 1

The Information Access Crisis: A Misalignment of Sources and Channels

Perspective	Top information sources (youth)	Top information channels (youth)	Top outreach channels (service providers)
Data	Friends/relatives: 72.1%; workshops: 41.9%; newspapers: 41.9%; bank officials: 27.9%; library/ resource centre: 23.3%	Social media: 86.4%; television: 43.2%; radio: 25%; Trade and Education ministries: 20.5% each	Social media: 75%; print media: 50%; radio/television: 50%; workshops/ community mobilisation: 37.5%; flyers: 25%; websites: 25%
Implication	High trust in informal, potentially unreliable networks; lower use of formal expert sources.	Preference for digital and broadcast media; government channels are peripheral.	Heavy reliance on channels that require connectivity and literacy, which many youth find costly or unreliable.

Source: authors' compilation.

4.4 The Training Dilemma and Digital Tools

A critical disconnect emerged between the barriers youth faced and the training they demanded. Financial management was the most requested training topic (86%), followed by digital marketing (69.8%) and business plan writing (67.4%), whereas loan and grant application training, the skill most directly linked to securing formal funding, was requested by 55.8%.

This pattern illustrates a training gap, in which youth showed the highest demand for general financial skills but comparatively lower demand for the specific skill (loan application) that directly addresses their primary barrier to growth.

Service providers' use of digital tools was modest: half used social media for outreach, 25% used digital loan application platforms, none offered online financial education modules, and 37.5% used no specific digital tools for youth-led SMEs. The impact of these tools was further limited by the technological illiteracy and infrastructure gaps noted above.

5. Discussion

This study set out to understand the challenges young people face, given that youth unemployment stands at a staggering 44.7%. What emerged was not a list of isolated grievances but a coherent account of a system under considerable strain. Namibia's experience with young entrepreneurs reveals interlocking failures that are difficult to escape. The following sections position these findings within the broader scholarly conversation, showing how Namibia's dynamics reflect, and in some respects intensify, patterns observed across the continent.

5.1 A Rational Response to a Broken System

One of the most striking results is that 65.9% of respondents had never applied for a formal loan, a figure that cannot be explained solely by lack of access to finance; it points instead to systemic disengagement. This is interpreted not as diminished ambition but as a rational, if costly, calculation under information asymmetry (Beck et al., 2005). Anticipating rejection due to collateral constraints or limited credit histories, young entrepreneurs self-select out of the application process, becoming discouraged

borrowers (Kon & Storey, 2003). The result is low application rates, which can appear as low demand and be used to justify institutional inaction.

The data reveal why so many young entrepreneurs feel discouraged. Banks' insistence on physical collateral, cited by five of the eight service providers (62.5%) and by 40% of youth who had applied for loans, acts as an immovable gatekeeper. This reflects long-standing critiques that many African financial systems remain tied to rigid, asset-based lending models (Mutula, 2008). Such practices reinforce what La Porta and Shleifer (2014) term the "vicious cycle of informality", in which those without assets are locked out and pushed further into informal business structures.

5.2 The Broken Information Structures

When asked where they turn for guidance, most respondents (72.1%) reported a firm reliance on friends and family, compared with bank officials (27.9%). This reliance on personal networks is now mediated through digital platforms: social media is the dominant channel (86.4%), extending Gabriel's (2003) insights on informal networks into the digital age. In many contexts, the WhatsApp group has become an "information ground", a social venue for knowledge exchange whose accuracy is incidental rather than assured (Pettigrew, 1999). Van Dijk's (2020) observation is instructive here: dependence on informal digital networks can reinforce inequalities without concurrent access to authoritative, verified information.

A revealing tension is the dilemma of training. Respondents expressed the strongest demand for general financial management support (86%), while loan and grant application training ranked lower (55.8%); they identify a knowledge gap but do not consistently prioritise the specific procedural know-how that opens formal doors. This finding resonates with Gichohi's (2016) work in Kenya and with the Global Entrepreneurship Monitor's observation that entrepreneurs in efficiency-driven economies often have drive but lack institutional navigation skills (Singer et al., 2015).

5.3 The Solutions Become Barriers

These results also highlight a design-reality gap, as described by Heeks (2010). Service providers are moving online, with half relying primarily on social media for outreach; however, the target audience faces high transaction costs (43.2%), poor internet connectivity (36.4%), and knowledge constraints (20.5%). The outcome is a widening gap between digital strategy and lived reality.

Technology, which should make inclusion easier, often becomes another barrier. This finding underscores the importance of hybrid models, such as those identified by Krymskaya (2025), that combine digital tools with trusted physical spaces, such as libraries and community centres. Such models recognise that technology alone cannot bridge divides; human mediation, translation, guidance, and trust-building remain essential.

5.4 Institutional Gaps that Sustain Exclusion

Stepping back, the data describe a self-reinforcing cycle:

- Information gaps (unclear rules and procedures) generate perceived financial barriers (anticipation of rejection).
- Anticipation of rejection produces avoidance (no application).
- Avoidance sustains informality (no records, no credit history).
- Informality further enlarges the original information deficit by keeping entrepreneurs outside the systems that generate formal financial knowledge.

This cycle is amplified by geography, technology, and institutional inflexibility. In Namibia, this reflects what Mair and Marti (2009) call institutional voids: banks, NGOs, and public programmes exist, but there are no strong, coordinated pathways connecting them to young people. As a result, well-intentioned initiatives often become isolated islands of innovation with little systemic impact.

Evidence from South Africa's Umgungundlovu District reinforces this picture (Dlamini, 2025). The pandemic acted as a stress test, exposing and magnifying existing weaknesses: businesses closed, start-up capital was depleted, and support structures unravelled, deepening every fault line in an already fragile ecosystem.

6. Conclusion and Recommendations

This paper moves beyond highlighting individual obstacles to diagnosing an interconnected syndrome. In Namibia, youth financial exclusion is not merely a banking problem; it is fundamentally an information and ecosystem problem, intensified by digital strategies that overlook user realities and by lending models that prioritise assets over potential. Within this cycle, piecemeal fixes, such as a new loan product or a standalone workshop, seldom gain traction. What is required is an integrated approach that reduces information asymmetry, bridges the digital divide, reforms financial mechanisms, and leverages trusted physical intermediaries, including libraries and community information centres.

Breaking these barriers first requires understanding how they fit together. The findings reveal a self-defeating cycle: information gaps create the perception that formal finance is out of reach, prompting young entrepreneurs to avoid banks altogether. This avoidance then reinforces informality and widens the original information gap.

This reality stands in sharp contrast to the vision of empowered youth at the heart of Agenda 2063 and undermines progress toward SDG 8, which calls for decent work and economic growth. The training dilemma, a strong demand for general financial skills alongside weaker demand for the specific know-how needed to navigate loan applications, signals a deeper failure of accessibility, packaging, and dissemination rather than a lack of information per se. For the SCECSAL community, this is not merely a challenge; it is a clear mandate to act.

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Enhancing Environmental Sustainability through Green Library Initiatives: A Case Study of Kawempe Youth Centre and Library

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Abstract

This paper explores new perspectives on the need for the adoption and promotion of green, sustainable libraries and greening practices in Kawempe division, Kampala district, Uganda. The aim of the study was to examine the current practices and projects at Kawempe youth centre and library (KYCL) in relation to adoption, use and sustainability of greening initiatives. The objectives of this study were to investigate the current initiatives at Kawempe youth centre and library (KYCL) in achieving green libraries; to identify the challenges faced at KYCL amidst the efforts to adopt green library practices and lastly to suggest possible solutions to the challenges faced. The case study site was chosen due to its central location within the Kampala capital city area and also because it is an urban slum with a high population comprised mainly of underprivileged youth, adolescents and out of school children. Case study design was adopted for this investigation. A total of 30 respondents were interviewed. Data was collected using in-depth interviews complemented by observations and a documents review. The data was analysed based on the emerging themes and behavioural patterns arising from the study. The findings show that efforts in achieving green sustainable libraries include provision of ICT and computing services at KYCL. In addition, the findings revealed that majority of the initiatives relate to outreach community engagement activities for example the ghetto-go-green climate adaptation and mitigation project, the Seed Science Project and the Global Girls Glow project. The study concluded that KYCL is a key player in the attainment of Uganda's digital transformation agenda and vision 2040 strategic objectives and therefore, should be supported towards becoming a model centre for climate action and community resilience. It is recommended that KYCL continues to explore funding opportunities for green library and environment sustainability initiatives.

Keywords: *green libraries, environment sustainability, green initiatives, libraries, Uganda.*

1. Background

In the face of increasing environmental degradation and climate change, there is a growing need for all sectors of society to adopt sustainable practices. However, in developing countries like Uganda the adoption of sustainable environmental practices within libraries remains limited.

The concept of green libraries, increasingly recognised internationally, reflects efforts to mitigate climate change impacts and promote economic and social sustainability (Fedorowicz-Kruszewska, 2020; Pagore & Chalukya, 2022; Ifla.org, 2024). According to Hauke et al. (2018) and Pagore & Chalukya (2022)

the world is undergoing some kind of ecological crisis and that there is a need for libraries to lead by example and to be at the forefront of the war on climate change. The effects of climate change will affect just about every aspect of life. Lindwall (2024) highlights that rapid global warming threatens all life on land and water. Climate change effects include unpredictable seasons, floods, droughts, storms, wildfires, biodiversity loss, ecosystem disruption, rising sea levels, melting ice, coastal damage, reduced freshwater, soil degradation and warmer oceans. It also exacerbates human challenges, including disease, displacement, mental health issues, inequalities and higher costs for health, food, housing and transport. Recognising access to information as a human right and libraries as key knowledge hubs (Abata-Ebire et al., 2018), their role in the provision of information for climate change is vital. Antonelli (2008) noted that greening libraries involved constructing buildings with sustainable materials, adding eco-friendly facilities and services and adopting environmentally conscious practices. The International Federation of Library Associations and Institutions (IFLA) defines a green and sustainable library as that which takes into account the environmental, economic and social sustainability (Hauke et al., 2026). IFLA guidelines add that a green and sustainable library can be of any size however, it should follow the core principles for sustainable and green librarianship which are; community engagement, accessibility and inclusion, resource efficiency or green office principles, eco-friendly computing, adopt green buildings design (Hauke et al., 2026). More to that, the evolution of green libraries is further guided by the 17 United Nations Sustainable Development Goals (United Nations, 2015), the Paris Climate Agreement (United Nations Framework Convention on Climate Change, 2016) and the UNESCO Education for Sustainable Development Programme (UNESCO, 2020).

2. Problem Statement

In recent years, libraries have evolved beyond their traditional roles as information repositories to become active agents of social and environmental transformation. Despite the growing global emphasis on the adoption of green library institutions that minimise environmental impact through energy efficiency, sustainable computing, e-waste management, eco-friendly infrastructure and environmental education, there is limited evidence of such initiatives being systematically adopted in local community libraries within Uganda.

While Kawempe Youth Centre and Library has been in existence since 1999 (Kyazike, 2023), there has been no external evaluation undertaken to assess the effectiveness of the work done at KYCL. It is not easy to gauge whether the centre is achieving its objectives with the view to improvement. This is in order to guide future activities. Therefore, the study sought to investigate the success and challenges of some of the environment sustainability related initiatives carried out at the centre.

3. Aim of the Study

The aim of the study was to examine the current practices and projects at Kawempe Youth Centre and Library in relation to adoption, use and sustainability of greening initiatives.

4. Objectives of the Study

The objectives of the study were:

- To investigate the current initiatives by Kawempe Youth Centre and Library (KYCL) in achieving green library practices.
- To identify the challenges faced at KYCL in their efforts to adopt green library practices.
- To suggest possible solutions to the challenges faced at KYCL in trying to adopt green library practices.

5. Research Questions

The study was guided by the research questions below:

- What are some of the current initiatives by KYCL to achieve green library practices?
- What challenges is KYCL facing in relation to the adoption of green library practices?
- What actions are being taken to solve the challenges towards the adoption of green library practices at KYCL?

6. Scope of the Study

In terms of geographical scope, the study was limited to the Kampala Capital City Metropolitan Area, Kawempe Division. Kawempe division is one of 5 divisions which make up Kampala Capital City. Kawempe is a low income, high density populated area with many youth who are under privileged and out of school (Wikipedia.org, 2024). In relation to the time scope, the study was conducted from June 2024 to July 2024.

7. Literature Review

7.1 Green Libraries - an Overview

According to Antonelli (2008) the green library movement began in the 1990s and gained prominence in the library profession by 2003. Its supporters including librarians, libraries, universities, cities and environmental associations advocate for adopting environmentally friendly and sustainable practices in libraries worldwide. Hauke et al. (2026) stress that the decision to convert a library of any type into a green library is dependent on the personal interests of the individual library staff or the strategic plans of the institution in which the library exists. However, a planned conversion should align with IFLA guidelines and core principles of green libraries namely; community engagement, accessibility and inclusion, resource efficiency or green office principles, eco-friendly computing, adopt green buildings design (Hauke et al., 2026).

7.2 Libraries and Environment Sustainability in Uganda

It has been documented by several researchers (Mwanzu et al., 2023; Munawaroh & Melati, 2018) that developing countries like Uganda contributed the least to global climate change yet suffer the greatest impact. Mulumba & Akullo (2018) identify air pollution, toxic pollutants, population growth and deforestation as key causes of environmental degradation in Uganda. They argue that librarian-led information dissemination alone is insufficient and propose the librarian-environment conservation model, advising librarians to engage in environmental research, education, eco-friendly practices, awareness campaigns and policy support. In contrast, Mwanzu et al. (2023) noted that Uganda's success in digital library transformation was majorly led by the Consortium of Uganda University Libraries (CUUL), which offered shared e-resources, databases, e-books and training. Additionally, Makerere University Library promoted open access and educational resources while the National Library of Uganda digitised historical archives to broaden user access (Mwanzu et al., 2023). The above advancements are aligned with Uganda's digital transformation agenda, the Fourth National Development Plan (NDPIV) and ICT policy emphasising improved digital infrastructure, connectivity, ICT entrepreneurship, innovations, inclusive ICT skills and human capital development (NPA, 2024; Ministry of ICT, 2014). Omona (2020) concluded that the provision of sustainable library and information services in Uganda will be critical in the achievement of the UN sustainable development goals as evidenced in Uganda's vision 2040.

7.3 Why Adopt Green Libraries in Uganda?

The need to protect the environment has become a global concern (Mwanzu et al., 2023). Mwanzu et al. (2023) stress that ozone depletion, global warming, climate change and greenhouse effects are some of the many environment challenges which need to be addressed. Munawaroh & Melati (2018) are in agreement with Mwanzu et al. (2023) suggesting that the survival of library services worldwide will depend on the action steps taken to address the effects of global warming.

Munawaroh & Melati (2018) note that green libraries are designed to minimise environmental impact while enhancing indoor quality. Adopting green practices can improve the library's public image and offers benefits such as resource efficiency, reduced waste and pollution and financial savings that can be redirected to other activities (Munawaroh & Melati, 2018). Mishra (2023) adds that green libraries promote environmental awareness, policy research, stakeholder discussions and advocacy campaigns while facilitating partnerships with government bodies. They support education, early literacy and digital skills and prioritise community engagement through workshops, exhibitions and activities that develop communication and leadership skills (Mishra, 2023).

Pagore & Chalukya (2022); Mishra (2023) highlighted that green libraries often used recycled local materials, large insulated windows and renewable energy sources like solar, wind, hydro, geothermal and biomass. In addition, they featured natural elements such as green rooftops, biophilic designs, natural lighting, outdoor spaces, gardens, ventilation systems and water features. Green libraries often used smart building technologies, including centralised automation, comfortable seating, healthy indoor environments, monitoring sensors, equipment performance tracking, data analytics, integrated security, real-time monitoring and remote access (Mishra, 2023). Educational programmes normally cover sustainable living, urban agriculture, environmental education for youth, sustainability talks and library innovation exhibitions (Mishra, 2023).

8. Research Gap

Existing literature shows growing global interest in green libraries and emphasises their importance in promoting environmental sustainability. However, there is limited empirical research examining how libraries in Uganda are practically integrating green principles into their daily operations and service delivery. In addition, none of these studies is specific to vulnerable and deprived slum locations such as Kawempe where the centre and library is located.

9. Methodology

Case study design was adopted for this investigation. The approach enabled the researchers to collect data on the views from selected participants by engaging in deep interactions and recording observations. Data was collected from 8 library staff and key informants plus 22 beneficiaries of projects run at KYCL. Purposive sampling was used to select the 30 respondents who took part in the study. This was the preferred sampling technique because it allowed the researchers to collect informative responses from selected participants while acquiring a deeper understanding of the phenomenon (Neuman, 2007, p.143). Staff were asked about their experiences in working at KYCL, the challenges faced and what they thought could be done to improve service delivery.

The study collected data using interviews. A structured interview guide was used with staff and key informants while a semi-structured guide gathered information from 22 randomly selected project beneficiaries. Since most greening initiatives were outreach activities, beneficiaries from Kisowera, Kizza and Kirokole zones in Kawempe North were interviewed. The centre's annual reports and profile files

were reviewed to gather background information. Qualitative data was analysed by identifying emerging themes and behavioural patterns from the study.

10. Ethical Considerations

The study was conducted in accordance with the accepted ethical standards governing research involving human participants (UNCST, 2014). The required approvals were sought from Makerere University and KYCL management before data collection began. Participation in the study was voluntary however; permission and informed consent was sought from parents of participants aged 10 – 18 years.

11. Presentation and Discussion of Findings

A total of 30 (100%) respondents were interviewed. Among the respondents, 18 (60%) were female and 12 (40%) were male. The findings and discussion were combined although categorised according to the objectives as presented below:

Objective 1: Current initiatives at Kawempe Youth Centre and Library towards achieving green library practices

Since 1999, KYCL's library and ICT programme has served over 80,000 users (Kyazike, 2023) offering books, reading spaces, computers, internet and school sensitisation workshops. Interviews revealed that ICT sessions supplement busy school timetables, enabling students to engage in online projects and gain digital skills. Youth especially girls benefit through training in web design, CV writing and essential computing for jobs and communication. Researchers learned that the mobile library, once serving about 21 schools around Kampala, was halted due to lack of funds.

A notable finding was the increase in refugees at the centre, rising from 5 to 30 women and children from Sudan. In an interview, the ICT coordinator was asked about the reasons for this rise and responded:

> *"Many of them are interested in learning English and they enrol for the English lessons. I am in contact with a Congolese based local church in the community which is interested in registering some of its Congolese youth for the skilling projects and computer lessons".*

It was noted from an interview with a respondent that refugees felt welcome, valued and they showed a sense of owning up, actively participating in activities. The library and ICT programme is a core internal initiative at KYCL. It ties into IFLA's green and sustainable library principles of access and inclusion, community engagement, responsible and eco-use of ICT's as well as resource efficiency (Hauke et al., 2026).

An interview revealed the Ghetto Go Green project, launched in 2023, supports climate adaptation in Kawempe's slum communities. Targeting youth and young women, the initiative addresses severe impacts of increased heavy rains, flooded drainage channels, collapsing homes, damaged sewage systems and declining sanitation. A world bank report similarly reported rising precipitation and intensified flooding in central and southern Uganda (The World Bank, 2020). In partnership with Network for Active Citizens, KYCL staff guide vulnerable residents to setup micro gardens, create public green spaces and manage waste. The Ghetto Go Green activities support research done by Munawaroh and Melati (2018) who recorded resource efficiency, waste management and reduced pollution as some of the benefits of adopting green library practices.

Further still, the UN habitat climate change assessment report for Uganda detailed that in Kampala the effects of climate change are displayed in the forms of floods caused by increased runoff water, decline in

treated fresh water, outbreak of water borne diseases for example cholera, flooding of sanitary facilities (toilets) which also become inaccessible and contamination of water sources (United Nations Human Settlements Programme [UN-HABITAT], 2010). Ultimately a community library's role in advancing environment related information and education cannot be underestimated as is echoed by Mulumba and Akullo (2018). In relation to climate resilience and improving food security, KYCL promoted urban farming within the Kawempe community through its *"buli maaka ne aka basin"* meaning: *"each household and a basin"* reach out activity. Again, due to the slum setup of homes with limited space, households are encouraged to grow vegetables for example tomatoes, carrots, onions, amaranth (dodo) and kale (sukuma wiki) in a single basin. KYCL purchases and distributes the seeds to the homes within Kawempe division. It was observed from the study that the beneficiaries from this activity were able to supplement food sources for their families as well as earn money from the sell and vending of vegetables. From the literature, Mishra (2023) noted that green library educational programmes covered topics on sustainable living and urban agriculture. More to that, this initiative aligned with IFLA sustainable and green librarianship principle of community engagement and economic viability (Hauke et al., 2026).

The Ghetto Go Green project also runs a community youth parliament, supported by the Network for Active Citizens. Held quarterly at KYCL premises, the community youth parliament engaged youth and welcomed women, leaders and residents to discuss issues such as drugs, education, sanitation and sports. KYCL further promoted environmental awareness on key global days and involved community members in waste management and clean-up activities like the *"obulungi bwa nsi"* meaning: *"the beauty of the world"* activity. The partnership also supported trainings in financial literacy, capacity building and NGO management. These findings support research done by Mishra (2023) who emphasized the need to prioritise community engagement, promote environmental awareness through seeking partnerships with public and private organisations when carrying out green library practices. For example; KYCL partnership with Network for Active Citizens.

Findings also highlighted the Seed Science Project, launched in 2018 in partnership with Seed Science Italy. According to a key informant, the initiative which was coordinated by KYCL worked with teachers and schools in Kawempe to inspire the youth especially girls to develop interest in science subjects. In a related finding, Watera (2019) observed that girls remained underrepresented in STEM fields in Uganda. Interviews revealed that participating Seed Science Project schools also had few female science teachers. The project made science enjoyable by using simple local materials such as soil, ash, paper and flowers for experiments and was open to both primary and secondary school learners. The existence of science clubs which make use of local materials re-affirms research done by Pagore and Chalukya (2022) and Mishra (2023) who found that green libraries often made use of local and recycled materials for most of their activities.

The Mindup project, launched in April 2022, focused on empowering women, men, single fathers, caregivers, and single mothers. Held every Monday, Wednesday, and Friday at KYCL, the programme offered entrepreneurship and financial literacy training, including loan management and forming savings groups or SACCOs. Women also received seedlings, while other participants accessed health talks and disease screening services at partner health centres, addressing the principle of community engagement, partnerships and economic viability. The Mindup project further linked to green libraries and environmental sustainability in several important ways. Firstly, through building sustainable livelihoods and resilience thereby promoting economic sustainability. Financially stable communities are better able to adopt and sustain environmentally friendly practices supported by green libraries. Secondly, the distribution of seedlings encouraged urban farming and greening of communities. This directly supports environmental sustainability through improved food security practices, reduced carbon footprints and creation of greener urban spaces, a key objective of green library initiatives (Hauke et al., 2025). Thirdly, and clearly evidenced is the importance of KYCL green initiatives which go beyond issuing reading ma-

terials to provide spaces for community education, creating awareness on sustainable living, health and environmental stewardship.

The Global Girls Glow project at KYCL, launched in 2023, engaged about 60 girls aged 10–17. Supported by Global GLOW International, it empowered participants to express their views, report abuse and build self-esteem, confidence, leadership, and communication skills. Sessions were held every Saturday for two hours, covering topics such as reproductive health, hygiene, healthy living and staying in school. Girls joined with parental or guardian consent. The initiative connected with IFLA green library principles of community engagement, partnerships, access and inclusion (Hauke et al., 2026).

Findings also highlighted the Brass for Africa project, which promoted youth participation in music and sports regardless of background. In Kawempe's largely Muslim community, many girls had previously been discouraged from taking part in such activities. The project complemented green library initiatives and environment sustainability by advancing sustainable behavioural change among the youth. Through encouraging girls' participation regardless of religious or cultural background, the project promoted equitable access to community library resources, a core green library principle (Hauke et al., 2025). KYCL is a safe, inclusive space where girls and the youth gathered, learn and participated therefore, strengthening the social pillar of sustainability. Brass for Africa supported green library goals by using music, performances and songs to raise awareness about climate change, pollution and tree planting. Sessions run every Wednesday and Thursday at KYCL for both in-school and out-of-school youth.

Objective 2: Challenges faced at Kawempe Youth Centre and Library in their efforts to adopt green libraries

A major challenge reported was NGO compliance. A key informant noted that government rules were numerous, frequently changing and poorly communicated. Requirements such as regular audits were difficult for KYCL to meet due to limited funds. Compliance also demanded civic education for users and community members, which the centre could not deliver because of funding constraints.

Curriculum changes in Uganda's lower secondary schools made several KYCL library materials outdated. The new curriculum, rolled out in 2020 by the National Curriculum Development Centre (NCDC) emphasised skills development and lifelong learning (NCDC, 2019). It introduced subjects like technology, design, performing arts, entrepreneurship, computing, political education and multiple foreign and local languages, yet KYCL had limited materials to support these areas.

The centre faced staffing challenges worsened after COVID-19 when five staff including the accountant left and were not replaced due to limited funds. Without a staffing budget recruitment is costly. Some projects like the Seed Science Project required professionals such as science teachers, nutritionists, social workers and others whose absence limited effective delivery for example explaining complex science concepts to students.

The Kawempe division, largely a slum with many idle youth, faced significant theft and insecurity. Community leaders, parents and residents frequently report thefts and burglaries to local police and security personnel. Funding, staff retention and overall centre operations were challenging. Some partner organisations did not provide financial support for activities, yet reports had to be prepared and professionals recruited.

Political interference was another challenge. During activities like the community youth parliament, politicians' involvement often turned discussions into personal political disputes. Similarly in the urban farming project, some women challenged technical staff from Kampala Capital City Authority (KCCA). The technical staff were volunteers sent to educate the women on fertilizer use. However, the attitude

displayed by people in the community undermined the activity's effectiveness. Additionally, monetized politics led participants especially women to expect money or handouts for attending activities sometimes refusing to provide information if not compensated.

Objective 3: Possible solutions to the challenges faced at Kawempe Youth Centre and Library in trying to adopt green libraries

Regarding NGO compliance, the centre director noted outsourcing funds to hire a legal officer to interpret regulations and ensure adherence to government policies. Non-compliance was described as a challenging process that could jeopardise future funding.

In relation to addressing the issue of changes in the lower secondary school curriculum, KYCL was seeking for funding and partners in order to update the library collection with NCDC approved study materials. The centre was further making use of e-books and online content which was aligned with the new curriculum.

To address staffing gaps, KYCL partnered with organizations to provide volunteers including a social worker, a nutritionist and a deputy executive director. Additionally, the Brass for Africa project supplied music teachers to conduct classes and train students in playing instruments.

To tackle theft and insecurity at the centre, security guards were employed who worked 24 hours, 7 days a week on an alternate basis. Security cameras were installed to monitor and record daily footage of activities at the centre. Regular security issues meetings were held at the centre in order to sensitise parents and people in the community about the need to report theft and burglary incidences.

KYCL addressed financial challenges by building a self-sustaining base through income generating activities like printing and photocopying. Partner funded projects such as urban farming, Mindup, Seed Science and some ICT programmes were integrated into core activities ensuring continuity even if funders withdrew support. It was noted that the partners for the global girls' glow project provided a small allowance although not sufficient for the female staff who coordinated the activity at the centre. It was observed that KYCL had a good number of networks and partners who played a critical role in advancing the environment sustainability agenda including greening initiatives. Similarly, Mishra (2023) stressed the importance of partnerships in achieving green library practices.

To tackle the political agenda and interference issue especially during the community youth parliament sessions, the coordinator for this activity avoided inviting active politicians and instead encouraged motivational speakers to participate.

Concerning the issue of monetized politics, the coordinator for this activity mentioned that hygiene and household items were distributed as opposed to cash handouts for example soap, cooking oil, sugar, salt and basins. The distribution of such items helped to promote hygiene and change the money gains mind set of people.

12. Conclusions

From the study, it can be concluded that the green library initiatives at KYCL are majorly outreach and community engagement rather than internal library centre in-house. The library and ICT programme which is a core initiative aligns with IFLA's green and sustainable library principles of access and inclusion, community engagement, responsible use of ICT's and resource efficiency. KYCL partnership projects addressed the notion of advancing environmental sustainability and championing climate adaptation within the Kawempe community and Kampala capital city at large. KYCL is a key player in the

attainment of Uganda's digital transformation agenda and vision 2040 strategic objectives and therefore, there is need for government support towards cultivating a model where libraries and youth centres become active agents of climate action and community resilience.

13. Recommendations

In light of the study findings, the below recommendations were made:

a) *Explore funding opportunities*: Having diverse funding opportunities to sustain initiatives and carter for recruitment and retention of staff.
b) *Creative practice*: Introduce more KYCL in-house green practices and systems as a way to display creative and innovative skills of library staff.
c) *Partnerships*: Strengthen collaborations for promoting green library activities across the community.
d) *International standards*: Embrace international green library standards as provided by the International Federation of Library Associations and Institutions (IFLA).
e) *Global participation*: The staff at KYCL should participate in greening events at regional and international levels.

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PARTNERSHIPS, ADVOCACY, AND STRATEGIC POSITIONING FOR SUSTAINABLE LIBRARIES

The Impact of Partnerships on the Promotion of Library and Information Services for Sustainable Communities

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Abstract

The collaboration between libraries, public institutions, academic entities, and community-based organisations has become essential in bridging information gaps and promoting sustainable development. Apart from addressing the information gaps, collaborations and partnerships increase the profile, visibility, credibility, and influence of the library in communities beyond the existing user base. This study investigated the impact of partnerships in advancing library and information services to promote sustainable communities. An open distance e-learning (ODeL) University Library and Information Services (LIS) was used as a case for the study. A quantitative research method was employed in the study using a survey as the primary data collection tool. A structured questionnaire was used to collect data from the selected University LIS partners. The findings highlight how partnerships enhance the delivery of information services in libraries. Such collaborations improve resource sharing, expand outreach, and facilitate community engagement through inclusive knowledge dissemination. It was further found that collaborations and partnerships not only strengthen resource mobilisation and service outreach but also empower communities through inclusive and participatory information dissemination. The study concluded that there is a growing need for collaboration between libraries and other public and community-based organisations to enhance the quality of education and sustainable communities.

Keywords: *partnerships, open distance e-learning, library and information services.*

1. Background and Introduction to the Study

Libraries and other information centres have, for some time, operated in silos and often compete against one another. The complex, interdisciplinary nature of sustainability challenges, however, demands a more integrated and collaborative approach. Collaborative partnerships between diverse stakeholders (e.g., libraries, government entities, private and public companies, academic institutions, community groups) are increasingly seen as a powerful mechanism to amplify the reach, relevance, and impact of these information services.

These collaborations have become essential in bridging information gaps and promoting sustainable development. In addition to addressing information gaps, collaborations and partnerships increase the library's profile, visibility, credibility, and influence in communities beyond its existing user base. There are various reasons for libraries and information services engaging in partnerships, and these include, pooling of resources, the reach and accessibility of information services, relevance to the communities they serve, alignment with sustainable development, and raising the visibility of libraries.

2. Review of Related Literature

Kranich (2012) argues that libraries are reclaiming their historical role as "cornerstones of democracy" by actively engaging in civic life. This is no longer a passive role but an active one, requiring libraries to move "beyond their walls" (Williment & Jones, 2016). The impetus for this shift is twofold, namely, the internal drivers, that is, a professional ethos within librarianship that emphasises community-led planning, social inclusion, and addressing "community needs" rather than just "patron wants" (Fisher & Durrance, 2003); and external drivers: Economic pressures where the digital divide, and the recognition that "wicked problems" like poverty, social isolation, and health disparities cannot be solved by any single agency (Jaeger et al., 2013). Libraries, with their trusted, neutral, and accessible physical spaces, are uniquely positioned to act as connectors and platforms for public service delivery.

2.1 Types and Nature of Partnerships in Promoting Information Services

There are various types and models of library partnerships that promote information services. The following are some of the partnership models that are prevalent in libraries:

Library-Government Partnerships

This is a type of partnership in which libraries work with municipal/government departments (education, health, community services) to deliver services, provide resources, or reach underserved groups. Libraries, especially public or community libraries, have historically maintained close relationships with government agencies, as they are often established, funded, and regulated by municipal or national governments. However, in recent decades, library–government partnerships have evolved from mere administrative oversight to collaborative mechanisms that enable libraries to extend their reach, diversify their services, and support sustainable community development (IFLA, 2020; Denton, 2015). These partnerships bring together the resources, infrastructure, and policy frameworks of government bodies with the community engagement and knowledge management expertise of libraries.

Library–government partnerships typically occur at municipal, provincial, or national levels, depending on the scope and governance of the library system. According to Aina (2019), such partnerships may take the form of:

- Service delivery collaborations, where government departments (education, health, social services) use libraries as access points for community information and outreach programmes.
- Resource-sharing agreements, in which municipal or provincial governments provide funding, ICT infrastructure, or technical support for library operations.
- Policy and planning partnerships, where libraries contribute to government-led strategies for education, digital inclusion, or community development.

In many African contexts, public libraries serve as community information centres, providing access to information and services that respond to local needs and contribute to broader social and economic development objectives. Their programmes and operations are often shaped by national and subnational government policies and development priorities (Bopape et al., 2021; Samb, 2020). This integration ensures that library services are not peripheral but embedded in state-driven social transformation agendas. Similarly, in Kenya, county governments have collaborated with the Kenya National Library Service (KNLS) to expand digital library access through the "Digital Literacy Programme", promoting inclusion in rural counties (IFLA, 2021).

Library-Educational Institution Partnerships

This partnership relates to the collaboration between libraries with schools, universities, and colleges for outreach, resource sharing, digital training, and joint programmes. Libraries and educational agencies are natural allies in fostering lifelong learning. A central benefit of these partnerships is the extension of library services to underserved or rural communities. The partnership between the University of South Africa (UNISA) Library and the Nelson Mandela Bay Municipality is an example of this type of collaboration. Through collaboration, municipal libraries became collection points for UNISA students, offering free Wi-Fi, study spaces, and computer access (South African News Agency [SANews], 2023). This model improves access to higher education resources, particularly for distance learners and low-income residents.

Collaborations with educational institutions are becoming increasingly common. Academic and public libraries frequently collaborate with schools, universities, and research institutions for literacy promotion, digital learning, and shared resource use. Osuchukwu (2016) found that Nigerian libraries partnered with higher education institutions to promote literacy and cultural heritage programmes that contributed to community empowerment. Such linkages enable libraries to integrate formal and informal learning systems, promoting lifelong learning and sustainable knowledge societies. Bertot et al (2014) concur that libraries often host digital literacy classes, resume workshops, and job search assistance, with government partners providing curriculum expertise, funding, or certification. This model directly serves unemployed or underemployed adults, an often-underserved group.

Library-Non-Profit/Community Organisation Partnerships

These are libraries working with NGOs, community groups, friends of the library, cultural or heritage organisations to run programmes, outreach, heritage preservation, literacy. Libraries are increasingly recognised as agents of social transformation that promote literacy, information access, inclusion, and sustainable community development. To realise these roles effectively, libraries often collaborate with non-profit organisations (NPOs) and community-based organisations (CBOs) that have strong grassroots connections and expertise in social mobilisation. According to IFLA (2020), partnerships with community organisations strengthen libraries' ability to respond to local needs by leveraging external expertise, local networks, and social capital. These collaborations are essential for achieving the United Nations Sustainable Development Goals (SDGs), particularly SDG 4 (Quality Education), SDG 10 (Reduced Inequalities), and SDG 11 (Sustainable Cities and Communities). Libraries collaborate on matters of mutual interest, such as literacy and educational programmes. Non-profit organisations working in education and literacy often collaborate with libraries to deliver reading promotion programmes, adult literacy classes, and after-school tutoring. For example, Osuchukwu (2016) reports that in Nigeria, public libraries partnered with local community groups to establish "reading tents" and "book clubs" in rural areas to promote literacy and lifelong learning. Similarly, the Room to Read foundation has worked with libraries across sub-Saharan Africa and South Asia to develop community reading spaces and provide learning materials to underprivileged children (IFLA, 2021).

Another collaboration is based on community development and empowerment partnerships. In many developing countries, community-based organisations collaborate with libraries to facilitate skills training, entrepreneurship development, and local advocacy. For instance, Olaifa and Olayiwola (2019) note that Nigerian libraries worked with community cooperatives to organise empowerment seminars for women and youth, thereby promoting socio-economic sustainability.

The literature unequivocally positions partnerships with non-profit and community organisations as a cornerstone of the modern public library's strategy for community impact. These collaborations are a powerful mechanism for translating the library's foundational values of equity and access into tangible,

life-changing services. By pooling resources, expertise, and community trust, libraries and non-profits create a synergistic effect that is greater than the sum of their parts. While navigating challenges of sustainability, capacity, and cultural differences requires intention and skill, the evidence confirms that these alliances are not merely advantageous but essential for building more inclusive, resilient, and supportive communities.

Library-Private/Corporate Partnerships

While collaborations with government and non-profit sectors are well-established, engaging the private sector presents a distinct and often contentious frontier. Library-Private/Corporate Partnerships involve collaborations between libraries and for-profit entities, ranging from local small businesses to multinational corporations. These partnerships are increasingly viewed as a strategic avenue for securing resources, enhancing service offerings, and fostering economic vitality. These partnerships bring together the public mission of libraries with the resources, innovation, and efficiency of private and corporate actors.

According to the International Federation of Library Associations and Institutions (IFLA, 2020), partnerships with corporate entities enable libraries to secure funding, technological tools, and professional expertise necessary for enhancing community-oriented information services. Such collaborations align closely with the United Nations Sustainable Development Goals (SDGs)—particularly SDG 4 (Quality Education), SDG 9 (Industry, Innovation, and Infrastructure), and SDG 17 (Partnerships for the Goals). Many corporate organisations engage with libraries as part of their Corporate Social Responsibility initiatives. For example, banks, telecommunication firms, and publishing companies have sponsored community reading rooms, mobile libraries, and ICT hubs. In Nigeria, Olaifa and Olayiwola (2019) reported that companies such as MTN and Zenith Bank partnered with public libraries to provide digital literacy programmes and e-learning resources for youth. Similarly, Microsoft's "Libraries for Innovation" initiative in South Africa equipped public libraries with internet connectivity and digital literacy training under its Corporate Social Responsibility framework (LIASA, 2020).

2.2 The Role of Partnerships in Promoting Library and Information Services to Communities

In the face of evolving information needs, technological disruption, and persistent social inequities, the paradigm of the library as a solo service provider has shifted to one of a collaborative partner. Partnerships have become a central strategy for libraries and information services (LIS) to expand reach, relevance, and impact in their communities. As funding, infrastructure, and user needs evolve, libraries increasingly rely on collaborations with other organisations (education, health, community, government, private sector) to deliver services effectively. For instance, the International Federation of Library Associations and Institutions (IFLA) describes partnerships as "a successful strategy for libraries" in an era when libraries cannot operate in isolation (IFLA, 2021). Partnerships play a crucial role, as discussed below.

Extending Access and Outreach

Partnerships help libraries reach communities and user groups beyond their traditional footprints. For example, the study "Towards functional school libraries: supporting library assistants in under-resourced schools through a university-community-school partnership" in South Africa, describing a "university-community-school partnership" which supported under-resourced school libraries, shows how partnerships can expand library support services where resources are scarce (Silbert & Bitso, 2015). Thus, partnerships enable libraries to serve communities they might otherwise struggle to support alone.

Facilitating Innovation, Relevance and Service Diversity

Partnerships enable libraries to introduce new services, programmes and reach new user needs. In the "Fostering Smart Citizens" paper, public libraries collaborated with other community stakeholders (including governments and possibly non-profits) to act as hubs for digital literacy, civic participation and innovation (Buyannemekh et al., 2024). Through partnership resources and expertise, libraries can adapt services to evolving community information needs.

Empowering Communities and Supporting Development

Partnerships allow libraries to contribute to broader social development outcomes in addition to providing access to resources. For example, the academic libraries partnering in "Resourcing community partnerships through academic libraries" show how libraries can support research, community learning, and knowledge exchange via partnerships (Wiggins et al, 2020). Therefore, partnerships position libraries as agents of community development, not only service providers.

Strengthening Institutional Capacity and Sustainability

Partnerships can help libraries overcome resource, capacity, and funding constraints. Denton (2015) argues that libraries facing budget and resource challenges need dynamic, innovative partnerships to meet community demands. Partnerships can boost libraries' internal capacity and the sustainability of their services.

2.3 Challenges and Barriers to Partnerships

While partnerships between libraries and various community organisations are widely promoted as essential for sustainable community development, the literature reveals significant challenges that can undermine their effectiveness. Sustainable communities require long-term, resilient systems that address economic viability, social equity, and environmental responsibility. However, library partnerships often face barriers that threaten their sustainability and impact. Numerous barriers hamper effective partnership formation, implementation, sustainability, and equitable impact. Understanding these challenges is essential if partnerships are to effectively promote LIS for sustainable communities.

Structural and Systemic Barriers

Funding instability and resource dependence are the primary challenges documented across multiple studies. Lilburn (2020) identifies the "grant cycle trap," where partnerships depend on short-term funding that aligns with grant cycles rather than long-term community needs. This creates several sustainability problems such as inability to plan beyond funding periods, constant reallocation of staff time to seek new funding, programme discontinuity that undermines community trust and pressure to pursue funder-driven priorities rather than community-identified needs. Another barrier is the institutional asymmetry and power imbalances. Partnerships often involve organisations of vastly different sizes, resources, and institutional power. Gibson et al. (2017) document how power imbalances manifest in several ways, namely, larger partners dictating terms and agendas, community-based organisations being marginalised in decision-making, and unequal burden of compliance and reporting falling on smaller partners. These power dynamics can reproduce existing community inequities rather than addressing them, contradicting the social sustainability goals of the partnership.

Operational and Managerial Challenges

The literature consistently identifies human resource constraints as a critical barrier. Serginson (2018) notes that partnership coordination requires significant staff time that is rarely accounted for in library

staffing models. Specific challenges include a lack of specific training in partnership management and moral injury when partnerships fail due to resource constraints.

Philosophical and Ethical Tensions

The most discussed ethical challenge involves the tension between partnership requirements and library values. Kranich (2012) documents cases where libraries faced pressure that compromised their values. These include limiting access based on partner requirements, and prioritising partner visibility over service quality. These compromises can undermine the library's role as a neutral, trusted community space, thereby reducing its long-term social sustainability.

Cultural and Linguistic Barriers

Partnerships serving diverse communities often encounter significant cultural challenges such as unconscious bias in programme design, language barriers in materials and communication, cultural misunderstandings in service delivery and failure to recognise different cultural knowledge systems.

Contextual and Environmental Barriers

Library partnerships exist within political contexts that can change rapidly due to shifting municipal priorities with new administrations, changes in funding streams due to political decisions, political pressure to demonstrate immediate results, and partisan opposition to certain types of partnerships.

The literature clearly demonstrates that partnerships, while potentially valuable for sustainable community development, face significant challenges that can undermine their effectiveness and sustainability. The most critical barriers involve power imbalances, resource instability, and philosophical tensions that threaten the library's core mission.

2.4 Strategies for Strengthening Partnerships

Given the many benefits of partnerships for libraries, literature increasingly emphasises how to do partnerships well, that is, strategies to build, manage, and sustain partnerships so they deliver real impact for communities and sustainable development. The central premise in the literature is that while partnerships are essential, their success is not automatic. Many collaborations fail to achieve their intended impact due to internal conflicts, power imbalances, or misaligned objectives. According to IFLA (2021), partnerships alone do not guarantee success, but strategic design, capacity, governance, evaluation, and alignment matter.

There are several interconnected strategies for overcoming challenges and building robust, impactful partnerships, which are discussed. One of the first strategic steps is to ensure the library and its partners share a clear vision, goals, and expected outcomes. Strong partnerships are underpinned by clarity in roles, responsibilities, and formalisation (e.g., agreements, MOUs).

Foundational Strategies

The purpose is to establish a shared vision and clear, measurable goals. Scholars like Bryson, Crosby, and Stone (2006) stress that this vision must be translated into specific, measurable, achievable, relevant, and time-bound (SMART) objectives that are owned by all partners. This ensures alignment and provides a clear benchmark for success. The literature highlights the importance of relational practices - investing time in personal relationships, demonstrating reliability, and showing respect for different forms of knowledge (Lasker, Weiss, & Miller, 2001). Putnam's (2000) concepts of bonding (within groups) and bridging (between groups) social capital are critical for creating a cohesive collaborative environment.

Structural and Process-Oriented Strategies

Effective partnerships require clear roles, responsibilities, and decision-making processes. This includes formalised terms of reference, steering committees, and transparent protocols for conflict resolution (Ansell & Gash, 2008). A well-defined structure prevents ambiguity and ensures accountability.

Strategic Resource and Power Management

Dependence on a single, short-term funding source can destabilise a partnership. Diversifying funding streams and investing in core administrative support ("backbone" functions) are key strategies for sustainability (Kania & Kramer, 2011). Equally, acknowledgement and management of power dynamics remain a proactive strategy to strengthen the partnerships.

2.5 Problem Statement

Although library and information services are widely acknowledged as essential for advancing community sustainability, many information service initiatives struggle to realise their full potential, albeit with ongoing strides. One significant limitation lies in the insufficient promotion of these services, namely, efforts to raise awareness, encourage usage, and ensure long-term engagement within communities. Partnerships have been identified as a promising strategy to enhance the reach and effectiveness of LIS promotion.

The LIS has entered multiple partnerships with municipal libraries, private and public organisations, and correctional centres. There is, however, a lack of empirical evidence regarding the forms of partnerships that are most effective in promoting information services, the specific mechanisms within these partnerships that contribute to improved outreach and user engagement, and how the promotion of library and information services through partnerships leads to tangible, sustainable outcomes within communities. This study, therefore, seeks to address the question of how partnerships impact the promotion of library and information services for sustainable communities.

2.6 Purpose and Objectives of the Study

The purpose of the study was to investigate the impact of partnerships on the promotion of library and information services for sustainable communities. The study was premised on the following research objectives:

- To identify the types and nature of partnerships involved in promoting library and information services for sustainable community development.
- To explore the role of partnerships in promoting library and information services to communities.
- To examine the challenges and barriers that partnerships face in promoting library and information services for sustainable communities.
- To propose strategies for strengthening partnerships to maximise their impact on sustainable community development.

3. Methodology

To achieve the objectives, a quantitative research method was employed in the study using a survey as the primary data collection tool. A structured questionnaire was used to collect data from the selected University LIS partners. The study focused on the partnerships with municipal libraries. At the time of conducting this study, there were 91 municipal libraries collaborating with the LIS. These municipal

libraries are from the eight provinces of South Africa. One of the remaining provinces has not yet partnered with the University. Table 1 depicts the province and the number of partner libraries.

Table 1

Provinces and the Number of Partner Libraries

Province	Number of partner libraries
Eastern Cape	1
Free State	42
Gauteng	12
KwaZulu-Natal	14
Limpopo	—
Mpumalanga	1
Northern Cape	1
North West	6
Western Cape	14

Note. An em dash (—) indicates that no partner libraries were reported for the province.

The 91 municipal libraries constituted the population of the study. A questionnaire was distributed to all the heads of the partner libraries through their e-mail addresses. The questionnaire was created using Google Forms, and a link was sent to the partners. The e-mail addresses of the heads of partner libraries were obtained from a list of partners compiled by the University of South Africa.

4. Findings and Discussion

This research presents findings from a study of 91 public or community libraries, to which 57 libraries responded, yielding a 63% response rate. The findings provide a direct, institutional perspective on the role, nature, and challenges of partnerships in advancing library and information services for sustainable communities.

4.1 The types and nature of partnerships involved

The findings confirm that partnerships are diverse in type, scope, and purpose, reflecting the multifaceted needs of sustainable community development. This is corroborated by Aina (2019) and in the IFLA (2021) publications on library partnerships. 100% of responding libraries reported having at least one active partnership with Unisa LIS in the form of an MoU. A total of 61% further explained that their partnership encompasses hosting or co-hosting specific events and programmes led by a partner. 25% of libraries reported having long-term, formalised partnerships that were integrated into their strategic plans, such as the provision of sustainable internet access. A smaller segment (14%) of partnerships was primarily for monetary donations, grants, or gifts of equipment and software.

4.2 The role of partnerships in promoting library and information services

Libraries reported that partnerships are critical for expanding their mission beyond traditional services. 84% of libraries agreed that partnerships "allow us to offer services we could not provide with our existing staff expertise or budget." 68% of respondents stated that partnerships have increased their library's relevance to their municipalities and community stakeholders. A total of 90% of libraries re-

garded partnerships as promoting digital inclusion, literacy, and providing safe, inclusive community spaces. 72% of libraries reported that partnerships enabled them to acquire books, ICT equipment, or internet connectivity. Technology-centered collaborations improved digital inclusion, enabling libraries to support e-learning and online information access. Silbert and Bitso (2015) attest that university-community-school partnership support under-resourced school libraries to expand library support services where resources are scarce.

4.3 The challenges and barriers that partnerships face

The findings reveal a stark picture of the internal and external constraints libraries face in managing partnerships. An overwhelming 89% of libraries reported that existing staff were stretched too thin to manage partnerships effectively without dedicated time. While partnerships can be cost-effective, 80% of libraries lack the budget to scale successful pilot programmes into permanent services. In mitigation, 58% of libraries prefer a "partnership by opportunity" model rather than a strategic plan, leading to an unmanageable or ineffective portfolio of collaborations. 65% of libraries frequently cited disagreements over roles, publicity, and the scope of shared projects. This is confirmed by Gibson et al (2017) that larger partners dictate terms and agendas, marginalising others in decision-making, and the unequal burden of compliance and reporting falls on smaller partners. 55% of the libraries cited bureaucracy as a factor slowing the decision-making processes within government/municipalities. Inconsistent communication from partner organisations was a common frustration cited by 50% of the libraries.

4.4 Strategies for strengthening partnerships to maximise impact

With 58% of libraries citing a lack of strategy, a formal system is needed. Libraries should categorise partners as transactional, strategic, or potential, and allocate resources accordingly. This ensures that staff time is focused on the most impactful alliances. Addressing the 89% challenge of staff capacity is paramount. Libraries should use these findings to make a business case to the government and funders for dedicated staff positions. As supported by Ansell and Gash (2008) libraries should combat misaligned expectations (65%) and communication issues (50%) and develop a standard package for prospective partners. This kit would clearly outline the library's mission, available resources, partnership guidelines, and a draft MOU template, setting clear expectations from the outset. With only 40% engagement, the private sector is an untapped resource. Libraries should proactively approach businesses not for charity, but for strategic alliances that address community needs, which aligns corporate social responsibility with library goals.

5. Recommendations

The study recommends the following:

- To reduce misunderstandings, libraries should establish Memoranda of Understanding (MOUs) that clearly outline roles, responsibilities, resource commitments, and expected outcomes for all partners.
- Libraries should involve community groups, local leaders, and user associations when designing partnership initiatives to ensure programmes respond directly to community needs.
- Partners should work with libraries to create long-term literacy, digital skills, health information, and environmental sustainability programmes that remain active beyond short-term project cycles.
- Libraries and their partners should co-host more community mobilisation events, reading campaigns, digital inclusion workshops, and awareness drives to enhance the visibility and relevance of library services.

- Partnerships should include opportunities for training and professional development, focusing on ICT competency, project management, monitoring and evaluation, and community engagement.
- Stakeholders should adopt a resource-sharing model, allowing libraries access to partner facilities, technology, and expertise to expand service delivery for sustainable community development.
- Libraries should work with partners to develop monitoring tools, progress indicators, and evaluation frameworks to track project outcomes and ensure accountability and sustainability.
- Libraries need to advocate for equal participation in decision-making, ensuring that community needs take precedence over partner-driven agendas.

6. Conclusion

In summary, partnerships vary by partner type, level of involvement (strategic vs programmatic), and by the domain of service (digital inclusion, literacy, heritage, entrepreneurship, etc). The literature affirms that strategic partnerships, when designed, implemented, and sustained well, can significantly increase the impact of library and information services in fostering sustainable communities. Key strategy domains include alignment and vision, governance and roles, capacity building, community engagement, evaluation, sustainability planning, and leveraging technology. For libraries wishing to maximise their contribution to sustainable community development, purposeful strategic planning for partnerships is indispensable, rather than relying on ad-hoc or opportunistic collaborations.

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Collaborative Partnerships and the Revitalisation of Primary School Libraries in Eswatini: A Multiple-Case Study of Five Donor-Supported Schools

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Abstract

School libraries play a significant role in promoting literacy, critical thinking, and lifelong learning among primary school learners. However, the development and sustainability of functional school libraries in Eswatini remain limited, hindered by scarce resources, inadequate infrastructure, and weak long-term maintenance. This paper reports on a collaborative project in which three organisations worked together to revitalise five school libraries across the four regions of Eswatini. The initiative, involving Nazarene Compassionate Ministries – Eswatini (NCM-E) and Canada (NCM Canada), the Eswatini National Library Service (ENLS), and the Eswatini Library and Information Association (ESWALA), aimed to revitalise and sustain primary school libraries in donor-supported schools. The five schools across the four regions were Ndzingeni Nazarene Primary (Hhohho), Tsambokhulu Nazarene Primary (Lubombo), Mliba Nazarene Primary and Black Mbuluzi Nazarene Primary (Manzini), and Sibovu Nazarene Primary (Shiselweni). Data were collected through semi-structured interviews with head teachers, teacher-librarians, and partner representatives. Thematic analysis showed that the partnership strengthens book provision, improves library organisation, and enhances technical capacity: ENLS and ESWALA provided technical expertise, while NCM Canada supplied books and library materials. The team also conducted site visits to each school. Challenges included shelving delays, limited space, and insufficient training. The findings demonstrate that coordinated collaboration offers a viable model for sustainable school library development in Eswatini.

Keywords: *school libraries, collaborative partnerships, literacy development, Eswatini, donor-supported schools.*

1. Introduction

1.1 Background of the Study

School libraries play a vital role in promoting literacy, independent learning, and curriculum enrichment (Mojapelo, 2018). In Eswatini, however, numerous primary schools remain without libraries, as resources, infrastructure, and professional assistance are all persistently insufficient (Dlamini, 2021). Past

interventions have, in most cases, been piecemeal in nature, leading to only temporary improvements. For instance, projects run by the African Library Project in Eswatini have often lacked follow-up support once initial materials were supplied.

Global studies consistently show that well-resourced, effectively operating school libraries have a positive influence on reading performance and learners' overall experience (IFLA, 2015; Devi, 2013). School libraries are central to literacy promotion and curriculum support in most education systems (Mnyandu, 2023). In developing countries such as Eswatini, however, the establishment, maintenance, and sustainability of such libraries remain haphazard, hindered by limited financial support, inadequate infrastructure, constrained budgets, and competing educational priorities that slow the development of functional school library programmes (Gretes, 2013).

Many donor-funded libraries in Africa face difficulties once initial support ends, raising concerns about continuity, resource maintenance, and community ownership (Ngulube, 2019). Some reports suggest that school library programmes fail because of a lack of trained staff, inadequate integration of library use into teaching, poor stakeholder coordination, and limited community engagement (Devi, 2013). Book donations alone are rarely sufficient; they require complementary organisations responsible for training, policy, stakeholder partnership, and control systems (IFLA & UNESCO, 2025; IFLA, 2015).

In response to these gaps, nonprofit organisations, professional bodies, and donor agencies have undertaken initiatives to support selected Nazarene primary school libraries in Eswatini. To address these systemic challenges, a collaborative initiative was established involving Nazarene Compassionate Ministries – Eswatini (NCM-E) and Canada (NCM Canada), the Eswatini National Library Service (ENLS), and the Eswatini Library and Information Association (ESWALA).

NCM-E is a faith-based, registered NGO established in 2009 to foster Christ-like compassion in vulnerable communities across Eswatini, working in partnership with local congregations of the Church of the Nazarene. Its programmes span health (including HIV and AIDS), WASH, education, early childhood development, and humanitarian response, empowering individuals and families to thrive. NCM-E also supports national priorities such as promoting literacy through school libraries; with assistance from NCM Canada, it has donated books, learning materials, and shelving to schools across the country.

NCM Canada is an international development charity that partners with Nazarene churches to meet the needs of vulnerable children, families, and communities worldwide. Rooted in the gospel call to compassion, it supports initiatives in poverty alleviation, health, education, and disaster response. Through its charitable registration in Canada, NCM Canada mobilises resources and partnerships to extend this mission globally, empowering churches to act as agents of sustainable transformation.

ENLS is an Eswatini Government institution operating under the Ministry of Information and Communication. Established under the 2002 Act, it aims to provide free access to knowledge, preserve Swazi culture, promote literacy, and develop information centres (including at Tinkhundla level) and school libraries. It continues to evolve alongside ICT development to support national development, lifelong learning, and digital inclusion, drawing on initiatives such as benchmarking visits to South Africa and the roll-out of digital skills training.

ESWALA was formed in 1984 to champion library services, professional interests, research, and training for information personnel in Eswatini (ESWALA, 2025). It aims to provide equitable access to information, support literacy, and foster national development through knowledge access, operating within the national library system and engaging with global bodies such as SCECSAL and IFLA.

The initiative supports schools across all four regions of the country - Hhohho, Lubombo, Manzini, and Shiselweni. NCM Canada donates library materials, books, and shelves, while ENLS and ESWALA provide technical expertise, including set-up, cataloguing, classification, and training. These are primarily Nazarene-affiliated schools located across the country, and the partnership models a strategic alliance that seeks to advance primary school learner education in the country's rural schools.

To institutionalise the partnership, the three organisations collectively developed a Memorandum of Understanding (MoU) covering roles and responsibilities, operational procedures, and monitoring and evaluation of the project. Although the MoU was not formally signed because of scheduling constraints, its provisions were used fully during the project and served as the guide for how coordination, implementation, and accountability were carried out.

To reinforce the partnership, delegations from NCM Canada, together with representatives of ESWALA and ENLS, organised visits to all five schools on different dates. These visits enabled the team to engage with school leadership, observe library improvements, and reconcile donor expectations with school-level realities. This paper traces the work of the partnership and how the coordinated effort is transforming the state of school libraries, making them stronger and more viable.

1.2 Problem Statement

Primary school libraries in Eswatini remain underdeveloped and weak, even though they are significant in fostering literacy and lifelong learning. Their growth has been constrained by persistent challenges, including limited resources and funding, inadequate infrastructure, and a lack of collaborative partnerships with other stakeholders. Addressing this requires a coordinated and collaborative approach to sharing resources, expertise, and advocacy. Interventions employed in the past have been too disjointed and have therefore had only a limited long-term effect. This paper reports on a multi-stakeholder partnership that aims to restore and maintain school libraries in donor-supported schools in Eswatini.

1.3 Purpose of the Study

The purpose of this study is to report on a collaborative partnership initiative aimed at revitalising and sustaining purposively selected primary school libraries in Eswatini through coordinated partnerships among NCM-E, NCM Canada, ENLS, and ESWALA. The paper highlights how collective action addresses systemic challenges of limited resources, inadequate infrastructure, and weak integration of libraries into the promotion of reading and literacy.

1.4 Main Objective

To describe and discuss the input, roles, and plans of collaborative partnerships in enhancing the sustainability and functionality of the Nazarene primary school libraries in donor-supported schools in Eswatini.

1.5 Specific Objectives

- To record the contributions and role played by NCM-E, NCM Canada, ENLS, and ESWALA in the reinvigoration of the five Nazarene primary school libraries within the four regions of Eswatini.
- To outline the technical knowledge and skills offered by ENLS and ESWALA.
- To determine the challenges faced by schools and partners in developing and maintaining school libraries.
- To record the visitation activities conducted by the NCM Canada, NCM-E, ENLS, and ESWALA teams.

2. Methods

2.1 Research Design

This collaborative initiative was documented and analysed using a qualitative case study design, as case study research is particularly useful for the in-depth investigation of a phenomenon within a specific real-life context. It is also well suited to generating extensive, in-depth descriptions of complex phenomena. This design enabled a detailed understanding of the partnership dynamics, school experiences, and sustainability strategies.

2.2 Study Participants

Five major schools were purposively selected based on their participation in the Nazarene schools' programme. Participants consisted of head teachers/teacher-librarians, ENLS Outreach and Extension officers, ESWALA Executive members, and representatives of NCM-E and NCM Canada. Table 1 presents the participant groups included in the study.

Table 1

Study Sites and Participant Groups

Study component	Description
Research design	Qualitative case study (multiple sites)
Site selection (schools)	Five major schools purposively selected based on their participation in the Nazarene schools' programme
School-based participants	Head teachers; teacher-librarians (or head teachers serving as teacher-librarians, if applicable)
Library outreach/extension participants	ENLS Outreach and Extension officers
Professional association participants	ESWALA Executive members
NGO/faith-based partners	Representatives of NCM-E; representatives of NCM Canada

2.3 Data Collection Instruments

Semi-structured interviews were employed to gather qualitative, detailed insights into the partnership's roles, progress, challenges, and sustainability efforts. Field notes and observations of library spaces complemented the interviews. Data collection was further enriched by documented visitation reports from the NCM Canada, ESWALA, and ENLS teams, who visited each of the five schools on scheduled dates. These visits provided additional observational insights into library readiness, partner engagement, and school-level implementation.

2.4 Data Analysis

Thematic analysis was employed to identify recurring patterns and themes. Data were coded inductively, allowing themes to emerge around contributions, challenges, and sustainability strategies.

2.5 Ethical Considerations

Permission was granted by the participating schools and partner organisations, and the purpose of the study, confidentiality measures, and participants' right to withdraw were explained to all participants.

3. Results

3.1 Objective Findings

Contributions and role played by NCM-E, NCM Canada, ENLS, and ESWALA

NCM-E played a critical role throughout the project, identifying high-need schools, facilitating communication with school leadership, conducting initial needs assessments, coordinating the transit of materials from Canada, and ensuring that materials were received and distributed appropriately. Their involvement was essential to the sustainability and accountability of the initiative.

NCM Canada is a key partner in this initiative. It supported NCM-E with a wide range of educational materials tailored to different levels of schooling: primary schools received early readers, picture books, children's novels, non-fiction texts, and classroom supplies such as bulletin board materials, stationery, math counters, and construction paper. Teacher resources included materials on pedagogy, child development, differentiated instruction, and subject-specific teaching aids, while administrative offices benefited from donated furniture such as office chairs and filing cabinets. The overarching aim was to enrich learning environments, support teachers, and cultivate a culture of reading for both academic and recreational purposes.

The situation of the Nazarene primary schools prior to the NCM initiative varied considerably; the teams found libraries already available in some schools. Table 2 summarises the conditions found in each school.

Table 2

Conditions Found in the Schools

Name of school	Library	Books	Shelves	Teacher-librarian
Black Mbuluzi Nazarene Primary School	Available	Available	Available	Not yet trained
Mliba Nazarene Primary School	Available	Available	Available	Not yet trained
Ndzingeni Nazarene Primary School	Available	Available	Available	Not yet trained
Sibovu Nazarene Primary School	Housed in a staff room	Available	Available	Not yet trained
Tsambokhulu Nazarene Primary School	Not available	Books still in boxes	Boxed, not yet installed	Not yet trained

When ENLS and ESWALA began their set-up work at the different school library sites, they shared the following observations. At Tsambokhulu, there was no library, as it was still under construction; NCM Canada provided shelves to be installed and books to be shelved once the school reopens, and the books were processed and catalogued by the ENLS team.

At Sibovu, it was noted that there was no standalone library; a makeshift library housed in the staff room was all that was available. NCM Canada brought shelves from a previous visit, and re-shelving will take place when the school reopens.

The library at Black Mbuluzi was found to be too small. After negotiations, the school committee, through the head teacher, allocated a classroom to be used as a library. NCM Canada negotiated with the Design and Technology Department at Dvokolwako High School to make the shelves, which have since been paid for and completed.

A library was found to be available at Mliba Primary School but was not fully utilised. The collection was observed to be reasonably good, drawing on previous donations from NCM Canada. Re-shelving had already begun before schools closed and will continue when they reopen; processing of books and cataloguing was carried out by the ENLS team.

The library at Ndzingeni Nazarene Primary is large enough for the school's needs but is not in order: the stacks are unkempt and not motivating to pupils. Processing and re-shelving were also ongoing, carried out by the ENLS team.

4. Technical knowledge and skills offered by ENLS and ESWALA

ENLS and ESWALA processed books and prepared materials, making them ready for shelving and access by learners. ENLS provided technical expertise, including cataloguing, classification, and book processing, while ESWALA members offered professional guidance, training, and ongoing support to teacher-librarians. At present, several collections are awaiting shelf placement before they can be readily accessed by learners; one school is planning an official opening in early 2026.

Visitation activities by the NCM Canada, NCM-E, ENLS, and ESWALA teams

The team successfully conducted visits to the identified Nazarene primary schools at scheduled times following the donations. The visits focused on accountability and progress monitoring, engaging students and teachers, and sharing best practices and innovative strategies to promote reading and strengthen school library infrastructure. The visits also aimed to finalise the roles and responsibilities set out in the MoU between the partners, and provided a valuable opportunity to review project progress and identify further areas for collaboration. Table 3 presents the visitation dates.

Table 3

School Visits by Partners

School	Date	Status
Ndzingeni Nazarene Primary	7 July 2025	Completed
Black Mbuluzi Nazarene Primary	8 July 2025	Completed
Mliba Nazarene Primary	11 July 2025	Completed
Tsambokhulu Nazarene Primary	15 July 2025	Completed
Sibovu Nazarene Primary	17 July 2025	Completed

Challenges faced by schools and partners in developing and maintaining school libraries

Several challenges emerged throughout the project. Teachers were initially hesitant to use the books due to concerns about loss, limited time, and unfamiliarity with integrating reading materials into lessons beyond English instruction. Structural constraints such as inadequate library space, lack of shelving, and the absence of designated library personnel further limited library utilisation. Cataloguing systems were often missing, making it difficult for teachers to identify relevant materials.

Language barriers also played a role. Although efforts were made to include SiSwati-language books, these materials frequently went missing despite their importance for cultural relevance and literacy development, and some families, particularly in rural areas, were hesitant about English-language books.

Teachers also faced broader resource shortages, including basic classroom tools and science equipment, which made library use a lower priority. The absence of essential teaching materials - such as scissors, sharpeners, or microscopes — reinforced the perception that books were supplementary rather than central to learning.

Communication challenges also emerged. As an external partner, the project lead sometimes encountered polite but incomplete feedback from schools, possibly driven by fear of losing support. Although improvements in Grade 7 results were observed in some rural schools, the causal link to library resources could not be definitively established.

5. Discussion

The Nazarene Compassionate Ministries delivered consignments of library materials, including books and shelves, to all five schools across the four regions. Library organisation was enhanced in all five schools, aligning with international guidance that treats the school library as enabling learning infrastructure rather than passive book storage (IFLA, 2015). Resource injection is argued to be a necessary catalyst for educationally meaningful libraries that are organised, staffed, and supportive of the curriculum (Mojapelo & Dube, 2014). Site visits by NCM Canada enhanced discipline, transparency, and coordination between donor assistance and school-level requirements, mirroring aid-effectiveness principles that emphasise alignment with local priorities, managing results, and mutual accountability between partners (OECD, 2005; Chigwada & Ngulube, 2024). However, slow timelines in shelving installation delayed library opening schedules, illustrating how delays in 'readiness' components can reduce the educational return on donated resources, especially where facilities and equipment are core conditions for effectiveness (Mojapelo, 2015; IFLA, 2015).

Key challenges included limited space in some schools, which restricted library layout and learner movement. International school library guidance underscores the importance of safe, flexible, and functional spaces; where physical footprints are constrained, design choices and furniture become critical to supporting active learning and equitable access. Further, gaps in capacity-building for teacher-librarians and in the empowerment of school administration were noted. Research indicates that school libraries without trained personnel to manage them, and to integrate their use into teaching and learning, tend to falter (Evans, 2014). Sustainability strategies identified as ongoing tasks for the partner teams included capacity-building for teacher-librarians, integrating library periods into school timetables, strengthening school leadership support and community involvement, and maintaining engagement through partner visitations and follow-up support. These findings align with evidence from the Southern African region showing that school libraries depend on school development and mentoring, curriculum integration, leadership ownership, and local participation (Evans, 2014). A study from Botswana similarly finds that information literacy and library use improve considerably when teacher-librarians collaborate intentionally with teachers (Dipetso & Moahi, 2019).

The findings show that collaborative partnerships can significantly strengthen school library development in resource-constrained contexts. The complementary and interdependent roles of the partners — NCM Canada providing materials, ENLS providing technical skills through cataloguing, and ESWALA providing professional support — created a holistic model addressing both resource and capacity gaps. The inclusion of school visitations by NCM Canada added a layer of accountability, relationship-building, and real-time assessment that strengthened the partnership's effectiveness, consistent with evidence

that ongoing engagement, rather than one-off donations, is critical to sustaining local ownership (Chigwada & Ngulube, 2024). Infrastructure delays highlight the need for better alignment between material donations and school readiness; nonetheless, the progress toward a 2026 launch demonstrates that sustained collaboration maintains momentum even when challenges arise.

The regional spread of participating schools enhances national equity and positions the partnership as a scalable model, particularly important in contexts where school library provision remains uneven across localities (Mojapelo & Dube, 2014). The emphasis on training and integration into teaching suggests a shift toward viewing libraries as active learning environments rather than storage spaces.

6. Limitations of the Case Study

The study focused on five donor-supported primary schools, limiting generalisability. Learner perspectives and quantitative literacy outcomes were not directly assessed, and the assessment of long-term sustainability was based on stakeholder perceptions rather than longitudinal data.

6.1 Future Work

Future efforts should focus on strengthening teacher-librarian training, supporting schools in developing library policies and operational guidelines, expanding the partnership to additional schools, exploring digital literacy components, and conducting follow-up visits to monitor and evaluate progress and sustainability.

7. Conclusion and Recommendations

This paper illustrates that joint ventures are a highly practical and effective strategy for restoring primary school libraries in Eswatini. The partnership provided material support, technical knowledge, professional advice, and site visits, helping to resolve existing challenges and establish a basis for sustainable library services. Although the intervention improved library organisation and strengthened accountability through partner visits, progress was delayed by inadequate infrastructure (especially shelving), uneven partner coordination, capacity gaps among teacher-librarians, and limited integration of the library into teaching and learning. The promising results across the four regions of Eswatini indicate potential for national scale-up; however, this requires a clearer standardised model and sustained follow-up mechanisms to protect momentum and accountability towards the 2026 launch.

7.1 Recommendations

- *Infrastructure delays*: Coordination among partners should be strengthened to minimise infrastructure delays, through joint implementation plans and timelines that link material delivery, installation, and library opening dates.
- *Teacher-librarian training*: Continuous professional development should be organised for teacher-librarians through short workshops and mentoring during partner visits and during ENLS/ESWALA set-up and material-processing sessions.
- *Curriculum integration*: To reduce the risk of libraries being under-used, schools should embed library use in policy, schedule library periods in timetables, and encourage co-planning between teachers and teacher-librarians.
- *Scale-up and standardisation*: The model shows strong promise across regions, but expansion to other schools nationally will require standardised readiness criteria to identify suitable new sites.

- *Accountability and communication*: Regular partner visitations should continue to reinforce accountability and support, guided by an agreed visitation calendar with standard checklists and action-plan templates, ensuring all partners are prepared in advance.

The project's most important legacy is the demonstration that sustainable school libraries result from multi-stakeholder cooperation - a model that can be extended to other schools in Eswatini, and to other educational institutions, beyond it.

Acknowledgements

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POLICY AND LEGAL ISSUES IN LIBRARIES AND INFORMATION SERVICES

Policy, Legal, and Advocacy Influences on the Sustainability of Libraries and Information Services in Tanzania

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Abstract

Libraries and information institutions in Tanzania are central to advancing literacy, education, digital inclusion, and national development. However, their long-term sustainability is constrained by weak policy support, outdated legal frameworks, inconsistent funding, and fragmented advocacy efforts. This study provides a bibliometric analysis of scholarly literature published between 2000 and 2024 to examine how policy frameworks, legal instruments, and advocacy strategies influence the sustainability of libraries and information services in Tanzania. Data were retrieved from Scopus using a structured search query and analysed through the R Biblioshiny 5.0 package to map publication trends, co-authorship networks, citation patterns, keyword co-occurrence, and institutional contributions. A total of 20 publications met the inclusion criteria. This dataset shows a 5.7% annual growth rate in output over 24 years, indicating a gradual increase in scholarly interest in governance-related LIS themes in Tanzania. The findings reveal limited scholarly engagement with Tanzanian library policy and legal issues, with research output concentrated around themes such as information access, ICT integration, and digital inclusion. In contrast, topics such as library legislation, policy reform, regulatory frameworks, and structured advocacy remain underrepresented. Keywords linked to "sustainability" and "information services" appear frequently, while concepts such as "library law," "copyright," and "policy governance" are rarely explored. The study concludes that strengthening the sustainability of Tanzanian libraries requires renewed policy attention, targeted legal reforms, enhanced institutional collaboration, and more coordinated advocacy led by professional bodies. The results provide evidence to inform policymakers, LIS professionals, and development partners on the strategic interventions needed to reinforce the policy and legal foundations of library services in Tanzania.

***Keywords**: library sustainability, policy frameworks, legal instruments, advocacy, Tanzania.*

1. Introduction

Libraries and information institutions play a key role in national development by promoting equitable access to knowledge, supporting literacy, enabling lifelong learning, and enhancing community participation. In Tanzania, libraries have historically contributed to adult education initiatives, community learning, and the preservation of cultural heritage (Elly et al., 2003). Over time, academic, public, school, and specialised libraries have broadened their services in line with Tanzania Development Vision 2025, the National ICT Policy (2016), and the Sustainable Development Goals (SDGs), reflecting broader African trends in digital transformation and knowledge-driven development (Ocholla, 2008).

Despite this progress, the sustainability of Tanzanian libraries is constrained by outdated policies and legal frameworks that fail to address contemporary information needs, digital ecosystems, and emerging access rights (Jaeger et al., 2013). The Tanzania Library Services Act of 1963 (revised 1975) predates the digital age and remains out of step with modern expectations regarding equitable access, digital content governance, and public service accountability (Mcharazo & Olden, 2016; Mubofu et al., 2025). Similar issues are evident across Africa, where outdated legislation, weak institutional governance, and a lack of regulatory guidance hinder library modernisation and service growth (Arnold, 2004). These policy gaps constrain libraries' ability to adapt to technological change, promote digital inclusion, and maintain service delivery.

Advocacy structures in Tanzania further exacerbate these challenges, as professional efforts remain fragmented and weakly connected to formal policy processes. Although professional bodies such as the Tanzania Library Association (TLA), the Consortium of Tanzania University and Research Libraries (COTUL), and the Tanzania Library Services Board (TLSB) engage in advocacy, their efforts remain fragmented, poorly coordinated, and often disconnected from national policy processes (Mcharazo, 2008). In contrast, global evidence demonstrates that strong advocacy coalitions and modern legal frameworks support resilient and innovative library systems (Grimes & Porter, 2024; IFLA, 2018). This emphasises the need for a more cohesive policy, legal, and advocacy environment to ensure the sustainability of library services in Tanzania.

Although various studies have examined information access, ICT integration, and digital literacy within Tanzanian libraries (Lwoga & Questier, 2014; Sife et al., 2007), fewer have focused on the policy, legal, and advocacy dimensions that influence the long-term sustainability of library services. Research across Africa similarly highlights limited engagement with governance structures, copyright regimes, institutional policy development, and coordinated advocacy mechanisms (Muswazi, 2000). This gap is concerning because sustainable library development relies on technology, resources, modern legislation, supportive policy frameworks, transparent governance structures, and strategic advocacy.

Given these gaps, there is a need to systematically map how the scholarly literature has addressed policy, legal, and advocacy issues that influence library sustainability in Tanzania. Bibliometric analysis offers a suitable approach for identifying research trends, collaboration networks, thematic patterns, and knowledge gaps. This study, therefore, examines publications from 2000 to 2024 to:

- Map publication trends related to policy, legal, and advocacy issues affecting library sustainability in Tanzania.
- Analyse co-authorship patterns, institutional contributions, and citation impact.
- Identify dominant and underrepresented themes in policy and legal scholarship within the LIS field.
- Generate evidence to inform policy development, legal reforms, and advocacy strategies for strengthening the sustainability of Tanzanian libraries.

2. Methods

This study employed a bibliometric approach to analyse scholarly literature on policy frameworks, legal instruments, and advocacy strategies for the sustainability of library and information services in Tanzania. Bibliometric analysis was selected because it enables systematic mapping of research trends, intellectual structures, and thematic foci over time. Scopus was selected as the sole database due to its broader international coverage of peer-reviewed LIS literature and its comprehensive metadata, which are vital for bibliometric analysis. A structured search query was developed to identify literature addressing policy, legal, and advocacy themes within the Tanzanian library context. The search was conducted using keyword combinations and Boolean operators. The final query was:

((“library policy” OR “information policy” OR “library legislation” OR “legal framework” OR “library act”) AND (“library management” OR “library sustainability” OR “library governance”) AND (“information services” OR “library services” OR libraries OR “public libraries” OR “academic libraries” OR “digital libraries” OR “information management” OR “university libraries”) AND (Tanzania))

The search covered the period from 2000 to 2024 to reflect recent developments in library policy and sustainability. Inclusion criteria included peer-reviewed journal articles, conference papers, book chapters, and books; publications written in English; documents addressing library policy, legal issues, governance, digital access, institutional frameworks, or advocacy; studies focused on Tanzania or containing Tanzanian relevance in keywords, abstracts, or content; and documents published within this date range. Exclusion criteria included non-scholarly materials (blogs, opinion pieces, commentary without an empirical basis); publications lacking essential metadata (missing year, authors, keywords); and studies with a general focus on LIS without reference to Tanzania or policy, legal, or advocacy issues.

The screening followed a PRISMA-style flow, which included: identification of documents (initial retrieval from Scopus); screening of documents (removal of duplicates and materials that did not meet relevance criteria); checking eligibility (evaluation of abstracts and full texts for relevance to Tanzania and to policy, legal, or advocacy topics); and inclusion of documents (a final set of 20 documents was retained for analysis). Some metadata gaps, such as missing publication years or author names, were manually verified and supplemented with original publisher sources to ensure the dataset’s reliability. Extracted metadata included author names, titles, publication years, source/journal, keywords, citations, affiliations, and document types. The data were cleaned to ensure consistency in author names, keyword spelling, institutional names, and publication years.

Bibliometric analysis was conducted using Biblioshiny 5.0, an R-based interface widely used for science mapping, trend analysis, and intellectual structure assessment in bibliometric studies (Aria & Cuccurullo, 2017). The bibliometric analysis examined annual scientific output, co-authorship, collaboration networks, keyword co-occurrence mapping, key sources and authors, citation analysis, institutional and country-level contributions, and source impact (H-Index). Results were presented through tables, bar charts, and network graphs generated within the Biblioshiny interface. The study is limited by the small dataset (20 publications) and reliance on Scopus-indexed literature, which may exclude relevant grey literature and regionally published studies.

3. Results

This section presents the bibliometric findings from the 20 analysed documents, focusing on publication trends, authorship patterns, institutional contributions, thematic concentrations, and citation impact. The results provide an overview of how policy, legal, and advocacy issues related to library sustainability in Tanzania have been addressed in the scholarly literature between 2000 and 2024.

3.1 General characteristics of the dataset

The dataset includes 20 documents published across 12 sources from 2000 to 2024. Table 1 summarises the key bibliometric indicators.

Table 1

Main Information About the Dataset

Description	Result
Timespan	2000–2024
Sources (journals, books, etc.)	12
Total documents	20
Annual growth rate	5.7%
Document average age	6.75 years
Average citations per document	8.3
Author keywords	62
Keywords Plus	11
Total authors	63
Average co-authors per paper	3.9
International co-authorship	20%
Document types	Articles (13), books (5), book chapter (1), review (1)

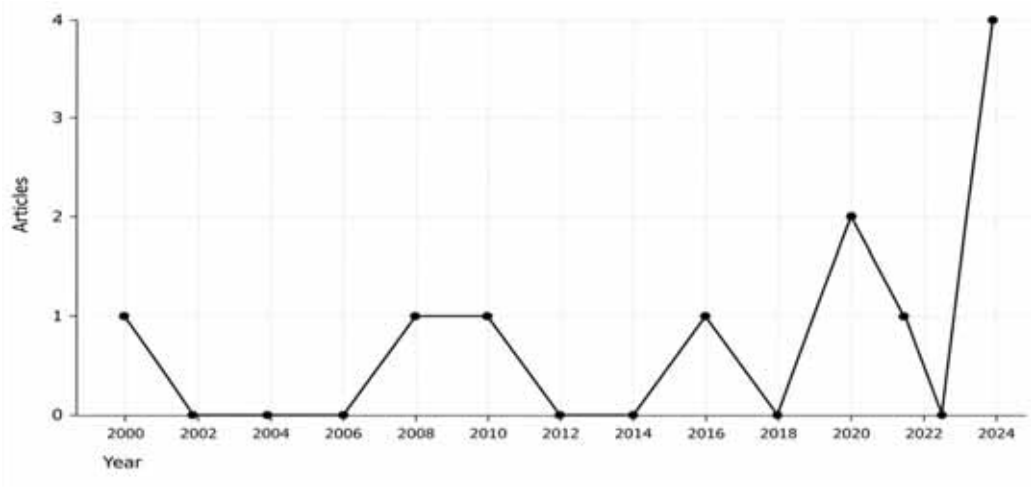
The consistent annual growth rate of 5.7% and the average age of documents indicate that most contributions are relatively recent, reflecting growing scholarly interest in library governance, digital transformation, and information policy.

3.2 Publication Trends

Annual scientific output exhibited slow, uneven growth from 2000 to 2014, followed by a significant rise from 2015 onwards (See Figure 1). The post-2015 growth aligns with developments such as national ICT reforms, increased digitisation efforts in academic libraries, and heightened interest in open access, data governance, and information rights. Although the overall volume remains modest, the upward trend indicates growing scholarly engagement with governance-related library issues in Tanzania.

Figure 1

Publication Trends

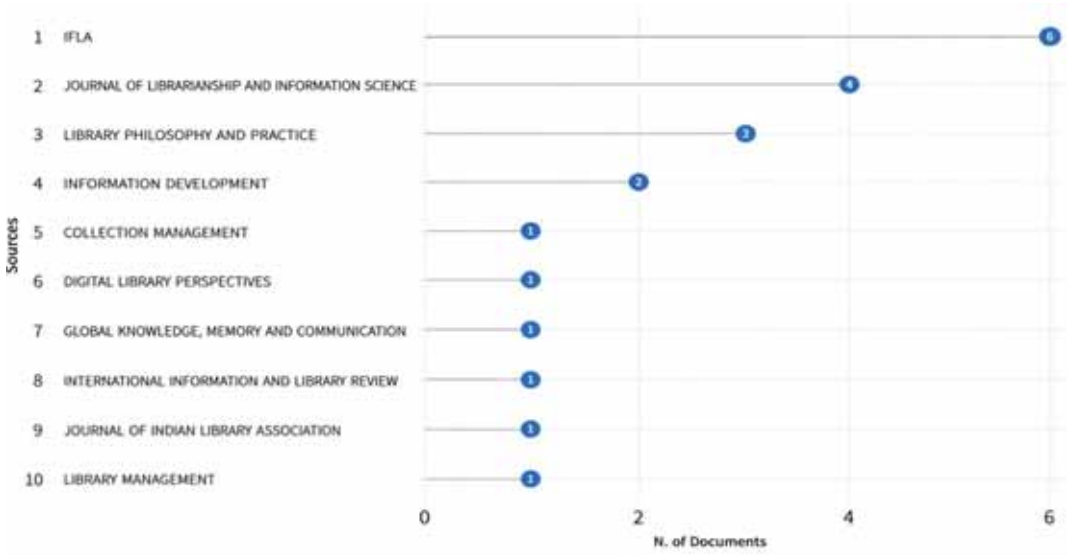


3.3 Source Impact and Distribution

The documents were published in 12 journals and books. The most relevant sources included Information Development, Library Philosophy and Practice, and the IFLA Journal. These sources accounted for the majority of publications in this dataset. Analysis of source impact (H-Index) revealed three outcomes: one source achieved an H-index of 4; several key journals, such as Library Philosophy and Practice and Information Development, recorded H-indices of 2; and the remaining sources had H-indices of 1 or lower, indicating limited citation circulation. This pattern suggests that although a few journals serve as recurring outlets for Tanzanian policy-related LIS research, the field's overall impact remains modest. Figure 2 presents the details.

Figure 2

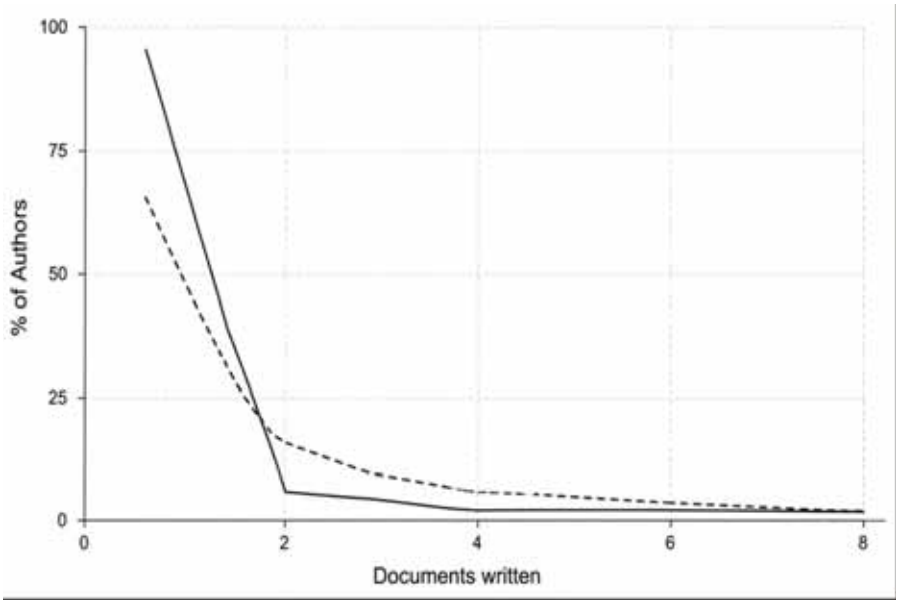
Source Impact and Distribution



3.4 Authorship and Collaboration Patterns

The analysis showed there were no single-authored documents, indicating a culture of collaboration in research. Main observations include: an average of 3.9 co-authors per document, suggesting multi-institutional and interdisciplinary efforts; international co-authorship at 20%, indicating modest yet increasing global involvement; and Lotka's Law analysis revealed that a few authors produced multiple works, while most contributed once. The absence of prolific authors may reflect the limited number of scholars dedicated to library policy, legal frameworks, and advocacy in Tanzania. The results are illustrated in Figure 3.

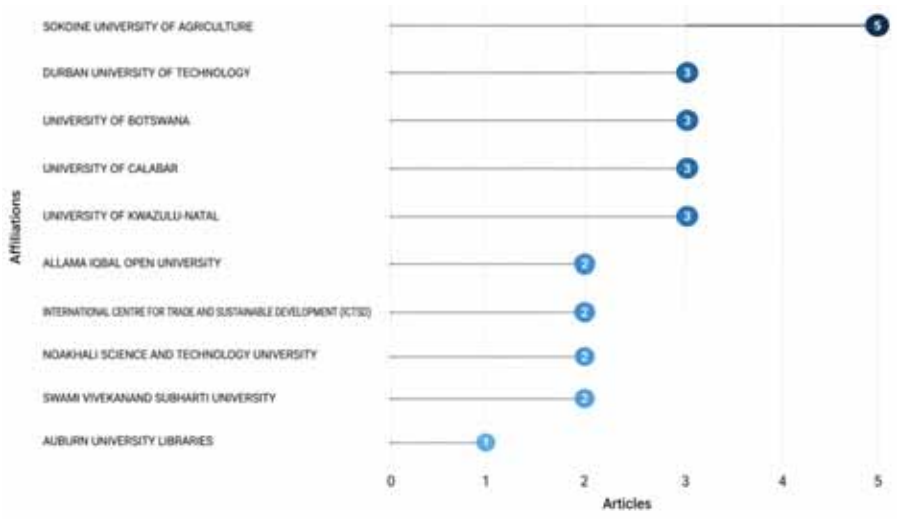
Figure 3
Authorship and Collaboration Patterns



3.5 Institutional contributions

Institutional analysis showed that research output is mainly produced by a few universities. Sokoine University of Agriculture (SUA) emerged as the most productive institution, followed by Durban University of Technology, University of Botswana, Muhimbili University of Health and Allied Sciences, University of Dar es Salaam, and the University of Dodoma. These universities serve as central hubs for LIS research and training, suggesting that policy-related scholarship is shaped by academic environments characterised by research networks and LIS programmes. Figure 4 presents the details of institutional contributions.

Figure 4
Institutional Contributions



3.6 Keyword co-occurrence and research themes

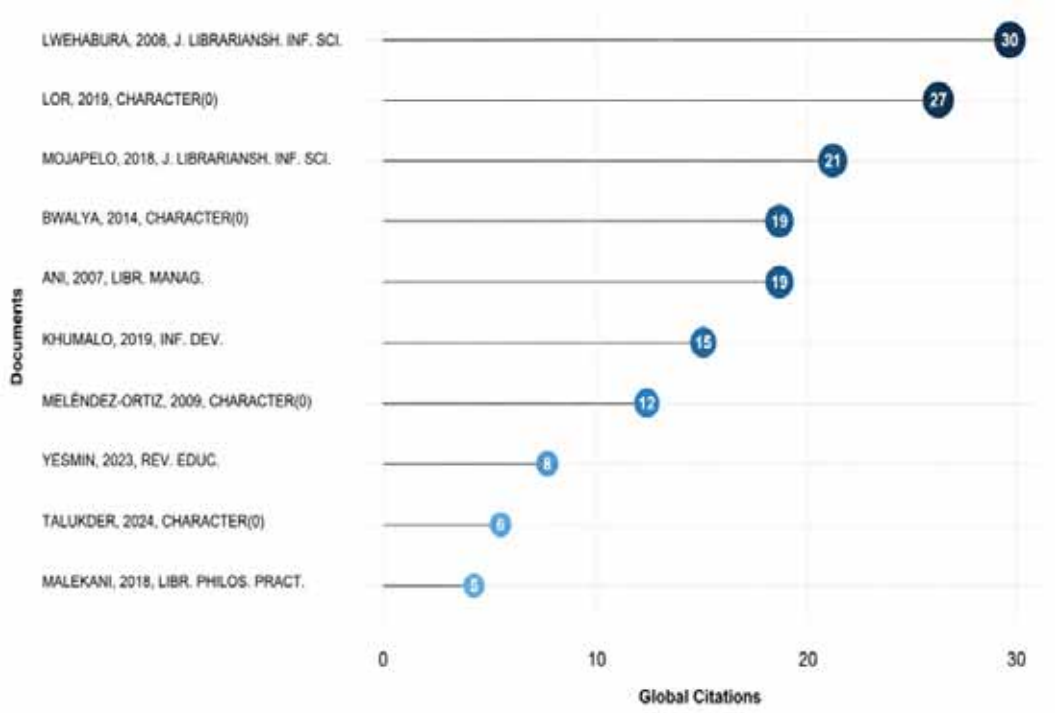
A total of 62 author keywords and 11 Keywords Plus were identified. Prominent recurring keywords included: "sustainability", "information services", "digital inclusion", "ICT policy", and "access to information". However, terms directly related to policy and legal frameworks, such as "library law," "legislation," "copyright," "policy reform," and "governance", were underrepresented. This discrepancy suggests that while Tanzanian LIS research increasingly engages with digital transformation and service delivery, the structural foundations (policy, law, and advocacy) remain unexplored.

3.7 Citation impact and influential publications

Citation analysis indicates moderate citation levels in the dataset, with an average of 8.3 citations per document. The most broadly cited publications were Lwehabura (2008) with 30 citations, Lor (2019) with 27 citations, Mojapelo (2018) with 19 citations, and Bwalya (2014) with 18 citations. These influential works emphasise themes of information literacy, public library development, and library governance, highlighting their ongoing relevance to discussions of sustainability. Details of citation impact and influential publications are presented in Figure 5.

Figure 5

Citation Impact and Influential Publications



Across the dataset, certain patterns emerged. The overall publication volume was low, indicating limited scholarly attention to policy, legal, and advocacy aspects. The data showed high collaboration and few influential authors, suggesting a dispersed research landscape without dominant thought leaders. Additionally, there was strong institutional concentration, with a few universities producing most of the output. The moderate citation impact reflects emerging yet underdeveloped debates on the study's theme.

The underrepresentation of legal and policy themes persists, despite their central role in sustainability. These findings collectively highlight the need for more targeted research, policy-oriented scholarship, and structured advocacy to enhance the sustainability of libraries in Tanzania.

4. Discussion

This bibliometric analysis offers insights into how policy, legal, and advocacy issues related to library sustainability in Tanzania are portrayed in scholarly literature. Given that the dataset for this study comprised only 20 articles, this limits the robustness of analyses like co-authorship networks and thematic mapping. This reduced statistical power may limit the robustness of certain analyses, particularly co-authorship networks and thematic mapping. The findings show that while research output on Tanzanian libraries has steadily increased since 2000, most publications still focus on operational aspects like digital inclusion, access to information, ICT policy, and service delivery. These patterns confirm earlier findings that LIS scholarship in Tanzania often emphasises technological and user-service issues over more fundamental topics such as legislation, governance, and institutional policy frameworks (Lwoga & Questier, 2014; Ocks & Salubi, 2024). Similarly, a recent study from African contexts shows that weak policy formulation and inconsistent implementation continue to undermine the effectiveness and sustainability of library services (Enang & Okwu, 2021).

The limited mention of keywords such as library law, copyright, policy reform, and governance highlights a notable gap in policy-oriented research, despite evidence indicating that sustainable library systems rely heavily on strong legal frameworks and coordinated policy support (Mcharazo & Olden, 2016; Mubofu et al., 2025). This pattern echoes findings from other African contexts, where persistent under-prioritisation of governance structures has slowed progress toward modern library systems.

The limited coverage of legal and governance topics in existing literature is especially concerning, given the well-documented issues posed by Tanzania's outdated Library Services Act of 1963 (revised 1975), which predates modern digital ecosystems and current expectations for equitable access to information (Mcharazo, 2008). Evidence from other countries indicates that those with stronger policy and legal frameworks tend to show greater resilience and innovation in their library systems (Grimes & Porter, 2024; Lor, 2015). Nevertheless, current academic focus does not sufficiently explore the effects of weak or outdated regulatory frameworks on Tanzanian libraries. Comparative studies show that countries with updated legal frameworks adapt more effectively to digital environments and open science agendas (UNESCO, 2021). This gap limits the evidence base for informing national policy reforms and hinders the development of modern governance models appropriate to digital information environments.

Authorship patterns further reveal the fragmented nature of the research landscape. The absence of single-authored publications and an average of nearly four co-authors per publication suggest strong collaboration. However, Lotka's Law analysis indicates that a few authors published more than once, while many contributed once. This suggests a lack of sustained research leadership in areas such as library policy, legal frameworks, and advocacy. This aligns with regional analyses of LIS scholarship that demonstrate low continuity and limited research leadership across Africa (Ocholla, 2008). Limited continuity among researchers hinders the development of a cohesive, cumulative body of knowledge. Moreover, 20% of the publications involved international co-authorship, consistent with broader findings in African LIS research that international collaboration remains relatively modest (Lenstra et al., 2022).

The dominance of contributions from Sokoine University of Agriculture, Muhimbili University of Health and Allied Sciences, the University of Dar es Salaam, and the University of Dodoma highlights the central role of universities in shaping national research agendas. However, this concentration suggests that institutions without LIS programmes and strong research cultures make a minimal contribution

to policy and legal scholarship. Similar patterns were observed in the bibliometric work of Leventakou (2024), who found that digital library and sustainability research tend to cluster within institutions with established LIS training programmes. Despite these institutional hubs, the relatively small number of publications addressing governance and advocacy suggests that Tanzanian LIS schools may not be prioritising these areas sufficiently within their research and teaching agendas. Scholars emphasise that LIS programmes must incorporate governance, information policy, and digital rights into their curricula to build a skilled workforce (Raju, 2014).

The citation analysis emphasises the importance of foundational contributions, with highly cited works such as Lwehabura (2008), Lor (2013), Bwalya (2014), and Mojapelo (2018) demonstrating the value of research on information literacy, public library development, and governance. However, the moderate average citation rate (8.3 citations per document) and the relatively small number of influential publications suggest an emerging and developing intellectual field. The low representation of publications focused on policy and law reflects limited scholarly research on copyright, licensing, open access, and user privacy. These issues are becoming increasingly central to librarianship in the digital age (Hamad et al., 2024; Johnson & Dubinsky, 2022). Ongoing shifts toward open science and digital rights frameworks further underline the need for modernised legal and governance structures (UNESCO, 2021; WIPO, 2020). This stagnation may hinder professional associations such as TLA, COTUL, and TLSB from grounding their advocacy efforts in evidence. International advocacy models reinforce the importance of evidence-based campaigns in influencing policy, funding, and public support.

The findings emphasise that although Tanzanian libraries operate at the intersection of national development priorities, the scholarly discourse has not sufficiently engaged with the policy and legal foundations required to sustain these roles. The limited focus on governance issues in the literature is misaligned with the urgent need for policy reform, funding mechanisms, legal modernisation, and coordinated advocacy efforts. Strengthening legal and policy frameworks is essential for Tanzania's progress toward SDG 4 (quality education) and SDG 16 (access to information and strong institutions). Enhancing these areas demands scholarly engagement, increased interdisciplinary and international collaboration, and a shift in research focus towards structural issues impacting library sustainability. Addressing these gaps will provide the necessary evidence to modernise Tanzania's legal and policy environment and secure the long-term viability of its library and information services.

5. Conclusion and recommendations

This bibliometric study examined how scholarly articles published from 2000 to 2024 describe policy frameworks, legal instruments, and advocacy methods related to the sustainability of libraries and information services in Tanzania. Although the number of publications has gradually increased, the overall volume remains modest, with a focus mainly on the operational and technological aspects of library services. Key topics such as library legislation, policy reform, governance, copyright, licensing, and coordinated advocacy are notably underrepresented. Patterns of authorship indicate a collaborative research environment; however, ongoing engagement among researchers is limited, resulting in a fragmented scholarly community and a lack of strong leadership in governance-related LIS issues. Furthermore, contributions are mostly confined to a few universities, and international collaboration remains relatively limited.

The analysis reveals that libraries play a key role in Tanzania's development goals, including digital transformation, education, and the Sustainable Development Goals. However, there is insufficient academic focus on the policy and legal frameworks that underpin these efforts. Without strong policies, effective legal systems, and strategic advocacy, the long-term sustainability of libraries in Tanzania could be compromised. The study emphasises the urgent need for evidence-based policy reforms, capacity building

in the governance and legal sectors, and sustained advocacy to strengthen the institutional foundations of library services. Increased scholarly engagement in these areas is essential for supporting Tanzania's transition to a knowledge-based society. As Tanzania advances its digital transformation agenda, modernising library legislation and strengthening advocacy will be critical for building resilient, future-ready library systems.

To improve the sustainability of libraries and information services in Tanzania, it is essential to update and harmonise the sector's policy and legal framework. Revising the 1963 Tanzania Library Services Act, which was last amended in 1975, and developing a comprehensive national library and information policy will help these services adapt to digital advancements. This includes addressing issues like copyright exemptions, user privacy, data management, open access, and digital preservation. Effective advocacy depends on coordinated efforts among organisations such as TLA, COTUL, and TLSB. Evidence-based campaigns and stakeholder coalitions- comprising educators, ICT specialists, civil society, and policy-makers- should support these efforts.

Progress depends on strengthening research and leadership in LIS by establishing dedicated research groups focused on policy, governance, and advocacy. It involves expanding postgraduate programmes in information policy, intellectual property, and digital rights, and establishing international collaborations with institutions with expertise in library legislation and policy-making. Increasing research visibility by promoting open-access publishing, contributing to indexed journals, and developing institutional repositories will enhance the profile and impact of Tanzanian LIS research. Without deliberate policy reform and evidence-based advocacy, Tanzanian libraries risk remaining operationally active yet structurally vulnerable in an increasingly digital knowledge economy.

Furthermore, the dataset for this study may not adequately represent the broader scholarly community, affecting the generalisability of findings. The limited output highlights gaps in research attention, prompting institutions to reconsider resource allocation in this area. To bridge these gaps, fostering collaboration among researchers can lead to larger, more diverse datasets, while targeted funding initiatives can support underrepresented topics. Increasing visibility through workshops and conferences can increase interest and encourage more scholarly contributions. Engaging critically with the implications of these limitations offers an opportunity for growth within the research community, ultimately leading to a more comprehensive understanding of the field.

Future studies should explore policy implementation, compare library laws across East Africa, assess funding and governance frameworks, and evaluate advocacy strategies. These reforms and initiatives will enable Tanzanian libraries to remain resilient, inclusive, and aligned with national development goals.

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STRATEGIC MARKETING OF LIBRARY AND INFORMATION SERVICES

Strategic Marketing of Library Resources in the Digital Age: A case study of the National Library of Namibia

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Abstract

This study examines the current marketing practices of the National Library of Namibia and explores innovative strategies to enhance its visibility, user engagement, and service delivery in the digital age. The research aims to evaluate existing marketing approaches, identify challenges such as limited digital presence and staff capacity, and propose strategic improvements based on the Marketing Mix Theory (7 Ps). Utilising a mixed-methods approach, the study gathers insights from staff and users through questionnaires and interviews. The findings reveal a significant gap in formal marketing planning, under-utilisation of digital platforms, and a need for staff training. The study recommends developing a comprehensive marketing strategy, strengthening digital outreach, and fostering community engagement to ensure the library's relevance and sustainability. This research provides valuable insights for policymakers and library management to optimise marketing efforts and better serve the Namibian public in the digital era.

Keywords: *library marketing, digital transformation, strategic marketing, user engagement, marketing mix.*

1. Introduction and Background

According to Waiganjo and Mwalengwanasho (2024), Namibia's library sector is undergoing a significant transformation driven by rapid technological developments and the increasing integration of digital resources. As the country seeks to position itself within the knowledge economy, the importance of strategic marketing for libraries has become more pronounced. Libraries are no longer solely physical spaces for borrowing books; they are vital knowledge hubs that must actively promote their services and resources to remain relevant and accessible in the digital age.

Despite advances, many Namibian libraries, including the National Library of Namibia, face challenges such as limited visibility, low user engagement, and inadequate use of digital platforms (Samupwa & Ampweya, 2026). These obstacles are often compounded by resource constraints, lack of staff training in modern marketing techniques, and insufficient outreach strategies, especially in rural and underserved communities. Without effective marketing, many potential users remain unaware of the wealth of information and services available, resulting in under-utilisation and diminished impact.

Workshops and targeted marketing campaigns present proactive solutions to bridge these gaps by raising awareness and fostering stronger connections with users. Such initiatives can enhance knowledge about digital collections, promote events, and improve overall user satisfaction. However, research indicates

that the strategic promotion of library services remains underdeveloped, particularly in the context of Namibia's evolving information landscape (Kamyabi et al., 2025). Libraries must therefore adopt innovative marketing approaches grounded in strategic frameworks, such as the Marketing Mix (7 Ps), to effectively communicate their value and expand their reach.

Historically, Namibia's libraries have been shaped by the legacies of unequal access to information stemming from apartheid policies, which created disparities in resource availability and service reach (Haindaka, 2024). Post-independence efforts to democratise access have seen the expansion of community libraries and digital initiatives, yet challenges remain, especially in remote areas where infrastructure and resources are scarce (Nengomasha & Shuumbili, 2020). Addressing these ongoing issues requires strategic planning, capacity building, and community engagement to leverage library resources effectively.

Globally, the role of libraries in supporting community development and lifelong learning is increasingly recognised. Metrics related to resource utilisation, user engagement, and outreach effectiveness serve as indicators of success (Kamyabi et al., 2025). Nevertheless, understanding how to interpret these data to inform strategic decisions remains a challenge. As Roy (2025) notes, it is crucial to analyse what these indicators reveal about the accessibility and relevance of library services.

In this context, this study aims to explore how strategic marketing practices, particularly through workshops and digital outreach initiatives, can enhance the visibility and utilisation of library resources at the National Library of Namibia. The insights gained will contribute to broader efforts to strengthen Namibia's library services, promote educational equity, and support lifelong learning in the digital age.

1.2 Statement of the Problem

In the rapidly evolving digital landscape, libraries are faced with the critical challenge of remaining relevant and accessible to diverse user groups. Despite their vital role in preserving and disseminating knowledge, many libraries, including the National Library of Namibia (NLN), are struggling to effectively promote their services and resources to the public. This challenge is compounded by limited awareness among users about the full spectrum of available services, particularly digital offerings, and a lack of strategic marketing initiatives tailored to contemporary communication channels (American Library Association, 2020).

Current marketing practices within the NLN are largely informal, inconsistent, and insufficiently aligned with the principles of strategic marketing, especially the 7 Ps framework. Staff members express a need for training and resources to leverage digital platforms such as social media, websites, and mobile applications, yet there is no comprehensive marketing strategy or dedicated team to drive outreach efforts (Booms and Bitner , 1981). Consequently, the library's visibility remains low, user engagement is limited, and the potential to attract new users or retain existing ones is underexploited.

Furthermore, the digital age has transformed user expectations, with many preferring digital, accessible, and interactive services. The NLN's weak online presence, outdated website, and limited use of digital marketing tools hinder its ability to meet these evolving needs. This gap between service provision and effective promotion results in under-utilisation of library resources, diminished user satisfaction, and a failure to fully realise the library's mandate as a national knowledge hub (Ndungu, 2019).

Therefore, this study aimed to investigate the current marketing practices at the National Library of Namibia, identify the key challenges faced, and explore strategic and innovative approaches, guided by the 7 Ps marketing framework, that can enhance the library's visibility, user engagement, and service delivery in the digital age.

1.3 Research Objectives

The main objective of this study is to assess how the National Library of Namibia can implement effective strategic marketing approaches in the digital age. The specific objectives are:

- To evaluate current marketing practices used by the National Library of Namibia.
- To identify challenges faced in marketing library services.
- To explore innovative and user-centered marketing strategies that can improve visibility and engagement.
- To recommend strategic approaches aligned with the Marketing Mix Theory (7 Ps) for improved service delivery.

2. Literature Review and Theoretical Framework

In the rapidly evolving landscape of information access and dissemination, libraries worldwide are experiencing transformative shifts driven by digital technology. Traditional roles of libraries as repositories of books and physical spaces are now supplemented, and in many cases replaced, by digital platforms, online resources, and virtual engagement strategies. For public institutions such as the National Library of Namibia (NLN), this transition presents both opportunities and challenges. To develop effective marketing strategies that enhance visibility and user engagement, it is essential to ground the study within relevant theoretical frameworks and to critically review existing literature on library marketing, digital outreach, and organisational transformation. These theoretical and empirical insights provide the foundation for understanding how libraries can leverage marketing principles to adapt to the digital age.

2.1 Theoretical Framework

The 7 Ps Marketing Mix

The core theoretical model guiding this study is the Marketing Mix, initially conceptualised by McCarthy (1960), which traditionally comprises four Ps: Product, Price, Place, and Promotion. Over time, scholars recognised that service organisations, including libraries, require additional Ps to account for the intangible and interactive nature of their offerings. Booms and Bitner (1981) expanded the model to include People, Process, and Physical Evidence, resulting in the 7 Ps framework. This extended model is particularly pertinent for libraries, which are service organisations that depend heavily on human interactions, service delivery processes, and tangible cues to communicate quality.

In the context of the NLN, the Product element encompasses the vast array of resources, both physical and digital, that the library offers, including collections, digital archives, information services, and community programmes. Price involves not only monetary costs but also perceived value, such as accessibility, relevance, and convenience. Place refers to both physical locations and the online presence, emphasising the importance of digital platforms like websites and social media to reach broader audiences. Promotion entails all communication strategies employed to inform and attract users, from traditional outreach methods to digital marketing campaigns. People emphasise the importance of staff and users, the staff's skills and attitudes directly influence service quality and promotional effectiveness, while user perceptions and feedback shape service offerings. The Process element involves the procedures and workflows through which services are delivered, with a focus on efficiency and user experience. Physical Evidence pertains to tangible cues such as the library's facilities, website design, and digital interfaces, which influence users' perceptions of professionalism and quality.

Applying the 7 Ps in a library setting encourages a holistic approach to marketing strategy development. It allows the NLN to analyse its current practices comprehensively, identify gaps, and develop targeted

interventions that align with organisational goals and user needs. The model also underscores the importance of integrating digital tools and platforms into the marketing mix, especially given the increasing reliance on online engagement in the digital age.

2.2 Evolution and Challenges of Library Marketing

Historically, libraries relied on traditional marketing methods, such as posters, flyers, and word-of-mouth, to attract users. However, with the advent of digital communication, the role of marketing in libraries has undergone a fundamental shift. Contemporary literature emphasises the importance of strategic marketing planning that aligns with organisational goals and responds to the evolving needs of users. Koontz and Mon (2014) argue that marketing should be integrated into the core functions of libraries, emphasising that a proactive marketing approach enhances visibility and user satisfaction.

The 7 Ps framework has gained widespread acceptance among library professionals, as it provides a comprehensive lens for evaluating current practices and identifying areas for improvement. Research highlight that promotion and physical evidence, such as a user-friendly website, engaging social media presence, and attractive displays, are critical for attracting new users and retaining existing ones. Despite these insights, many libraries face challenges such as limited financial resources, inadequate staff training, and organisational resistance to change. Ndungu (2019) notes that in developing countries like Kenya, these challenges are compounded by infrastructural deficits and low digital literacy among the population, issues also relevant for Namibia.

Digital Transformation and Outreach Strategies

The integration of digital tools has become a hallmark of modern library marketing strategies. Liu (2019) emphasises that digital transformation involves more than just adopting new technologies; it requires rethinking service delivery models, engaging users through online platforms, and developing new marketing tactics. Libraries that excel in digital outreach leverage social media platforms such as Facebook, Twitter, and Instagram to reach diverse demographic groups (Sharma & Singh, 2018). These platforms enable real-time communication, event promotion, and community building, increasing overall awareness and engagement.

Research indicates that a strong online presence, including a well-designed website and mobile applications, can significantly improve user experience and satisfaction (Kim & Lee, 2020). However, digital outreach also faces barriers, especially in regions with limited internet access or low digital literacy. Ndungu (2019) discusses the digital divide as a persistent issue in many African countries, including Namibia, where marginalised populations may have limited access to digital resources. Addressing this divide requires targeted outreach, community engagement, and capacity building, ensuring that digital marketing efforts are inclusive and equitable.

2.3 Marketing Strategies and Best Practices in Libraries

Effective marketing in public libraries hinges on understanding community needs and tailoring services accordingly. Acharya & Vagdal, (2023) advocate for a user-centered approach, emphasising that libraries should use data analytics and user feedback to inform their marketing strategies. Such approaches enable libraries to develop targeted campaigns that resonate with specific user groups and promote relevant resources.

Training staff in marketing and customer service skills is another recurring theme in the literature. Kotler and Keller (2016) argue that staff are the frontline ambassadors of the library's brand, and their ability to communicate effectively influences user perceptions. In Namibia, where resources may be limited,

capacity building becomes even more critical. Staff development programmes can empower employees with skills in digital marketing, social media management, and customer engagement.

Context of Namibia and the National Library of Namibia

Limited empirical research exists on the specific marketing strategies employed by Namibia's public libraries. Ndungu (2019) highlights that many African libraries, including those in Namibia, are still in the early stages of integrating digital marketing into their strategic plans. Challenges such as infrastructural deficits, limited funding, and low digital literacy among users hinder efforts to expand digital outreach. Furthermore, the country's geographical vastness and dispersed population pose logistical challenges for physical and virtual service promotion.

Despite these constraints, Namibia has made strides toward digital development, with government initiatives aimed at expanding internet connectivity and promoting e-governance. The NLN has a crucial role in leveraging these national efforts by adopting innovative marketing strategies that increase visibility and foster community engagement. Developing a comprehensive digital marketing plan aligned with the 7 Ps framework can help the NLN capitalise on the country's digital growth trajectory.

3. Research Methodology

This study employs a mixed-methods approach grounded in the pragmatism paradigm, which recognises the value of integrating both qualitative and quantitative research methods to explore complex phenomena comprehensively (Elgeddawy & Abouraia, 2024). The pragmatism paradigm asserts that knowledge is constructed through practical interactions and experiences rather than being solely objective or subjective. This perspective allows researchers to adopt flexible strategies that combine multiple sources of data, thereby providing richer insights to inform practice and policy (Elgeddawy & Abouraia, 2024).

To achieve the objectives of this research, data collection involved a combination of document analysis, surveys, and interviews. The initial phase included reviewing relevant institutional reports, strategic documents, and existing literature related to the marketing practices of the National Library of Namibia. This document analysis aimed to identify existing strategies, challenges, and areas for improvement within the library's marketing framework. These insights provided a contextual background that informed subsequent data collection tools.

Quantitative data was gathered through structured questionnaires distributed to both staff members and library users. The questionnaires comprised closed-ended questions designed to measure levels of awareness, perceptions, and engagement with the library's marketing initiatives. The survey instrument was developed based on the seven Ps framework, ensuring that each aspect of the marketing mix was adequately covered. To target knowledgeable personnel, purposive sampling was employed to select staff members involved in marketing, outreach, or service delivery. For library users, convenience sampling was used to include a diverse range of individuals such as students, researchers, and the general public, ensuring that the data reflected the experiences of different user groups.

In addition to the questionnaires, qualitative data was collected through semi-structured interviews conducted with key staff members responsible for marketing and outreach activities. These interviews aimed to obtain in-depth insights into the strategies employed, perceived challenges, and opportunities for improvement. The interviews were audio-recorded with participants' consent and transcribed for analysis. This qualitative component provided nuanced understanding and context to complement the quantitative findings.

Data analysis proceeded through both descriptive and thematic methods. Quantitative data from the questionnaires were analysed using descriptive statistics such as frequencies and percentages to identify trends, levels of awareness, and perceptions related to the library's marketing practices. This analysis facilitated an overview of the current state of marketing within the NLN, highlighting areas of strength and gaps. Meanwhile, the qualitative interview data were analysed thematically, following an inductive approach. Themes were identified through coding and categorisation, allowing for the emergence of patterns related to marketing practices, organisational challenges, and user engagement.

Throughout the research process, ethical considerations were prioritised. All participants provided informed consent prior to participating in surveys and interviews. Confidentiality and anonymity were maintained by assigning pseudonyms and securely storing data. Participants were informed that their participation was voluntary and could be withdrawn at any stage without consequence. Ethical approval was obtained from the relevant institutional review board, ensuring that the study adhered to established research ethics standards.

In summary, this mixed-methods research design, underpinned by the pragmatism paradigm, enabled a comprehensive exploration of the marketing practices of the National Library of Namibia. By triangulating data from documents, surveys, and interviews, the study offers a nuanced understanding of current strategies, challenges, and opportunities, providing valuable insights for enhancing the library's marketing effectiveness within its unique organisational and socio-economic context.

4. Findings

4.1 Current State of Marketing Strategies

The research revealed that the library's marketing efforts are largely informal and lack strategic coherence. Most staff members indicated that there is no formal marketing plan guiding promotional activities, leading to inconsistent and limited outreach. Promotion strategies are primarily confined to physical posters within the library and occasional social media posts, with little integration of digital platforms such as email newsletters or community engagement initiatives. As one staff member noted, "We promote our services when there's an event, but there's no sustained or planned campaign." This finding aligns with existing literature, which emphasises that without a strategic plan, libraries tend to rely on ad hoc marketing efforts that fail to reach broader audiences effectively (Kaur, 2009). The absence of a dedicated marketing team and insufficient budget further constrain the library's promotional capacity, limiting its visibility both offline and online.

4.2 Challenges in Promoting Library Services

The study identified several significant challenges faced by the library in its marketing efforts. Staff highlighted a lack of marketing skills, particularly in digital media management, content creation, and analytics, which hampers effective outreach. Budget constraints are a recurrent theme, restricting the procurement of marketing tools, advertising space, and training programmes. Moreover, the digital presence of the library is weak; the website is outdated, and social media accounts are rarely updated or utilised to their full potential. Users, on the other hand, expressed dissatisfaction with the current level of promotion, noting that they often learned about library services through word-of-mouth rather than official channels. External factors such as low digital literacy among some user groups and infrastructural limitations exacerbate these challenges, making it difficult for the library to expand its reach effectively.

4.3 Potential of Digital Platforms for Outreach

The study underscores the untapped potential of digital tools and platforms to enhance the library's marketing efforts. Both staff and users emphasised the importance of establishing a robust online presence

through active social media engagement, an updated user-friendly website, and the use of messaging apps like WhatsApp and SMS alerts. Staff suggested that leveraging these platforms could facilitate the promotion of new resources, upcoming events, and virtual assistance, thereby increasing accessibility and user engagement. Users expressed enthusiasm for regular social media campaigns, online events, and digital newsletters, which could complement existing physical marketing efforts. This resonates with literature findings that suggest digital platforms are essential for modern library outreach, especially in reaching younger and tech-savvy audiences (Sharma & Singh, 2018).

4.4 Evaluation of the 7 Ps Framework

Applying the 7 Ps marketing framework, the study's findings reveal specific gaps and opportunities in each element. Under Product, many services remain under-utilised due to poor awareness, highlighting the need for better promotion and greater visibility of digital resources. In terms of Price, although services are free, users perceive "hidden costs" such as time delays and limited online access, which could be addressed through better communication of value. The Place element is weak online, with an outdated website and inactive social media pages, indicating the need for a stronger digital presence and mobile-friendly solutions. Promotion is lacking in formality and consistency, requiring a strategic plan that leverages modern digital marketing tools. The People aspect points to a need for staff training in digital engagement and content creation, as staff are willing but lack skills. Process improvements are also essential, such as digitising services and streamlining access procedures. Finally, Physical Evidence, the library's branding and visual identity, requires refreshment both physically and digitally to create a more professional and recognisable brand.

5. Discussion

The findings highlight that the National Library of Namibia's current marketing strategies are inadequate for reaching contemporary audiences effectively. The informal and ad hoc nature of promotional activities hampers the library's visibility and engagement. The lack of a strategic marketing plan, coupled with limited digital infrastructure and skills, constrains efforts to expand outreach, especially among younger, digital-native users. These challenges are consistent with existing literature emphasising that strategic planning and digital competency are critical for modern library marketing success (Sharma & Singh, 2018).

There is considerable potential to leverage digital platforms more effectively. As the study suggests, establishing a robust online presence via social media, a user-friendly website, and messaging apps can significantly improve service promotion and user engagement. The literature supports this view, indicating that digital marketing is indispensable for libraries aiming to stay relevant in the digital age (Kim & Lee, 2020; Liu, 2019).

The application of the 7 Ps framework reveals specific areas for improvement. Enhancing awareness of services (Product), addressing perceived costs (Price), strengthening online presence (Place), establishing a strategic promotion plan (Promotion), developing staff competencies (People), digitising processes (Process), and refreshing branding (Physical Evidence) are essential steps forward. These findings suggest that a comprehensive, multi-faceted approach is necessary to transform the library's marketing efforts.

Implications for practice include developing a formal marketing strategy, investing in staff development, improving digital infrastructure, and fostering community partnerships. Future strategies should focus on creating engaging online content, increasing digital literacy among users, and ensuring infrastructural support for digital outreach. Implementing these measures could position the National Library of Namibia as a more accessible, vibrant, and user-centered institution aligned with the demands of the digital era.

6. Conclusions

This study has highlighted critical shortcomings in the current marketing practices of the National Library of Namibia, notably the lack of a strategic and digital-oriented approach. Despite the staff's willingness to promote services, limited skills, resources, and organisational support hinder effective outreach. Users' low awareness of available services underscores the urgent need for a structured marketing strategy that leverages digital platforms and community engagement. The application of the 7 Ps framework provided a clear pathway for identifying specific areas for improvement, emphasising the importance of integrated, innovative marketing efforts to enhance the library's visibility and relevance. Addressing these gaps through strategic planning, staff empowerment, and digital transformation will be instrumental in positioning the NLN as a vital knowledge hub in Namibia's evolving information landscape.

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KNOWLEDGE MANAGEMENT IN ORGANIZATIONAL AND DEVELOPMENT CONTEXTS

Applying Demarest's Modified KM Model and Stankosky and Baldanza's KM Framework in Health Sector NGOs' Knowledge Management Research

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Abstract

Knowledge Management models are used for different purposes and within different contexts. With increased competition for scarce resources among NGOs, knowledge is a key resource for improvement in their performance and sustainability, and hence, needs to be managed. The paper discusses Demarest's modified knowledge management (KM) model and Stankosky and Baldanza's KM framework as theoretical foundations for health sector NGOs' KM research. The paper explains the components, relevance, and practical applicability of the two theories to health sector NGOs' KM research. It is found that, though useful, the use of both Demarest's modified model and Stankosky and Baldanza's KM framework are inadequate as frameworks to enable health sector NGOs to build and leverage KM to improve the performance of their operations. Hence, the study recommends the development of a suitable KM framework that integrates both KM processes and institutional factors in one single comprehensive framework. The paper adds to the on-going debate on the suitability of the two models for KM in organisation research, and can inform teaching, research, and practice in the domain.

Keywords: *Demarest's Modified KM Model, Stankosky and Baldanza's KM Framework, knowledge management, health sector NGOs.*

1. Introduction and Background

We begin in this paper by establishing a general understanding of, and context for, the concepts of knowledge management (KM), non-governmental organisations (NGO), and theoretical frameworks. Knowledge is the most important asset that organisations have, and their most significant economic resource; hence, significant efforts are being made to determine how to acquire it, represent it, retain it, and manage it (Cepeda-Carrion, Martelo-Landroguez, Leal-Rodríguez, and Leal-Millán, 2017).

The concept of knowledge management has attracted many definitions. For example, Islam, Jasimuddin, and Hasan (2015) define KM as an integrated process that collects, stores, and disseminates knowledge in an organisation. According to the WHO, cited in Mohajan (2016), KM is defined as a set of principles, tools, and practices that enable people to create knowledge, and to share, translate, and apply what they know, so as to create, value, and improve effectiveness. For Yee, Tan and Thurasamy (2019), KM is the systematic management of an organisation's knowledge assets for the purpose of creating value

and meeting tactical and strategic requirements. It consists of the processes, strategies, and systems that sustain and enhance the creation, storage, and sharing of knowledge. As a process, KM is a systematic or intentional process that is linked to a broader set of organisational or project objectives, and which gives us the ability to tap into and share explicit and tacit knowledge, and to translate that knowledge into action (Sullivan et al., 2015). The definitions' shared concepts are, KM as a process (see Shongwe, 2016), strategy, system, practice principle, and tool that adds value to knowledge access, sharing, and application.

Knowledge management is important. Igbinovia and Ikenwe (2017) maintain that KM increases organisations' performances through increased efficiency, quality, innovation, and productivity. Adesina and Ocholla (2024) affirm that KM continues to be a growing concern in management research and practice because of its role in innovation capability, organisational competitive advantage, and continuous optimum performance. Consequently, KM has received particular attention in recent years from multiple academic fields (Pugna and Boldeanu, 2014).

The concept of non-governmental organisations (NGOs) is worth attention too. According to Steinberg (2011), NGO is a term used to define a wide range of organisations. Dennehy, Fitzgibbon and Carton (2014) view NGOs to be, a sub-sector of civil society, which consists of other non-NGO formations, including social movements, welfare organisations, secular organisations, and faith-based organisations. For Hulme (2001), NGOs are peopled organisations that are not part of state structures, not primarily motivated by commercial considerations or profit maximisation, are self-governing, and rely on voluntary contributions to a significant degree. While acknowledging that the attainment of good health remains one of the significant challenges of today's world, the World Health Organisation (WHO, 2003) argues that, in order to achieve national and global health objectives, there is a need for extraordinary levels of collaboration among multilateral agencies, national governments, the private sector, communities, as well as other stakeholders – such as NGOs. KM helps organisations know who to work with, what to do, and map out plans for their future. With increased competition for scarce resources, NGOs are forced to be more transparent and accountable for what they are doing with the resources provided for them (Tahajuddin, Hasan, and Kassim, 2021).

Theoretical Frameworks (TF) are key in anchoring investigations. However, 'Theoretical framework' and 'conceptual framework' concepts are confusing and often misunderstood (Ocholla and Le Roux, 2011; Ngulube, Mathipa and Gumbo, 2015). According to Imenda (2014, p. 189), a theoretical framework (TF) is "the application of a theory, or a set of concepts drawn from one and the same theory, to explain an event, or shed some light on a particular phenomenon or research problem." The theoretical framework provides information related to the problem statement and how to answer the research problem (Grant & Osanloo, 2014). Adom et al. (2018) maintain that a theoretical framework is a blueprint that is usually borrowed by researchers to build their house of research enquiry. They argue that, as a guide or plan that contextualises formal theories in research studies, a TF helps researchers undertake their studies, and hence, significantly contributes to scholarly and academic research. Chawinga (2019) concurs and adds that a TF acts as a guiding principle in answering questions that may sometimes be speculated on by researchers and assists in providing incontestable explanations in research.

Furthermore, Imenda (2014) argues that a theoretical framework is the theory that any person undertaking research adopts to steer him/herself in their research. The author argues that every person's point of view or point of reference, is their conceptual or theoretical framework. Ngulube et al. (2015) assert that theoretical frameworks are the foundation of a research plan that provides a model for understanding the problem under investigation.

Notably, the terms 'Theoretical framework' and 'Conceptual framework' are frequently used interchangeably. However, though similar in their roles and functions in research, they differ in some ways. Nevertheless, Adom et al. (2018) opine that both theoretical and conceptual frameworks significantly explain the path of research, while also grounding it in theoretical constructs. The conceptual or theoretical framework is "the soul of every research project. It determines how a given researcher formulates his/ her research problem – and how (s)he goes about investigating the problem, and what meaning (s) he attaches to the data accruing from such an investigation," (Imenda, 2014; Dlamini, 2016).

While expanding on the meaning of TF, Ocholla and Le Roux (2011, p. 62) highlight that a theoretical framework is broad and inclusive and that it is "informed by four major components: the hypothesis, the theoretical model, the research methodology (to be used to answer the hypothesis/research questions), and a well-defined literature review (supporting the focus of the research)." Moreover, they argue that to better understand theoretical framework, one needs to define the concept 'theory.' To them (Ocholla and Le Roux, 2011, p. 62), theory is "a conceptual explanation of a phenomenon and how it interacts with others (occurrences) in space and time to broaden the understanding and application of a concept." They caution that there are no unanimous understandings and interpretations of the concept 'theory,' even among established researchers, and claim that similar confusion may also be experienced while interpreting the concept of 'theoretical framework,' as it is easily confused with 'theory', 'conceptual framework', 'theoretical/conceptual model' and other like terms.

Ocholla and Le Roux affirm that authors interpret these terms differently. Edward, Andoh-Kwaw, and Joseph (2020) concur and affirm that theories are used to clarify, predict, and understand phenomena and that, usually, theories are used to assess and encompass prevalent knowledge within the limits of critical bounding assumptions. Elezi and Bamber (2018) acknowledge that KM has been studied from different perspectives, constructs, and contexts as the concept of knowledge is very multifaceted. As a result, they argue that KM models are generated with different foci.

2. Purpose of the Study

This paper aims at discussing Demarest's modified KM model and Stankosky and Baldanza's KM framework in relation to KM in health sector NGOs' research and suggests a modified model for the domain based on a recent PhD study (Kimani, 2025). We highlight related knowledge management theories/ models, focussing on the applicability and relevance of Demarest's modified KM model and Stankosky and Baldanza's KM framework, and suggesting a relevant modified model in the conclusion of the paper.

3. Knowledge Management Models

Knowledge management models are used for different purposes and within different contexts. Elezi and Bamber (2018) assert that KM models have different origins, consequently, one of the issues is framing the categories of these models, while another issue is the usefulness of different models within varying settings. Examples of knowledge management models discussed (Kimani, 2025) but found unsuitable for this study include Boisot's knowledge category model (1987); Nonaka's knowledge management model (1995), which is critically analysed by Adesina and Ocholla (2019); Hedlund and Nonaka's knowledge management model (1993); the Skandia intellectual capital model (1994); Frid's knowledge management model (2003); Kogut and Zander's knowledge management model (1992); Wiig's KM cycle model (1993); and the 360-degree KM model (2005). We focus on the Demarest and Stankosky models in the next section.

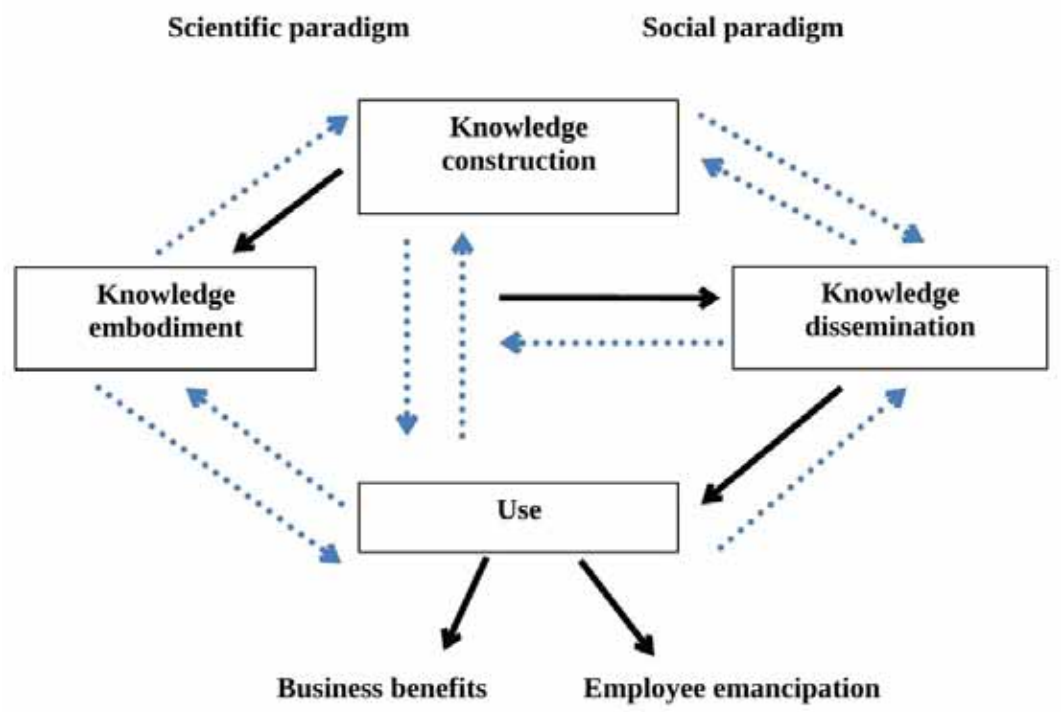
3.1 The Demarest and Stankosky Models

Demarest's modified knowledge management model (1999)

Demarest's modified KM model is a modified version of Demarest's KM model, which was developed in 1997 as an "adaptation of Clark and Staunton's (1989) model of KM" (McAdam and McCreedy, 1999). According to Elezi and Bamber (2018), "Demarest's 1997 model was created with a particular focus on the construction of knowledge and sees management of knowledge as a social approach rather than a scientific contribution." Further, the model adopts a holistic approach, which underscores the functional and social relationships among knowledge objects and processes. The main features/phases of Demarest's modified model are knowledge construction, knowledge embodiment, knowledge dissemination, and knowledge use, as illustrated in Figure 1.

Figure 1

Modified version of Demarest's Knowledge Management Model



Source: McAdam and McCreedy (1999)

a) *Knowledge construction*

This is defined as "the process of finding out or structuring a kind of knowledge" (Demarest, 1997). Other scholars, such as Nonaka and Takeuchi (1995), refer to knowledge construction as "organisational knowledge creation." According to Demarest's model, knowledge construction consists of both scientific inputs as well as the social construction of knowledge. He argues that there are two major views or paradigms regarding knowledge construction – the scientific knowledge construction paradigm, and

the social paradigm of knowledge construction. While trying to distinguish the difference between the scientific and social paradigms of knowledge construction, Morgan, Scarborough, and Gergen, as cited by McAdam and McCreedy (2000), indicate that on the one hand, the scientific view of knowledge construction takes a "knowledge is truth" view. This view considers knowledge to be fundamentally a canonical body of facts and rational laws and represents an absolutist description of knowledge construction. This view is associated with the incorporation of factual inputs, which are principally labelled as scientific, and thus not subject to social interpretation. On the other hand, the social paradigm of knowledge construction holds the view that knowledge can be socially constructed, instead of being seen as universal scientific truth. According to Alvesson and Willmott, and Clegg, Barrett, Clarke, Dwyer, Gray, Kemp, and Marceau, as cited by McAdam and McCreedy (2000), this approach to knowledge construction takes into consideration conflict, inequality, subordination, domination, and manipulation as influences, in addition to more traditional behavioural questions related to efficiency and motivation. Consequently, according to this view, knowledge construction involves a dynamic process of sense-making, other than being constrained solely to the absorption of a body of facts. There is a greater emphasis on an "interpretist" view that calls for making sense and understanding, not just acceptance.

Knowledge embodiment

Knowledge embodiment encompasses the process of choosing storage place for the created knowledge. According to Demarest (1997), this refers to the process of choosing a container for knowledge once it is constructed. The container for much of the firm's knowledge is selected by the intelligent desktop, and that container is, most often, a document. He adds that when knowledge is embodied, it is not only made formal, but it is explicit and distributable. He argues that both tacit and shared knowledge are unembodied: floating, held in memory or in the day-to-day business practices of a small number of people, but not formally encoded or available for dissemination or emulation (Demarest, 1997). McAdam and McCreedy (2000) affirm that Demarest's model assumes created knowledge is embodied within the organisation, not just through explicit programmes, but also through a process of social interaction.

Knowledge dissemination

This is the distribution of embodied knowledge across an organisation. Demarest (1997) refers to this as the human processes and technical infrastructure that make embodied knowledge – in this case, documents – available to the people within the firm, who use the documents and the bodies of knowledge those documents contain, to perform, i.e. to do work for customers, suppliers, business partners, and the firm itself. He argues that for knowledge to translate into some kind of useful commercial performance, it must be distributed from the locale of construction into other parts of an organisation or value chain, ideally to the points in the organisation where performance is possible (Demarest 1997).

Knowledge use

Demarest (1997) asserts that knowledge use refers to the eventual objective of the KM system: the production of commercial value for the customer. This is making knowledge work through the application of disseminated, embodied knowledge to specific problems and types of problems, with a view to getting results. According to McAdam and McCreedy (1999), the model is like that of Jordan and Jones (1997), who speak of knowledge acquisition, problem solving, dissemination, ownership, and storage. There are also similarities with the model of Kruizinga, Heijst, and Spek (1997), which includes knowledge policy, infrastructure, and culture. These models put emphasis on the construction of knowledge inside the organisation, including both scientific and social inputs. According to Saini, cited in Mohajan (2017), the flow of knowledge transfer in this model is exceedingly rapid and circulatory, just like in some forms of action learning. The model also broadens the 'knowledge use' element to include both business and employees' benefits. Additionally, knowledge is recognised to have economic use regarding organisation-

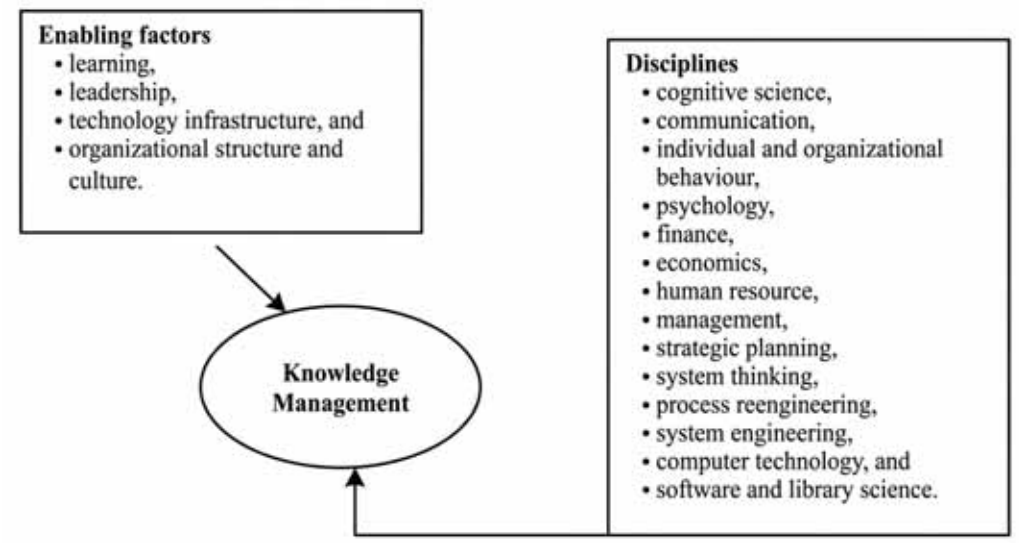
al outputs. McAdam and McCreedy (1999) argue that if KM is to have the backing and commitment of everyone in an organisation, then employee emancipation must also be addressed, together with the business benefits, and that these issues should be seen as complementary and mutually exclusive. This model is used in this study to explain how knowledge is constructed, embodied, disseminated, and used within health sector NGOs in Nairobi County, Kenya.

3.2 Stankosky and Baldanza's Knowledge Management Framework

Stankosky and Baldanza developed a KM framework in 2001. This framework postulates that KM incorporates other disciplines, including communication, psychology, cognitive science, individual and organisational behaviour, economics, finance, human resource management, system thinking, strategic planning, process reengineering, system engineering, computer technologies, and software and library science (Mohajan, 2017). The framework also identifies the four major foundations that are important for KM and its flow within an organisation. These are illustrated in the figure below, Figure 2.

Figure 2

Stankosky and Baldanza's KM Framework



Source: Mohajan (2017)

Due to the very large scope of the KM field, the framework is centred on crucial organisational elements, also referred to as enabling factors, such as learning, culture, leadership, organisation, technology (Sinha and Lamba, 2011; Elezi and Bamber, 2018) and organisation structure (Elezi and Bamber, 2018). According to Stankosky and Baldanza's KM framework, the four key foundations of the framework are leadership, organisation structure, technology infrastructure, and learning. These are discussed in the section below.

Leadership

Sinha and Lamba (2011, p. 460) opine that leadership is responsible for practicing strategic planning and systems thinking approaches, making best use of resources, fostering a culture that encourages open dialogue and team learning, and encouraging and rewarding risk taking, learning, and knowledge sharing. They identify key elements of leadership as strategic planning, system thinking, business cul-

ture, and communication. Mohajan (2017) postulates that leadership requires a leader who can oversee the organisation and offer the needed leadership for cultural changes in the organisation. He affirms that leadership deals with level decision-making processes involving the values, objectives, knowledge requirements, knowledge sources, prioritisation, and resource allocation of the organisation's knowledge assets. Moreover, leadership emphasises the need for integrative management principles and techniques.

Organisation Structure

Sinha and Lamba (2011) note that organisation structure should facilitate personal interactions and support communities of practice to capture tacit and explicit knowledge within the organisation. Further, organisational structure should be concerned with managing change, inspiring trust among people working together, and encouraging the free sharing of knowledge, to achieve better results in organisations. They identify key elements of organisational structure as processes, procedures, performance management systems, and communication. Haslinda and Sarinah (2009) argue that organisational structure in an organisation should instil trust among people within the organisation and encourage a free exchange of knowledge. Mohajan (2017) concurs and asserts that organisation structure should enable individual interactions and support communities of practice (CoP) to gather both tacit and explicit knowledge created or shared within organisations. Claver-Cortes, Zaragoza-Saez, and Pertusa-Ortega, cited in Ragab and Arisha (2013), affirm that flat organisational structures, with few hierarchal levels, are found to promote more knowledge sharing, since they enhance interaction and communication between employees.

Technology infrastructure

According to Mohajan (2017), technology infrastructure involves different information technologies, which provide support, as well as facilitate KM strategies and operations. It supports collaboration and codification of KM in the whole organisation by encouraging the efficient and effective use of both tacit and explicit knowledge. He identifies its essential elements as communication, virtual teams, internet, intranet, electronic mail data warehousing, as well as decision support systems. Sinha and Lamba (2011, p. 460) claim that technology infrastructure makes it possible to exchange information without formal structures and should promote the efficient and effective capture of both tacit and explicit knowledge, as well as support knowledge sharing in the entire organisation. Ndegwa (2015) adds that information technology provides organisational members with quick and effective access to the right amounts of information and accelerates the speed at which information is acquired and disseminated throughout organisations.

Learning

Sinha and Lamba (2011) maintain that the role of learning is to manage information, to enable the development of enterprise-wide knowledge, and use of that knowledge for organisational learning, and to bring about change and performance improvement. Mohajan (2017) points out that learning leverages knowledge and concentrates on the principles and practices that facilitate individuals to collaborate and to fully share knowledge among themselves. Consequently, learning is concerned with aspects of organisational behavioural and social engineering. According to Kumaraswamy and Chitale (2012), knowledge is embedded in organisational routines, processes, practices and norms, and it is through knowledge sharing, that organisational learning is enhanced. According to Ndegwa (2015), organisations learn, and this enhances their ability to exist. Some of the key elements of learning are virtual teams, learning communities, a culture of trust, and communication.

Stankosky and Baldanza's KM framework is key to this study as it stands out as a firm guide for appreciating and addressing enabling factors for KM within an organisation, such as, learning, culture, leadership, organisational structure and technology.

4. Appraisal, critique and application of the selected models to non-profit sector KM research

4.1 Demarest's Modified KM model critique

Elezi and Bamber (2018) criticise the Demarest modified KM model and note that "although Demarest (1997) discusses embodiment of knowledge management, the focus of the Demarest (1997) model is on the creation and construction of a knowledge management system and does not present much in the way of directing implementation and suggesting detailed methods of embodiment of successful KM."

However, some authors point to the fact that, despite the criticisms, the model is useful. For example, Dutta and Banerjee (2016) indicate that Demarest's KM model emphasises the construction of knowledge within the organisation and that this is not limited to scientific inputs but includes the social creation of knowledge. Therefore, this is positive, as it encompasses different views on knowledge creation. A significant number of theorists believe that knowledge is socially constructed (Demarest,1997; Wenger, 1998; Oluikpe, 2015). For his part, Gergen (1985) argues that the degree to which a given form of understanding prevails, or is sustained across time, is not fundamentally dependent on the empirical validity of the perspective in question but on the vicissitudes of social processes, for instance, communication, negotiation, conflict, and rhetoric. Oluikpe (2015) concurs and posits that knowledge construction is the process of creating knowledge within a specific context. While describing the importance of the social processes, Gergen, cited in Oluikpe (2015), explains the social construction process of knowledge and claims that knowledge construction is not value neutral, demonstrating that different individuals and groups construct reality from their unique contexts and backgrounds. Elezi and Bamber (2018) affirm that knowledge is a social phenomenon, generated and embedded in humans, even though technology supports the capture, storage, manipulation, and dissemination of knowledge. Therefore, a combination of human capabilities and technological advancement is expected to strengthen the usefulness of KM models.

The model emphasises that the implementation of knowledge in an organisation is not complete with explicit knowledge only but needs to include the process of social interaction (Mohajan, 2017). Demarest (1997) asserts that, considering the limitations of solely relying on the scientific paradigm to interpret KM, a different view or paradigm is needed. McAdam and McCreedy (1999) maintain that Demarest's KM model is attractive, as it offers a more holistic approach to knowledge construction, rather than assuming any provided definition of knowledge. Furthermore, they perceive the model as a useful means for structuring further research into the field of KM, as it represents a balanced view and permits KM to be associated with the evolving social paradigm, while at the same time contributing to the existing paradigm. Furthermore, Haslinda, and Sarinah (2009) posit that the model supports the view that constructed knowledge is embodied inside the organisation through explicit programmes as well as social interchange, after which, the espoused knowledge is disseminated throughout the organisation and its environs. They further acknowledge that the Demarest model indicates that knowledge is of economic use in achieving organisational outputs. Moreover, in the modified version of the Demarest model, the "use" element is extended to cover both business and employees' benefits. This is important as employees need motivation to support the entire process of KM. While supporting this view, McAdam and McCreedy (1999) maintain that if KM is to have the support and commitment of all stakeholders in an organisation, then employee emancipation must be addressed along with the business benefits. In their view, these issues (business and employees' benefits) should not be construed to be mutually exclusive, but complementary.

Demarest's KM model has been used in similar studies, for example, the study by McAdam and Reid (2000) on "A comparison of public and private sector perceptions and use of knowledge management."

It has also been used by Kasimu, Roslan and Fadhlin (2012) in their study on "Knowledge management models in civil engineering construction firms in Nigeria", and by Shateri, Safari, Hozhabrnejad, and Baghiabadi (2016) in their study on "Investigating the role of knowledge management as a tool for enhancing innovation and creativity in organizations." Our study adopted the Demarest modified KM model, though not in isolation. Instead, it was used jointly with the Stankosky and Baldanza KM framework.

The model has been widely applied for understanding the process of knowledge identification, creation, storage, sharing, and application, as discussed in detail in a related study (Kimani, 2025). It was useful in investigating the influence of current KM practices among health sector NGOs in Nairobi County, Kenya, while identifying the strengths and weaknesses in the current KM practice, with a view to making recommendations for improvement of KM practice in the organisations. Further, the model was useful in demonstrating the relationship between KM and performance of health sector NGOs in Nairobi County, Kenya, and the identification of critical factors necessary for improving KM practice among the health sector NGOs, so as to enhance their performance.

4.2 Stankosky and Baldanza KM Framework Critique

Authors such as Elezi and Bamber (2018), as well as Ragab and Arisha (2013), have noted that the Stankosky and Baldanza model has various shortcomings. Elezi and Bamber (2018) claim that, while the model emphasises knowledge enablers and recommends the application of KM through leadership, organisational structure, technology, and learning, it does not discuss the issues of knowledge creation, or capturing, and distributing channels. Additionally, Ragab and Arisha, (2013) observe that, though the model contributes to creating a roadmap for KM, it does not explain the cycle of knowledge movement within the organisation, raising doubts about how knowledge is managed following the implementation of KM practices.

Those in favour of the model include Heisig (2009); Serenko, Bontis, Booker, Sadeddin, and Hardie (2010); Parent, MacDonald, and Goulet (2014); and Mohamed, Stankosky, and Murray (2006). Heisig (2009) acknowledges that the success of KM initiatives is dependent on the basic condition under which it has been implemented and argues that it is necessary to identify the contextual factors critical for the success of KM in organisations. His study identified the central factors of KM in organisations to include human factors (culture, people, and leadership), organisational aspects (structures and processes), information technology, as well as management processes (strategy and control). Serenko et al. (2010), and Parent et al. (2014), cited in Elezi and Bamber (2018), recognise the beneficial aspects of this model in understanding the components and resources required to apply KM in an organisation. Mohamed et al. (2006) support this and assert that the four elements of the Stankosky and Baldanza KM conceptual framework form the "foundation" of any KM system and that without all the elements in some kind of harmony, a knowledge management system does not exist.

The Stankosky and Baldanza model has been used in other studies including the study of Calitz and Cullen (2017) on "The application of a knowledge management framework to automotive original component manufacturers," and the study by Olasina (2012) on "ICT support for knowledge management in primary healthcare: A case study of partnership for reviving routine immunization in Northern Nigeria (PRRINN)." The current study adopted the Stankosky and Baldanza KM framework and used it jointly with the Demarest modified KM model. The application of the Stankosky and Baldanza KM framework to this study is discussed in the section below:

In a related study (Kimani, 2025), the model is used in the application of KM through leadership, organisational structure, technology, and learning. The model's scope and context emphasise knowledge enablers, which are critical success factors with a great influence on the performance of organisations.

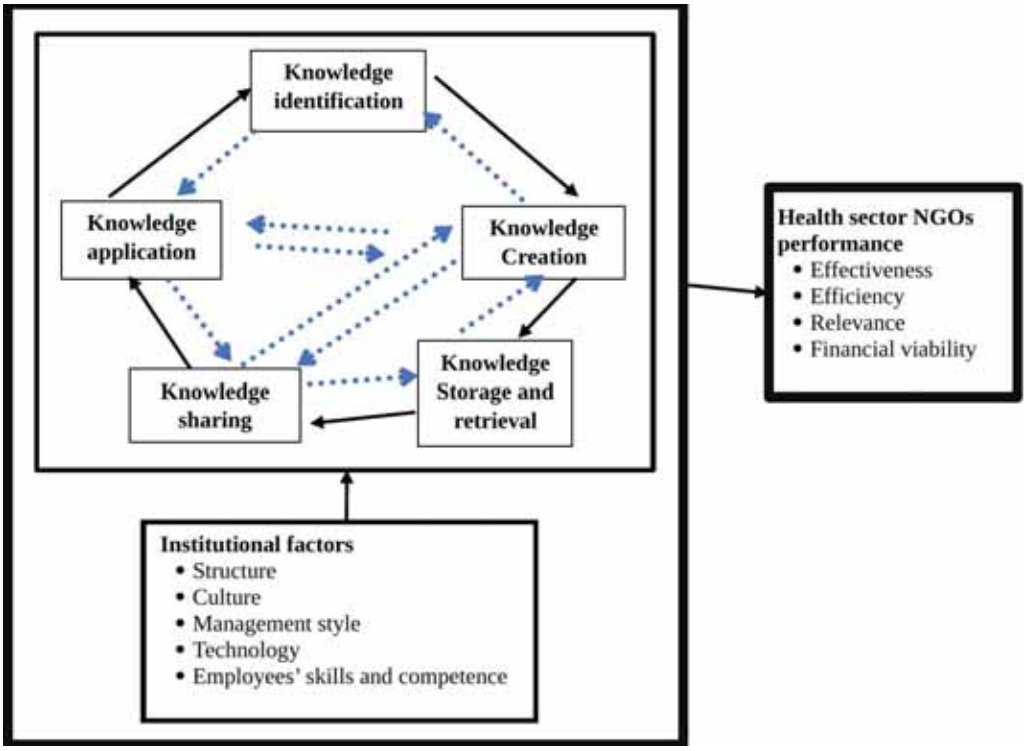
5. Conclusion and Recommendations

Demarest's modified KM model and Stankosky and Baldanza's knowledge management framework were used jointly in the PhD study referred to earlier. Demarest's modified KM model was used to demonstrate how knowledge is constructed, embodied, disseminated, and used within organisations. Even though these elements are important in KM and the performance of health sector NGOs, the study findings indicated that KM initiatives in organisations work well when organisational internal environments, also referred to as institutional factors, are addressed. Therefore, the study identified a second KM framework, namely, Stankosky and Baldanza's KM framework to be used in conjunction with Demarest's modified KM model. Stankosky and Baldanza's KM framework is centred on "crucial organisational elements," also referred to as enabling factors. These include leadership, organisation structure, technology, culture, and learning as key factors that create an environment conducive to KM activities in an organisation. These aspects have been included in the study as enabling factors, which were investigated to demonstrate how they influenced the KM activities in the organisations under study, and the subsequent influence on the performance of health sector NGOs.

We note that the use of both Demarest's modified model and Stankosky and Baldanza's KM framework, though useful, was found to be inadequate as a framework in terms of enabling health sector NGOs to build and leverage KM to improve the performance of their operations. Consequently, a modified model and framework, that is responsive to health sector NGOs' needs, has been suggested, as highlighted in Figure 3.

Figure 3

KM Framework for Health Sector NGOs



Source: Research data (2022)

The comprehensive KM framework integrates both KM processes (knowledge identification, knowledge capturing, knowledge storage and retrieval, knowledge sharing, and knowledge application) and institutional factors (organisational structure, culture, technology, management style, and employees' skills and competencies) in one single comprehensive framework.

This study's findings help focus on knowledge as a resource that impacts on organisations performance, provides a framework for setting up and sustaining effective KM processes that are cognisant of institutional factors, and promotes the development of a sound national KM policy and strategies for the health sector. The study recommends for creation of horizontal organisational structures with democratic and participatory management style that promotes a culture for KM in organisations, invests in modern and integrated IT systems for KM, and which improves staff and volunteers' capacity to undertake KM activities. The integrated model helps KM initiatives to be responsive to health sector NGOs needs and promotes the growth and sustainability of their programmes. The research provides new insights to scholars in this field, providing a basis for further empirical tests, replication and advancement in KM theory.

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Knowledge Management Practices for Sustainable Agriculture Development in the Kingdom of Eswatini: The Case of Eswatini Water and Agricultural Development Enterprise

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Abstract

Agriculture has become increasingly knowledge-intensive in today's knowledge-driven economy, especially in the context of globalisation and the growing challenges posed by climate change. Hence, effective agricultural production now depends on timely access to accurate knowledge that supports innovation, informed decision-making, sustainable production, competitiveness, continuous learning, and the adaptation of production systems to emerging challenges and market opportunities. Knowledge Management (KM) has therefore emerged as a critical enabler of sustainable agricultural development. However, despite its growing importance, KM practices within state-owned agricultural entities in developing economies remain insufficiently examined. This gap is evident in the context of the Eswatini Water and Agricultural Development Enterprise (EWADE), a Category-A state-owned entity with a mandate to support national agricultural and rural development. This study explored the KM practices employed by EWADE to manage knowledge for sustainable agricultural outcomes. Guided by the K4Health Knowledge Management Index (KMI), the study assessed KM maturity across four key practice areas: organisational structure, learning opportunities, internal KM culture, and knowledge sharing for sustainable agriculture. Using a convergent parallel mixed-methods design, data were collected from 29 respondents to triangulate organisational KM performance. Findings indicate an overall KMI score of 0.6, positioning EWADE at a critical inflection point—one where foundational KM capabilities exist but are hindered by systemic weaknesses that constrain sustainability and organisational impact. The study recommends decentralising KM roles, standardising KM-related training, and strengthening external knowledge-sharing platforms to enhance organisational learning, operational efficiency and long-term sustainability.

Keywords: *knowledge management, sustainable agriculture, state-owned enterprises, Eswatini Water and Agricultural Development Enterprise.*

1. Introduction

Agriculture is a cornerstone of sustainable economic development and long-term food security at both national and global levels. It relies heavily on local production and smallholder farmers (Abed et al., 2024). In the modern era, agriculture has evolved into a knowledge-intensive industry where knowl-

edge serves as a crucial factor of production and value creation (Tumwebaze et al., 2025). The sector in Eswatini stands at a critical inflection point, facing structural challenges despite clear opportunities for transformation (World Bank, 2025). Knowledge constitutes a valuable asset for stakeholders, playing a critical role in societal transformation and progressive farming (Aparna, 2021). Consequently, the role of Knowledge Management (KM) is paramount in addressing the complexities of modern farming practices (Murthy et al., 2021). Smallholder farmers in Eswatini are particularly vulnerable to shocks such as climate change, market fluctuations, and natural disasters. These challenges threaten food security and the attainment of the Sustainable Development Goals (SDGs), particularly SDG 1 on No Poverty, SDG 2 on Zero Hunger, and SDG 12 on Responsible Consumption and Production. Although agriculture's contribution to Eswatini's Gross Domestic Product (GDP) has declined to approximately 7% in 2023, it remains vital for rural development, export earnings, and as a social safety net (World Bank, 2025). In a knowledge-based economy, organisational knowledge assets are essential for superior performance and sustainability (Phaladi & Ngulube, 2022). KM enables institutions to demonstrate the value of investments through measurable impacts on decision-making and programme delivery. This study investigated the KM practices within the Eswatini Water and Agricultural Development Enterprise (EWADE) to ascertain how knowledge is managed to foster sustainable agricultural development.

2. Background of The Study

State-owned enterprises (SOEs) are pivotal economic drivers and knowledge-creating institutions in many economies (OECD, 2018). However, many SOEs face challenges regarding knowledge transfer and retention, often exacerbated by turnover and a lack of retention strategies (Phaladi & Ngulube, 2022). Operating within a nation grappling with high poverty (58.9%) and chronic food insecurity, EWADE is mandated to enhance water security and agricultural productivity through large-scale infrastructure projects such as the Lower Usuthu Smallholder Irrigation Project (LUSIP) and the Komati Downstream Development Project (KDDP) (Government of Eswatini, 2020). EWADE's effectiveness is challenged by climate risks, technical knowledge gaps among farmers, and institutional fragmentation. These complexities necessitate robust KM to retain expertise and facilitate adaptation. However, like many African public agricultural agencies, EWADE faces potential deficiencies such as siloed operations and ad-hoc learning processes. This research addressed the lack of structured KM practices at EWADE by evaluating its KM maturity using the K4Health KM Index framework.

2.1 Theoretical Framework

The study adopted the K4Health Knowledge Management Index (KMI), a KM assessment tool developed by the Knowledge for Health (K4Health) Project. This instrument was designed to evaluate the extent to which an organisation or project uses KM practices, identify areas and opportunities for improvement, and develop strategies to strengthen KM capacity. It measures capability across four key KM practice areas: organisational structure (including KM vision, strategy, policy, and staff), learning opportunities (e.g., continuous professional development), internal KM culture (focused on seeking out and sharing knowledge), and KM for global health (efforts to advance the global health agenda and align with international KM standards) (The Knowledge for Health Project, 2018). Within each KM practice area or domain, there are various KM elements. It allows for the assessment of 27 KM elements through open-ended questions, scored as 0 (not practised) or 1 (systematically practised), and normalised to a 0–1 scale for analysis. The KM elements are then tallied across the four domains to identify the total KM index number, which is the overall KM Index Score for the organisation. However, according to The Knowledge for Health Project (2018, p. 3), not all KM elements need to be measured for every organisation, especially if a particular element is not relevant. This is why this study adopted those elements that best align with EWADE.

2.2 Problem Statement

Despite the acknowledged importance of KM in agriculture, it remains under-researched in this sector (Tumwebaze et al., 2025), yet this deficiency in KM can lead to poor food production, food insecurity, instability, and resource degradation (Gardeazabal et al., 2023). In Eswatini, stagnant sector growth and minimal systemic changes highlight an urgent need for transformation (World Bank, 2025). Weak KM has been identified as a constraint leading to the low adoption of frontier technologies and poor coordination. Emergent farmers and extension officers often face limited access to agricultural information (Buitendag & Hattingh, 2024). Existing conventional frameworks often fail to address the complexity of agrifood systems and the modern needs of agriculturalists and agribusinesses (Baños, 2024; Short et al., 2023). Therefore, there is a critical need to evaluate and strengthen KM practices at EWADE to ensure they effectively support sustainable agriculture.

2.3 Purpose and Objectives

The purpose of this study was to explore knowledge management practices for enhancing sustainable agriculture at EWADE. The specific objectives were:

- To explore the organisational structure of EWADE in facilitating Knowledge Management.
- To assess the extent to which EWADE provides formal and informal learning opportunities to facilitate effective Knowledge Management.
- To explore the prevailing internal KM culture at EWADE.
- To establish the extent to which KM practices foster global Sustainable Agriculture at EWADE.
- To recommend ways in which EWADE should align its KM system with best practices to leverage Eswatini's sustainable agricultural development agenda.

3. Literature Review

This section presents a review of related literature on KM for sustainable agriculture, the role of libraries and information services in KM, and KM domains as depicted in the K4Health Knowledge Management Index.

3.1 Knowledge Management and Sustainable Agriculture

KM is defined as a dynamic, epistemic, and systematic process whereby strategic approaches and practices are applied to identify, capture, create, store, share, utilise, and protect valuable organisational knowledge for value creation (Ansari, 2019; International Organisation for Standardisation [ISO], 2018). In agriculture, KM is crucial for catalysing innovation and climate-relevant interventions; increasing productivity and farmer performance; enhancing sustainable competitiveness; supporting effective and efficient decision-making and problem-solving; and counteracting corporate amnesia (Abugri & Brandner, 2021; Amaliah, 2025; Tumwebaze et al., 2025). It enables the translation of global technical guidelines into local solutions, bridging the gap between scientific research and farm-level application to achieve sustainable development and address global sustainability challenges (Contreras-Medina et al., 2024).

3.2 The Role of Libraries and Information Services in KM

According to Kumar (2021, p. 56) and Wiig (1986, p. 7), new intellectual output in the form of books, journal articles, theses, technical reports, and case studies is stored in one central place to build a systematic organisational memory, make knowledge available organisation-wide, provide access to corporate

memory, ensure effective usage, and continuously evaluate its usability. Librarians possess strong knowledge management skills; collaboration with IT professionals, KM practitioners, and agriculturists can therefore play a crucial role in establishing agricultural research information services and institutional repositories for the long-term preservation of scholarly content (Singh, 2021). A study by Kumar (2021) revealed that developing countries such as India have also made good progress in managing their agricultural knowledge resources, resulting in repositories such as Shodganga, Krishikosh, TKDL, Vidyanidhi, and NISCAIR.

3.3 Knowledge Management Domains

This section presents a review of related literature on the four KM domains of organisational structure, learning opportunities, internal KM culture, and KM for global sustainable agriculture.

Organisational Structure

An enabling KM organisational structure includes a clear strategy, policy framework, dedicated staff, and budget (The Knowledge for Health Project, 2018). A flexible, decentralised structure is often better positioned to implement KM initiatives compared to rigid hierarchies (Mkhatshwa, 2019). Structural support ensures that knowledge flows effectively between departments and levels (Walczak, 2005).

Learning Opportunities

Learning organisations nurture continuous professional development and collective learning (Senge, 1990). Learning opportunities involve exposing employees to training, conferences, and communities of practice to strengthen skills and absorptive capacity (Lenart-Gansiniec, 2022). In agriculture, this includes training on new technologies and sustainable practices.

Internal KM Culture

Organisational culture is central to effective KM (Davenport & Klahr, 1998). A strong KM culture encourages knowledge sharing, trust, and the pursuit of new ideas. It requires leadership that supports innovation and provides incentives for sharing (Singh et al., 2012).

KM for Global Sustainable Agriculture

Effective KM integrates global sustainability goals into local agricultural systems. It involves disseminating innovative practices and fostering collaboration among stakeholders. However, gaps persist in maintaining external databases and aligning with international standards such as ISO 30401:2018.

4. Research Methodology

The study adopted a pragmatist epistemology, hence the use of a convergent parallel mixed-methods design (Creswell & Plano Clark, 2018). The concurrent collection of quantitative data to statistically measure the four KM domains was integrated with qualitative insights from open-ended responses that contextualised barriers and gaps, providing a comprehensive understanding of the KM practices at EWADE. The target population comprised EWADE employees, including executive management, senior management, first-line management, and general staff. A stratified random sampling technique was used to ensure representation across all levels. The sample size was 31, consisting of 4 executives, 7 senior managers, 5 first-line managers, and 15 staff members.

A Google Forms survey questionnaire consisting of closed and open-ended questions, adapted from the K4Health Knowledge Management Index (KMI) framework, was employed to concurrently col-

lect both quantitative and qualitative data. The instrument assessed 27 KM elements across the four domains, scored dichotomously (0 or 1). Quantitative data were analysed using the KMI framework. A binary scoring system was applied, where a score of 1 was assigned if more than 70% of respondents confirmed a practice was systematic, and 0 if fewer than 70% confirmed it. Domain scores were normalised to a 0–1 scale. Qualitative data were analysed using thematic analysis to identify patterns and socio-organisational contradictions.

5. Presentation and Discussion of Findings

5.1 Demographic Profile

The study achieved a response rate of 29 out of 31 participants. The majority of respondents (82.8%) were aged between 30 and 49 years. The gender distribution was 69% male and 31% female. The workforce is highly educated, with 37.9% holding a master's degree and 48.3% a bachelor's degree. Tenure varied, with 48.3% having served 0–5 years, indicating a need for strategies to retain institutional memory.

5.2 Findings by KM Domain

Organisational Structure (score: 0.6/1.0)

While 82.8% of staff understand KM concepts and 75.9% confirmed the existence of a KM strategy, structural gaps remain. Only 51.9% confirmed the existence of a KM policy, and 48.1% denied it, suggesting inconsistent implementation or awareness. Although 72.4% indicated the presence of KM officers, roles appear centralised or siloed. Budget allocation was confirmed by 65.5% of respondents. The score of 0.6 reflects an emerging but inconsistent maturity.

Learning Opportunities (score: 0.8/1.0)

This domain showed the highest maturity. 82.8% of respondents confirmed that new staff receive KM orientation and have opportunities for external training. However, ongoing internal training on KM concepts was less consistent (51.7% confirmed). While external conference attendance is supported, the impact tracking of these trainings remains a weakness.

Internal KM Culture (score: 0.5/1.0)

A paradox exists within the culture. High innovation support was reported, with 93.1% encouraged to seek new ideas and 89.7% supported in testing them. However, incentives for knowledge sharing are critically low, with only 20.7% confirming their existence. Additionally, only 34.5% reported the use of a directory of employee competencies. While 82.8% feel safe reporting problems, the lack of incentives and systematic tracking of sharing initiatives (34.5%) hinders a robust sharing culture.

KM for Global Sustainable Agriculture (score: 0.5/1.0)

EWADE actively absorbs global knowledge, with 96.6% confirming the adoption of technical guidelines and 86.2% supporting participation in global associations. However, external knowledge sharing is weak. Only 34.5% confirmed the existence of a database for sharing knowledge with external audiences. Alignment with ISO 30401:2018 standards was confirmed by only 46.4% of respondents. The failure to adhere to global benchmarks limits interoperability, global credibility, and scalability potential, confining EWADE primarily to an implementation role rather than a credible international knowledge contributor.

5.3 Overall KMI Score

As shown in Table 1 below, the overall KMI score for EWADE is 0.6 (60%). The findings reveal a fragmented KM landscape. Organisational structure gaps (Objective 1) create bottlenecks, where field staff are often excluded from strategic KM processes. While learning opportunities (Objective 2) are available, they are not uniformly distributed or tracked for impact. The internal culture (Objective 3) fosters innovation but fails to reward sharing, creating a disconnect between idea generation and dissemination. Finally, regarding global sustainability (Objective 4), EWADE effectively utilises global knowledge for local application but fails to systematically share its own innovations, limiting its contribution to the broader agricultural community. This places the enterprise at a critical inflection point.

Table 1

Overall KMI Score for EWADE

KM Element	Possible KM Elements, by Domain	Number of Questions Answered	KM Index Number, by Domain	KM Index Score, by Domain (0 to 1)	Maturity Interpretation
1. Organisational Structure	6	6	4	4/6 = 0.6 (60%)	Emerging but Inconsistent
2. Learning Opportunities	5	5	4	4/5 = 0.8 (80%)	Advanced and Sustainable
3. Internal KM Culture	10	10	5	5/10 = 0.5 (50%)	Fragmented and Unstable
4. KM for Global Sustainable Agriculture	6	6	3	3/6 = 0.5 (50%)	Fragmented and Reactive
Total Possible	**27**	**27**	**16**		
KM Index Score (Normalised Range: 0 to 1)			**16/27 = 0.6 (60%)**		**Critical Inflection Point**

6. Conclusion and Recommendations

6.1 Conclusion

This study concludes that EWADE has successfully established foundational KM elements (KMI 0.6), supported by strong individual learning initiatives (0.8). However, this progress is fragile and undermined by systematic barriers, including inconsistent policy implementation, severe cultural disincentives for sharing, critical vulnerabilities in knowledge retention, and strategic failures in external knowledge contribution. The organisation possesses the human capital and absorptive capacity required for KM, but is institutionally failing to convert individual learning into shared, measurable, and standardised organisational knowledge. These findings underscore the urgent necessity for structural and cultural interventions to move KM from an ad-hoc process to a resilient, institutionalised system capable of sustaining EWADE's mandate for agricultural development and water security.

6.2 Recommendations

To enhance KM maturity and support sustainable agriculture, EWADE should:

- *Structural decentralisation and policy institutionalisation***:** EWADE must mandate formal KM policies and dedicated, non-ad-hoc budget allocations across all organisational levels to address the structural deficits revealed. KM roles should be decentralised and embedded within departmental operations, particularly within first-line management and field teams, to ensure KM practices are aligned with project implementation and overcome current hierarchical fragmentation.
- *Standardise learning and integration:* To maximise the return on staff capacity investment, EWADE must implement standardised, quarterly KM-specific training protocols and guidelines that ensure equitable access for all staff, including field personnel. Crucially, mandatory tracking systems should be integrated to measure the impact of training, guaranteeing that individual knowledge acquired is translated into institutional best practices and operational improvements. This will further enable the institution to integrate lessons learned into its Monitoring and Evaluation systems to ensure adaptive learning.
- *Strengthen internal KM culture:* To address the fragmented KM culture, EWADE must introduce formal recognition and incentive systems that systematically reward staff for sharing knowledge, contributing to databases, and mentoring colleagues. A functional, organisation-wide competency directory must be established to build trust and facilitate peer-to-peer knowledge leveraging. Furthermore, mandatory knowledge hand-off processes and exit interviews for departing staff are essential to mitigate the high risk of tacit knowledge loss.
- *Global alignment and external knowledge generation:* Finally, EWADE must strategically strengthen its external knowledge-sharing platforms, ensuring the internal database is routinely updated, professionally managed, and its usage and impact systematically tracked, and that external knowledge is integrated. To enhance institutional excellence and scalability, EWADE should immediately begin aligning its internal KM systems with the international benchmark of ISO 30401:2018 for KM systems.

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EMPOWERING LIBRARIES, INFORMATION PROFESSIONALS AND USERS FOR TRANSFORMATIVE CHANGE

Artificial Intelligence in Library and Information Science Education: A Regional Survey of Curriculum Integration in Eastern and Southern Africa

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Abstract

Artificial intelligence (AI) is reshaping professional practice across sectors, with significant implications for the library and information profession and for Library and Information Science (LIS) education. While African academic libraries are beginning to adopt AI technologies, and frameworks for AI literacy have been proposed, little empirical evidence exists on how LIS departments in Eastern and Southern Africa are integrating AI into their curricula to address emerging skills and competency gaps. Previous studies have identified the lack of AI-related skills as a key barrier to AI adoption in African libraries, raising concerns about whether LIS graduates in the region are adequately prepared for AI-driven professional environments. This study investigated how LIS departments in Eastern and Southern Africa are updating their curricula to respond to these challenges. The study employed a descriptive cross-sectional research design. Data were collected through an online questionnaire administered via the KoboToolbox, focusing on curriculum revision, AI content integration, pedagogy and competencies, faculty capacity, and institutional support and infrastructure. The study targeted LIS departments in 11 active member countries of the Standing Conference of Eastern, Central and Southern African Library and Information Associations (SCECSAL), achieving a 55% response rate. Findings indicate that curriculum revision is well established across the region; however, AI integration remains partial, fragmented, and uneven, with limited comprehensive embedding across modules. AI-related competencies emphasise ethical awareness and conceptual understanding, while teaching approaches remain predominantly lecture-based. Institutional support for AI capacity development is inconsistent and often ad hoc, with a general absence of supportive national and institutional policies. The study recommends coordinated curriculum integration; sustained faculty development and cross-departmental collaboration; stronger institutional policies, investment, and infrastructure to support meaningful and sustainable AI integration in LIS education; and diversification of pedagogical approaches and practices for AI-related content.

Keywords*: artificial intelligence, AI integration, library and information science education, LIS curriculum, Eastern and Southern Africa.*

1. Introduction

Artificial Intelligence, defined for this study as "computing systems that can engage in human-like processes such as learning, adapting, synthesizing, self-correction and use of data for complex processing tasks" (Popenici & Kerr 2017, p. 2), is impacting various sectors including the library and information science (LIS) profession in Africa. The launch of ChatGPT by OpenAI on 30 November 2022 (Marr,

2023), followed by other Generative Artificial Intelligence (GenAI) innovations that "automatically generate content in response to prompts written in natural-language conversational interfaces" (UNESCO, 2023a, p. 7) such as Claude (Payne, 2025) and Copilot (Mehdi, 2023), sparked a surge of interest in AI and marked the beginning of a new era creating new possibilities across various sectors and for individuals. For example, most library professionals were not actively engaged with or focused on machine learning and generative AI technologies until ChatGPT made AI more visible and accessible (Bridges et al., 2025). However, AI is not new, having existed as a field of research since the 1950s when the British mathematician Alan Turing addressed the question, "Can machines think?" in his paper titled "Computing Machinery and Intelligence" (Turing, 1950). In August 1955, John McCarthy and colleagues coined the term "Artificial Intelligence" in "A Proposal for the Dartmouth Summer Research Project on Artificial Intelligence" (McCarthy et al., 1955).

2. Problem Statement

Seven decades after its emergence, AI's rapid advances are reshaping sectors and regions worldwide, including the LIS profession in Africa. Although libraries in Africa, especially academic libraries, are adopting AI technologies (Nkomo & Matli, 2025; Abba, 2024), and frameworks for AI literacy in academic LIS settings have been proposed (Chigwada, 2024; Ndungu, 2024), there is limited research on how LIS departments in Eastern and Southern Africa are integrating AI into their curricula, to contribute towards addressing skills and competency gaps that AI has exposed among librarians. While studies like those in Zambia (Alam et al., 2024), Kenya (Chepchirchir, 2024) and Nigeria (Eiriemiokhale & Sulyman, 2023) reveal positive perceptions among librarians and emerging AI efforts in libraries in Africa, they also highlight critical obstacles, such as resource constraints and skills gaps (Oyetola et al., 2024; Oladokun et al., 2025a). Several other authors, including Abba (2024), Cox (2024), Emiri (2023), Yusuf et al. (2022), Tait and Pierson (2022), and Hervieux and Wheatley (2021) have also identified the lack of AI-related skills as a major constraint to the adoption of AI in libraries in Africa.

Some studies have also pointed to gaps in the knowledge and skills embedded in LIS curricula that are needed to ensure the employability of LIS graduates in the 21st century. In Kenya, Mwaurah et al. (2025) found a mismatch between LIS graduates' skills and emerging technologies in the LIS field, noting that the LIS curriculum was not sufficiently addressing job market requirements. Similarly, in Zimbabwe, Katuli-Munyoro and Mutula (2016) established gaps in knowledge, functional skills and generic employability training within LIS curricula needed to meet 21st-century employability demands. With the increasing adoption of AI in library and information organisations, these existing skills gaps raise further concerns about the capacity of LIS curricula to remain relevant and adequately prepare graduates for AI-driven library and information work. The extent to which AI concepts, skills and competencies are currently integrated into LIS curricula in Eastern and Southern Africa remains largely undocumented, creating uncertainty about whether LIS graduates in the region are being adequately prepared for the changing demands of the profession and highlights a knowledge gap that this study sought to address.

3. Aim and Objectives

The study aimed to investigate how LIS departments in Eastern and Southern Africa are updating their curriculum to address the AI-related skills gap reported in various studies.

3.1 Objectives

- The study focused on the following two objectives:
- To examine the extent to which curricula in LIS departments include AI-related knowledge, skills, and competencies.

- To identify the institutional and pedagogical factors influencing the integration of AI and emerging technologies into LIS curricula, including the availability of relevant national and institutional policies.

4. Literature Review

4.1 Artificial Intelligence and Libraries

Libraries have been leveraging AI-based technologies before the arrival of ChatGPT and other GenAI chatbots. In the 1990s, they were implementing expert systems, a branch of AI developed during 1970s, in cataloguing, collection development, reference services, indexing, among others (Muqueem, 2014). Today, according to Gajbhiye (2024), AI is "improving resource discoverability, streamlining operations, enhancing accessibility, and empowering libraries to better serve their patrons" (p. 8). Tshabalala (2024) reports that AI in libraries enhances space utilisation and the user experience, while Bassey and Owushi (2023), point out that AI also has the potential to enable libraries update and expand their services and enhance their relevance in the present-day digital environment.

Practical applications of AI-based technologies, particularly in academic libraries and among library service and product vendors, are already widespread. These include the use of generative AI to deliver personalised knowledge services Kim (2025) and AI-powered assistive technologies, such as text-to-speech and Radio Frequency Identification (RFID)-based self-checkout systems (Asim et al., 2023). Several institutions have deployed AI chatbots and service robots, including *Aisha* at Zayed University Library in the United Arab Emirates (Lappalainen & Narayanan, 2023), *PERSIST* at the Central Library of Singapore (Raghvaiah & Sreekanth, 2023), and *Libby* and *Sifiso* at the University of Pretoria and the National Library of South Africa, respectively (Modiba & Ngulube, 2024). Major discovery and search-system vendors, including Clarivate, EBSCO, and ProQuest, have also integrated AI-powered features into their products (Bridges et al., 2025).

4.2 AI Skills in Libraries

AI adoption in libraries is presenting a new challenge, a human capital related challenge. AI has exposed knowledge and skills gaps among librarians. Increased adoption of AI-powered library systems calls for new sets of skills, including "technical understanding of AI and the ability to critically evaluate the impact on information services" (Bridges et al., 2025, p. 799). Hervieux & Wheatley (2021) established that academic librarians in the United States and Canada require more training regarding AI and its potential applications in libraries. Alam et al. (2024), Chepchirchir (2024) and Eiriemiokhale and Sulyman (2023) also noted critical AI skill gaps in university libraries in Zambia, Kenya and Nigeria, respectively. Implementing AI in libraries calls for specialised knowledge and expertise in many subject areas including machine learning, natural language processing, and data science, and libraries may not have the necessary skills among their staff (Bassey & Owushi, 2023).

To effectively use AI to enhance library operations and service delivery, librarians need a combination of basic and advanced technical, ethical, and digital competencies. Key skills include ethical awareness, advanced AI literacy, algorithmic understanding, natural language processing (NLP), and predictive analytics to, among others, address challenges such as data privacy and AI bias, and enhance data management, retrieval, and improve user access to resources (Tshabalala & Dube, 2024; Dorr et al., 2025; Lo, 2025; Oladokun et al., 2025b; Rojo et al., 2025; Westover, 2025). Tshabalala (2024) also emphasises the importance of librarians developing digital skills that enable them to effectively use intelligent technologies, and Cher (2024) indicates that library staff need to build competencies in developing and applying different approaches to applying AI. Bhatt and Paul (2025) also argue that it is very important for emerging library and information science professionals to be able to understand, evaluate, and use AI

tools, highlighting the urgent need to integrate AI literacy into LIS education to prepare future professionals with core AI skills and competencies.

4.3 Technology and Curriculum Reform

Advances in technological development is among the factors that influence curriculum development and adaptation in higher education as the learning institutions need to keep up with scientific and technology development (Alajmi et al., 2020; Galustyan, 2024; Hasnida, 2024). New technology impacts on labour markets by automating routine jobs leading to demands for new skills which ultimately force academic institutions to revise or introduce new curriculum to equip graduates with the new skills, prepare them for the evolving labour market, and at the same time maintain their relevance.

Successive waves of technological change have driven curriculum adaptation in higher education. The early mainframes and minicomputers created demand for programming skills, leading to the introduction of programming courses, while the rise of microcomputers and desktop computers in the 1990s resulted in the integration of computer literacy into university degree curricula (Wolfe, 1992; Hobbs & McGill, 1996). The Internet and web-based technologies impacted on the mode of delivery of university courses and enabled virtual universities (Baer, 1998), and recently tools such as Zoom transformed virtual teaching and learning (Stefanile, 2020). In this new era of artificial intelligence, curricula need to be updated to align educational outcomes with the emerging economic, societal and industry demands (Galustyan, 2024; Hasnida, 2024), and thus, to also ensure that graduates have a future and access to the evolving job markets.

5. Research Design and Methods

The study adopted a descriptive cross-sectional research design, which involves analysing data collected from a population at one specific point in time (Wang & Cheng, 2020) and to describe the distribution of one or multiple variables in the population (Aggarwal & Ranganathan, 2019). The study population was the LIS departments in universities in the Standing Conference of Eastern, Central and Southern African Library and Information Associations (SCECSAL) region. The study focused on 11 active SCECSAL member countries, whose national library and information associations participate regularly in the biennial SCECSAL conferences. These are Botswana, Eswatini, Lesotho, Kenya, Malawi, Namibia, South Africa, Tanzania, Uganda, Zambia and Zimbabwe. Thirty-six (36) library and information science departments were identified through internet web searches. However, initial contact information for the departments were established for only 32 departments.

The study used an online questionnaire on KoboToolbox to collect data on the following five focus themes: curriculum revision, integration of AI related content, pedagogy and competencies, faculty capacity, and institutional support and infrastructure. An electronic mail message explaining the purpose of the study and inviting the departments to participate in the study was sent to the heads of department of the 32 LIS departments. The invitations to two departments were not delivered due to the non-existence of the two email addresses used, while in another case the researchers received a decline leaving 29 LIS departments in the accessible, and ultimately, target population. Data were collected between 18 November and 5 December 2025.

6. Findings

Sixteen out of the 29 departments completed the online questionnaire resulting in a response rate of 55%. Baruch and Holtom (2008) in their analysis of 1,607 studies of which 490 different studies used surveys, published in 2000 and 2005 in 17 refereed academic journals, report an average response rate

of approximately 35.7% (SD = 18.8) for organisational surveys. Furthermore, in this study, four countries had only one university-based LIS department each, three of which responded to the survey, and responses were received from eight out of the 11 target countries, representing 73% country coverage. Taken together, these factors indicate that the 55% response rate provides sufficient representativeness to support meaningful analysis.

6.1 Country Coverage

Out of the 11 countries covered in the survey, responses were received from Kenya (five departments), South Africa (three departments), and one each from Eswatini, Lesotho, Malawi, Namibia, Uganda and Zimbabwe, while two respondents did not indicate their country.

6.2 Year of Establishment

Fourteen out of 16 participating departments indicated the year of their establishment. Three departments (21.4%) were established before 1980, with a further three (21.4%) founded between 1980-1999 and another three (21.4%) between 2011-2020. Four departments (28.6%) were established between 2000-2010, while one department (7.1%) was established after 2020.

6.3 LIS Qualifications Offered

The 14 departments indicated the LIS qualifications they offered, and these ranged from diploma to doctorate level. All departments, 14 (100%), offered bachelor's degree programmes, followed by 12 (85.7%) offering master's degrees programmes, and 10 (71.4%) offering doctoral/PhD programmes. Only six (42.9%) and four (28.6%) departments offered diploma and postgraduate diploma programmes respectively.

6.4 Faculty Staff

The staff complement in the 14 departments ranged from between one and five members to more than 30. Five (35.7%) departments reported a staff complement of one to five members, four (28.6%) had between six and ten, two (14.3%) reported between 11 and 20, another 2 (14.3%) had more than 30 staff members, and one department (7.1%) had between 21 and 30 members.

6.5 LIS Curriculum Revision and Influencing Factors

All 16 (100%) participating departments had revised their curriculum in the past ten years. Five departments (31.3%) conducted a comprehensive overhaul of their programmes, while another five made significant revisions, such as adding one or more new dedicated courses. Three departments (18.8%) made moderate changes, like introducing new modules across several courses, and another three (18.8%) implemented minor adjustments, such as adding a few topics.

Several factors influence curriculum development and revision. In this study, 13 departments (81.3%) identified feedback from employers and LIS stakeholders as a key influence, with an equal number also citing labour market trends and emerging job opportunities. Advances in information and communication technologies, as well as benchmarking against regional or international LIS programmes, were each mentioned by 12 (75%) departments. National higher education policies or accreditation requirements, institutional strategic priorities, and the emergence of new disciplinary areas (e.g., data science, big data, artificial intelligence) were reported by 10 (62.5%) departments. Professional LIS associations and student feedback were each cited by eight (50%) departments, while academic staff recommendations were mentioned by six (37.5%) departments. Finally, findings from graduate tracer studies and input from advisory boards or curriculum review committees were each reported by five (31.3%) departments.

6.6 Integration of AI in the Revised Curriculum

Fifteen departments indicated introducing AI in their curriculum, with varying degrees of integration. Only one (6.3%) department reported having AI fully integrated across multiple modules with clear learning outcomes. Ten (62.5%) departments included AI concepts in several modules, though not comprehensively, while four (25%) mention AI briefly or included it in only a single module. One (6.3%) department indicated that its curriculum does not contain any AI-related topics or learning outcomes, and cited the following as the main barriers:

- Absences of institutional AI policy/strategy
- Lack of faculty staff to teach AI-related topics
- Lack of access to expertise in other university units/departments
- Concerns about AI ethics

6.7 AI-related Topics or Themes in the Curriculum

Regarding AI-related topics or themes in the revised curriculum, among the 15 departments, 12 (80.0%) had included *AI ethics*, 11 (73.3%) had *introduction to AI*, nine (60.0%) indicated *data analytics and visualization*, while *chatbots and generative AI tools*, and *information behaviour and AI recommendation systems* each was included in the curricula of eight (53.3%). Six (40%) departments mentioned *machine learning*, five (33.3%) indicated *natural language processing*, and four (26.7%) indicated *AI governance*.

In relation to integrating AI into library and information domains, 10 (66.7%) departments indicated integration into modules or courses related to library services, and nine (60.0%) into metadata and knowledge organisation, including digital repositories. Other domains where AI was incorporated included information retrieval and discovery, in research, ethics, privacy and data governance in libraries, and archiving, each reported by six (40.0%) departments. AI applications in robotics and library automation, as well as data analytics, were mentioned by five (33.3%) departments, while four (26.7%) reported AI for inclusive and accessible library services, and three (20%) also indicated human-AI collaboration. Only two (13.3%) departments indicated integrating AI into student assessments, one (6.7%) department had not integrated AI in any of the listed domains, while another one (6.7%) reported AI integration in "other" LIS domains.

6.8 AI Competencies

When asked to indicate the AI-related competencies emphasised in their revised curriculum, 14 out of the 15 departments provided responses. Eleven (78.6%) departments indicated competencies related to ethical, governance, and conceptual skills, followed by application and use skills such as employing existing AI tools to enhance LIS workflow, mentioned by 10 (71.4%) departments. Critical evaluation and research skills, as well as managerial and integration skills, were each reported by six (42.9%) departments. Technical and development skills, such as building, coding, or implementing AI-based library systems, were included in the programmes of two (14.3%) departments. Two (14.3%) departments did not emphasise any specific AI-related competencies in their programmes.

6.9 Primary Pedagogical Methods Used

Only 13 departments responded to the question related to pedagogical methods used to deliver AI-related modules or courses. Traditional lectures and tutorials remained the most common and primary pedagogical method used, reported by all the 13 (100%) departments. Online or blended instruction was used by 10 (76.9%) departments, while case studies of AI applications and problem-solving exercises were employed by eight (61.5%) departments. Peer-to-peer or collaborative learning and the use

of research papers and critical literature reviews were each used by seven (53.8%) departments. Group discussions and project-based learning using AI tools were reported by six (46.2%) departments. Guest lectures from AI practitioners were indicated by four departments (30.8%), and experiential or lab-based training was used by two (15.4%) departments.

6.10 Faculty Capacity

Regarding faculty capacity development to enable the teaching of AI-related topics and courses, nine (60.0%) departments reported that their staff had received formal AI-related training or professional development, while six (40.0%) indicated that no such training had been received. In-house workshops or training sessions were the most common form of training, reported by six (66.7%) out of the nine departments, followed by formal training workshops or short courses, indicated by five (55.6%) departments. Formal degrees or certificates in AI or data science, as well as sabbaticals or research grants for AI-related study, were each reported by one (11.1%) department. Attendance at external conferences with financial support from the parent institution and collaborative teaching with computer science or information technology departments were each mentioned by two (22.2%) departments.

6.11 Support Needed

When asked to indicate the types of support that would enhance faculty capacity to teach AI-related content, 12 (80.0%) out of the 15 departments that have integrated AI in the curriculum reported that guest lectures and seminars delivered by AI experts, as well as specialised AI training for staff, would be most beneficial. Co-teaching or mentorship with computer science or IT departments, and access to modern AI tools and learning resources, were each indicated by 10 (66.7%) departments. Dedicated time for staff AI skills development was mentioned by nine (60.0%) departments, while eight (53.3%) departments each cited support to attend AI-related events and the need for an institutional AI strategy and policy. Seven (46.7%) departments indicated the importance of access to online toolkits containing tutorials and lesson plans for AI in LIS, while four (26.7%) departments highlighted the need for funding to support AI curriculum development and research.

6.12 Partnerships with other Departments

Partnerships can potentially enhance LIS departments' access to relevant resources and expertise to complement their efforts for delivering AI-related courses. While six (40.0%) out of 15 departments indicated that they had partnership arrangements with other academic departments within their universities, seven (46.7%) departments reported having no partnerships, although they were in the process of exploring potential collaborations. One (6.7%) department each indicated having partnerships with industry partners (e.g., technology companies and libraries) and having no partnerships or plans to establish any, respectively.

6.13 University/Institutional Incentives

Asked whether their parent institutions had incentives in place to motivate staff to enhance their capacities in AI technologies, eight (53.3%) out of 15 departments indicated that their institutions offered incentives to support staff in updating their skills in emerging technologies, although these were provided on an ad hoc basis. In contrast, seven (46.7%) departments reported that no such incentives were available in their institutions.

6.14 Institutional Policy on AI

When asked to indicate the level of institutional policy priority for integrating AI into the curriculum, two (13.3%) departments reported that it was a high priority, with dedicated resources allocated by the institution. Eight (53.3%) departments indicated that AI integration was a medium priority, where its adoption was encouraged but supported with limited resources. In four (26.7%) departments, AI integration was considered a low institutional priority, with efforts largely driven by individual faculty interests, while in one (6.7%) department, AI integration was reported as not being a priority at all.

6.15 Institutional Technological Infrastructure

When asked to rate the adequacy of their parent institutions' technological infrastructure (including laboratories, software, and data access) for AI-integrated teaching, seven (46.7%) departments indicated that it was inadequate. Five (33.3%) departments rated the infrastructure as moderate, while only three (20.0%) reported that it was adequate.

6.16 National Policies Related to AI

Regarding the existence of national policies that could guide or encourage the inclusion of AI in higher education curricula, eight (50.0%) of the 16 departments participating in the study indicated that existing policies moderately mention AI or digital transformation, but only in broad terms. Three (18.8%) departments reported that current policies strongly encourage AI adoption and provide clear guidance, while another three (18.8%) indicated that AI is addressed only to a small extent, with minimal or unclear references. Two (12.5%) respondents reported that there were no national policies related to AI in higher education.

6.17 Institutional Formal Strategy

When asked about the existence of a formal institutional strategy, policy, or framework explicitly addressing AI or digital transformation, eight (50.0%) departments reported that such a strategy existed but was still in development or in draft form. Five (31.3%) indicated that no strategy existed yet, although discussions were ongoing. Only one (6.3%) department reported having a fully developed and implemented strategy, while one department (6.3%) was unsure, and another (6.3%) reported that no strategy existed and it was not under discussion.

7. Discussion

The discussion revolves around the two objectives of the study, focusing on curriculum revision and integration of AI-related knowledge, skills, and competencies, as well as the institutional and pedagogical factors, influencing the integration of AI and emerging technologies into LIS curricula, including the presence of relevant national or institutional policies.

7.1 Curriculum Revision and Integration of AI-related Knowledge, Skills, and Competencies

The findings show that overall curriculum revision is an established practice among LIS departments in Eastern and Southern Africa to keep up to date with developments in the information world, confirming the findings of Ocholla and Bothma (2007) and Mwaurah et al., 2025). In this study, all participating institutions indicated having reviewed their programmes within the past decade. Except for one department, all have worked towards integrating elements of AI in their curriculum, reflecting efforts to align LIS educational programmes with changing technological contexts and job market demands. However, the findings show that the depth and scope of the revisions to integrate AI vary considerably, ranging

from comprehensive overhauls to relatively minor adjustments. This aligns with Ndungu (2024), who makes a parallel argument in the context of information literacy instruction: rather than treating AI as a separate subject, existing media and information literacy (MIL) programmes should be revised to incorporate AI-specific content.

The study has established that AI integration within the revised LIS curricula remains partial and uneven across departments while most departments adopt a fragmented approach by embedding AI concepts into selected modules. This may suggest that AI is being seen as an additional subject area to consider and not as a core curricular component, validating Bridges et al.'s (2025) argument that many LIS programmes treat AI literacy as a supplementary skill rather than a core competency, confining it to elective courses or short modules. Where AI is included, emphasis is placed on foundational and applied themes, particularly AI ethics, introductory AI concepts, data analytics, and chatbots and GenAI, highlighting a strong emphasis on practical skills and AI literacy. These findings echo those of Bridges et al. (2025) in their review analysis of syllabi from leading international LIS programmes, in which they established a strong orientation toward applied AI literacy in the LIS courses. In addition, integration is most visible in domains closely aligned with traditional LIS functions, such as provision of library services, metadata and knowledge organisation, information retrieval, and digital repositories, indicating an effort to contextualise AI within established professional and library practices, alluding to Lund et al. (2020) findings that AI adoption among academic library employees, clusters around roles and functions already familiar to librarians rather than novel technical applications.

This pattern of integration is mirrored in the specific competencies departments choose to emphasise. The competencies emphasised in AI-integrated LIS curricula reflect a strong orientation towards ethical awareness, governance, and conceptual understanding of AI. This dominant focus suggests that LIS departments are prioritising preparing graduates to critically engage with AI technologies rather than to design or build AI-based library and information systems. Application-oriented skills, particularly the use of existing AI tools to enhance LIS workflows, also receive substantial attention, aligning with the professional and practice-based nature of LIS education. In contrast, competencies related to critical evaluation, research, management, and systems integration are less consistently emphasised, and technical development skills remain marginal. The limited inclusion of coding, system development, or implementation competencies is consistent with the capacity constraints identified elsewhere in this study. It may also reflect a deliberate curricular choice to avoid overlap with computer science and information technology programmes; however, as departments were not asked directly about this rationale, this remains a plausible interpretation rather than a finding of the study. Overall, the findings indicate that current AI competency development in LIS programmes is largely conceptual and applied, with limited emphasis on advanced technical expertise.

7.2 Institutional and Pedagogical Factors, and Relevant Policies

The study established that employers' and LIS stakeholders' feedback, including labour market trends and emerging job opportunities, were the key factors that influenced decisions to integrate AI into the LIS curriculum in many departments. This, to some extent, aligns with Mwaurah et al. (2025) and Kassim et al. (2023) recommendations that curriculum reviews should consider emerging trends and evolving job market requirements to ensure that graduates possess relevant and market-responsive competencies to enhance their employability.

While LIS departments in the study responded to societal pressures, consistent with institutional theory's account of organisations seeking legitimacy by aligning with external expectations rather than acting on internal technical rationality alone (Berthod, 2016), the findings revealed uneven and weak institutional factors playing a key role in facilitating the integration of AI into the LIS curriculum. Formal

AI-conducive national and institutional policies and strategies, which among others are critical to AI integration in education (Miao et al., 2021), are largely in the developmental phase in most institutions. This is consistent with the global and regional evidence showing that fewer than 10% of over 450 schools and universities surveyed worldwide had comprehensive formal AI policies (UNESCO, 2023b), and only 4 out of 10 of nearly 3,900 respondents across 47 African higher education institutions reported having such policies (World Innovation Summit for Education et al., 2025).

In the current study, where available, overall, AI integration into the educational curriculum is treated as a moderate or low priority. Incentives for staff skill enhancement in emerging technologies exist in some institutions but are largely ad hoc, while many departments report no incentives at all, indicating limited strategic commitment to professional development. Furthermore, AI integration into the curriculum is constrained by scarce financial, technical, and human resources and frequently left to individual initiative. These gaps are exacerbated by inadequate technological infrastructure, collectively undermining coherent, scalable, and equitable AI integration in higher education and pointing to the need for stronger institutional commitment, coherent AI policies, and sustained investment in infrastructure, as pointed out by Miao et al. (2021) and as highlighted as major barriers by Gorbunova et al. (2026).

AI integration into the curriculum requires more than simply adding AI content to existing teaching. Strong consideration should be given to how AI is taught, how the faculty are prepared, and how institutions support pedagogical change. Although the departments participating in the study employed a variety of delivery methods for AI-related topics in their programmes, the findings clearly show that AI-related teaching in LIS departments in the region remains largely through traditional lectures and tutorials, used by all responding departments. While blended learning, case studies, and problem-solving activities are moderately adopted, more interactive approaches such as project-based, experiential, and lab-based learning are limited. This suggests a cautious and incremental integration of AI pedagogy, with constrained opportunities for hands-on engagement and real-world application, which are essential for developing practical AI competencies (Chen et al., 2023; Miao & Cukurova, 2024). Furthermore, faculty capacity to teach AI-related content is uneven across departments, a situation that is not unique to this study. Mah and Groß (2024) examined 122 university faculty members and found differences in AI self-efficacy, use and attitudes among faculty. Although a majority reported some form of AI training, this is predominantly delivered through short-term, in-house workshops rather than formal qualifications or sustained professional development pathways. Departments strongly emphasised the need for expert-led training, co-teaching with computer science or IT staff, access to modern AI tools, and dedicated time for skills development, highlighting institutional constraints on pedagogical innovation. Overall, this study highlights the gap between faculty engagement with AI and the institutional support available to them.

8. Conclusion and Recommendations

LIS departments in Eastern and Southern Africa are responding to the adoption and integration of AI across the higher education sector, with efforts to revise LIS curriculum to integrate AI appearing to be an uneven process shaped by both external demands and internal institutional contexts. There is also inadequate faculty capacity to teach AI-related content across departments, which calls for investments in capacity development initiatives for the faculty, including enhanced collaboration with other relevant departments within the institutions to leverage their technical skills and expertise. While the awareness of the importance of integrating AI-related concepts, skills and competencies in LIS curriculum is high, the enabling environment composed of supportive policies, incentives for faculty members, and technical infrastructure, have not yet kept pace, posing a significant barrier to comprehensive AI integration in LIS education in the region. Considering these findings, we make the following recommendations:

- LIS departments should adopt a more coordinated approach to AI integration by systematically embedding AI-related knowledge, skills, and competencies across core LIS modules, supported by clearly articulated learning outcomes and assessment strategies.
- Universities should invest in sustained faculty development by providing formal and continuous AI training opportunities, protected time for skills enhancement, and incentives linked to teaching innovation. Cross-departmental collaboration with computer science departments, through co-teaching, mentoring, or joint curriculum development, should be formalised and can help address expertise gaps and support pedagogical innovation.
- Universities should develop clear AI policies and strategies that prioritise curriculum innovation, allocate dedicated resources, and improve technological infrastructure. Consistent institutional support, rather than ad hoc initiatives, is essential to enable experiential and practice-based AI teaching and sustain long-term development of AI-related human capital in LIS education.
- LIS departments should deliberately diversify their pedagogical approaches and practices for AI-related content, for example, through project-based assignments, case-based exercises, guest lectures from AI practitioners, and structured laboratory or experiential components.

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Assessing the 21st Century Library and Information Science Core Competencies: A Study of Librarians at Karatina University, Kenya

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Abstract

The evolution of Information and Communication Technologies has reshaped library roles, information science curricula, and patron needs. In higher learning institutions, academic librarians are expected to be embedded librarians to meet their patrons' increasing information and research needs. These global digital transformation presents African academic libraries with both opportunities and pressing challenges, situating them at a critical intersection between tradition and innovation. In Kenya, this transition is hindered by a significant skills gap among librarians, limiting their capacity to meet evolving academic and research demands. The objective of the study was to assess the 21st-century competencies of library professionals at Karatina University against a global framework to identify critical areas for development. The study was underpinned by the ALA core competencies framework. In recognition of other crucial competencies missing in this framework, the ALA was enhanced with 21 Century competencies derived from empirical literature. A combination of these offered international credibility, adaptability to local context, and the ability to assess and benchmark. An online questionnaire was administered to 18 library staff that have an LIS education with a 94% response rate. This aided in generating measurable data to pinpoint competency gaps and prioritise capacity-building needs. The results reveal distinct insufficiencies in AI awareness, research data management, open science, and digital metadata management, despite strengths in traditional library values. The study proposes a structured, continuous professional development for librarians, to bridge the competency gap, and ensure the provision of relevant, future-ready library services in Karatina University and similar contexts.

Keywords*: academic librarians, LIS competencies, Karatina University, Kenya, university libraries.*

1. Introduction

Globally, libraries are undergoing a significant transformation, shifting from conventional information storehouses to diverse knowledge hubs not only facilitating knowledge creation, storage and dissemination, but also enhancing spaces for active learning and collaboration. Momoh and Folorunso (2019), posit that libraries are transforming from information storehouses to dynamic knowledge hubs that support digital access, cultural preservation, and community collaborations. Rahmanova (2025) notes that the digital revolution has reshaped libraries into technology-centred hubs for information, education, and cultural preservation.

In the African context, the digital age presents a dual reality for libraries, offering significant potential for transformation alongside persistent structural challenges. African libraries can leverage global trends like open access initiatives, research data management, and mobile technologies to increase the visibility of

local research and foster a more inclusive scholarly conversation, evolving from repositories into vibrant hubs for knowledge creation and development (Jain & Akakandelwa, 2016; Onunka et al., 2023). However, this potential is constrained by a persistent digital divide, characterised by financial constraints, inadequate Information and Communication Technology (ICT) infrastructure, low digital literacy, and a reliance on irrelevant donated materials coupled with slow open access uptake, all of which perpetuate dependency on foreign content and hinder a locally-driven knowledge economy (Jain & Akakandelwa, 2016; Bouaamri et al., 2022).

Compounded by socio-cultural and educational hurdles including resistance to change, outdated Library and Information Science (LIS) curricula, and the need to address localised knowledge, the transformation of African libraries cannot rely on infrastructure or policy alone; it fundamentally depends on librarians as the critical agents of change. These professionals serve as essential intermediaries between technological potential and community needs, capable of bridging digital divides, curating locally relevant knowledge, and revitalising library services. Therefore, without deliberate investment in their capabilities through updated education, continuous professional development, and stronger continental advocacy, the promise of the 21st-century African library will remain unfulfilled, accentuating the urgent need to empower librarians as the foundation of successful transformation.

1.1 Statement of the Problem

While the broader African context presents a clear mandate for professional empowerment, the effectiveness of this response is ultimately tested at the institutional level. In Kenya, universities like Karatina University are pivotal in driving national development goals and fostering a knowledge-based economy. The university library is expected to be at the heart of this academic mission. However, a preliminary review suggests a potential misalignment between the evolving demands of the academic community and the existing skill sets of the library staff. If the professionals at the helm of this essential service lack the requisite competencies in areas such as digital literacy, data management, and advanced user engagement, the library risks becoming a peripheral entity rather than an active partner in teaching, learning, and research. This study, therefore, narrows its focus to Karatina University to empirically investigate this potential disconnect, identifying specific competency gaps to inform a targeted capacity-building strategy.

To aid in this investigation, the study presents the following research objectives:

RO1: To determine the self-assessed proficiency level of librarians at Karatina University in the core 21st-century LIS competencies.

RO2: To identify the most significant competency gaps that hinder the delivery of modern, user-centric library services.

RO3: To ascertain the priority capacity development initiatives needed to bridge the identified competency gaps.

2. Literature Review

To contextualise the present study, it was essential to review the methodological approaches and key findings of previous empirical research that has assessed librarian competencies, particularly those with a focus on 21st-century skills (Table 1). This review helped to situate the current study within the broader scholarly conversation and identify the research gaps it aimed to address.

Table 1

Summary of Empirical Studies

Author(s) & year	Target audience / context	Methodology	Key competencies	Main findings
Meals et al. (2025)	Writing instructors (University of the District of Columbia)	Qualitative exploratory; semi-structured interviews	Pedagogical collaboration, faculty-librarian partnership	Faculty scaffold research assignments iteratively; librarians underused as partners
Yang et al. (2025)	Senior U.S. academic library leaders	Expert panel consensus	AI literacy, ethical AI use, strategic digital leadership	LIS programmes not preparing graduates for AI competencies
Andrikopoulou et al. (2022)	Academic librarians (international review)	Literature review (surveys, case studies, qualitative studies)	Research Data Management (RDM), role identity	RDM presents role ambiguity; gaps in technical and consultative skills
McCarthy (2021)	Community college health sciences librarians (US)	Mixed methods: survey (Likert scale) + follow-up	MLA competencies, professional development barriers	Self-rated intermediate proficiency; barriers include time and funding
Raju (2021)	LIS educators & academic librarians (Global North/South)	Qualitative phenomenological interviews + document review	IT integration in LIS curricula, pedagogical skills	IT taught in-house, but pedagogical skills lag behind technical skills
Mubofu (2025)	Tanzanian librarians (Tanzania Library and Information Assoc.)	Quantitative survey	Digital competencies, AI awareness, cataloguing	Varied digital skills; key gaps: digital cataloguing, AI awareness
Badenhorst & Raju (2023)	South African academic librarians	Qualitative multiple case study: interviews + document review	RDM, digital literacy, instructional design	Gaps in research methods, data curation, funding for RDM support
Mfengu & Raju (2022)	African research librarians, research offices	Qualitative interviews	Research impact assessment, bibliometrics, altmetrics	Libraries constrained by metric-driven mandates without adequate skills
Raju (2020)	South African higher education LIS professionals	Mixed methods: surveys, interviews, job ad analysis	Digital scholarship, metadata, scripting, systems thinking	Gaps in advanced ICT, metadata management, scripting skills
Joel & Ibrahim (2021)	University librarians (Borno State, Nigeria)	Descriptive survey (questionnaire)	IT, interpersonal, and leadership competencies	All three competency clusters highly needed; gaps in IT skills
Thomas (2023)	Clinical librarian / Chief Diversity Officer (US)	Case study	DEI, cultural competence, inclusive outreach	Librarians can lead DEI initiatives; skills in advocacy needed
Dube et al. (2024)	Academic librarians (systematic review, 2020–present)	Systematic Literature Review (PRISMA)	IT tools (AI, IoT, chatbots), required skills	Identified tools and skills needed; challenges: infrastructure, training

A synthesis of recent empirical studies (summarised in Table 1) reveals consistent competency gaps across global and African contexts, particularly in AI literacy, RDM, open science, and digital pedagogy. While studies in Tanzania, Nigeria, and South Africa highlight region-specific barriers such as infrastructure and funding, there remains a lack of focused investigation within Kenya University settings presenting a geographical and contextual gap that this study aims to address.

3. Theoretical Framework

Several global frameworks outline 21st century LIS competencies, including American Library Association (ALA, 2023), Association of College and Research Libraries (ACRL, 2015), CILIP PKSB (2022) and IFLA's (2012) Continuing Professional Development and Workplace Learning (CPDWL). This study adapts the ALA core competencies of Librarianship (2023). This framework reflects basic knowledge gained through LIS education, job on-boarding, and ongoing professional development in early and mid-library career. It includes nine core areas: Gateway knowledge; Information Resources; Lifelong Learning and Continuing Education; Management and Administration; Organisation of Recorded

Knowledge and Information; Reference and User Services; Research and Evidence-based Practice; Social Justice; and Technological Knowledge and Skills.

The ALA framework provides a foundational and validated framework that helps in assessing core professional knowledge particularly for early and mid-career professionals, which encompasses the majority of the library staff at the Karatina University. However, to fully capture the 21st century component of this study and address the evolving demands in academic libraries, some specific, empirically-supported competencies drawn from the LIS literature reviewed in this study have been included. Table 2 presents the identified competencies.

Table 2

Core LIS Competencies

#	Competency	Key elements from ALA framework and literature
1	Technological Knowledge and Skills	Application of current technologies (ILS, repositories, digital tools) to library operations and services.
2	Organisation of Recorded Knowledge and Information	Cataloguing, metadata, classification, and knowledge organisation systems.
3	Reference and User Services	Reference interviews, searches, and advanced research support for users.
4	Information Resources	Collection development, management of e-resources, and resource evaluation.
5	Management and Administration	Planning, budgeting, project management, and change leadership.
6	Research and Evidence-Based Practice	Using research methods and data to inform practice and decision-making.
7	Social Justice	Ensuring access, equity, diversity, and inclusion in library services.
8	Lifelong Learning and Continuing Education	Commitment to ongoing professional development in the field.
9	Gateway Knowledge	Understanding the library's role, ethics, and history within society.
10	Research Data Management (RDM) & Curation	Understanding the data lifecycle, Data Management Plans, and institutional repositories.
11	Open Science & Scholarly Communication	Knowledge of open access publishing models, institutional repositories, and scholarly communication trends.
12	AI & Emerging Technologies Awareness	Understanding the potential applications and ethical implications of AI and emerging technologies.
13	Knowledge Management & Systems Thinking	Capturing, sharing, and utilising institutional knowledge and systems-level thinking.

4. Research Methodology

This study employed a quantitative, census-based exploratory design using a structured online questionnaire to assess competencies across all 18 LIS-qualified library staff at Karatina University, representing the complete target population rather than a sample. A full census was conducted to ensure a comprehensive, institution-specific profile, aligning with case-based research approaches that focus on in-depth analysis of bounded groups (Yin, 2018). Data were collected and analysed descriptively based on an enhanced ALA competency framework and analysed descriptively in Excel to identify strengths and gaps, providing a targeted evidence base for local capacity development.

5. Results

5.1 Demographic Profile of Respondents

The study achieved a 94% response rate (17 out of 18 LIS-qualified staff). Respondents were predominantly female (59%) with 11–20 years of experience (88%). Educational qualifications included Diploma (41%), Bachelor's (35%), and Master's (24%) in LIS. Staff were distributed across Circulation & Customer Services (41%), Systems (23.5%), Reference & Research (23.5%), and Acquisitions (12%).

5.2 Summary of Competency Proficiency Levels

Table 3 summarises the self-assessed proficiency levels across the 13 competency areas ranked by average scores.

Table 3

Average Proficiency Scores by Competency Area (N=17)

Rank	Competency area	Average proficiency (out of 5)	Tier
1	Social Justice	4.0	Top tier — library's strength. Core values, collections, and service culture.
2	Gateway Knowledge	3.9	Top tier — library's strength. Core values, collections, and service culture.
3	Information Resources	3.8	Top tier — library's strength. Core values, collections, and service culture.
4	Lifelong Learning & Continuing Education	3.7	Top tier — library's strength. Core values, collections, and service culture.
5	Technological Knowledge & Skills	3.6	Middle tier — transitional competencies. The library can perform core functions but needs to build on this.
6	Reference & User Services	3.5	Middle tier — transitional competencies. The library can perform core functions but needs to build on this.
7	Organisation of Recorded Knowledge	3.4	Middle tier — transitional competencies. The library can perform core functions but needs to build on this.
8	Management & Administration	3.2	Middle tier — transitional competencies. The library can perform core functions but needs to build on this.
9	Knowledge Management & Systems Thinking	3.1	Middle tier — transitional competencies. The library can perform core functions but needs to build on this.
10	Research & Evidence-Based Practice	2.9	21st-century research and digital competencies — bottom tier, critical gaps.
11	Research Data Management (RDM) & Curation	2.8	21st-century research and digital competencies — bottom tier, critical gaps.
12	Open Science & Scholarly Communication	2.7	21st-century research and digital competencies — bottom tier, critical gaps.
13	AI & Emerging Technologies Awareness	2.6	21st-century research and digital competencies — bottom tier, critical gaps.

5.3 Priority Competency Gaps

Table 4 highlights the five most critical gaps, defined by the lowest proportion of staff rating themselves as "Proficient" or "Expert".

Table 4

Priority Competency Gaps at Karatina University Library

S/N	Competency gap	Key evidence (proficient/expert staff)	Strategic implication
1	AI & Emerging Technologies Awareness	0% (0 out of 17 staff)	No staff confident in AI concepts or ethics.
2	Open Science & Scholarly Communication	0–17% (0–3 out of 17 staff)	Minimal ability to manage repositories or advise on open access.

S/N	Competency gap	Key evidence (proficient/expert staff)	Strategic implication
3	Research Data Management	0–17% (0–3 out of 17 staff)	Very limited capacity to support RDM or DMPs.
4	Research & Evidence-Based Practice	12–29% (2–5 out of 17 staff)	Low proficiency in bibliometric and research methods support.
5	Digital Metadata Management	24% (4 out of 17 staff)	Weak skills in organising digital assets.

6. Discussion

The competency profile of librarians at Karatina University reveals a profession in transition, characterised by strong traditional foundations but critical gaps in emerging, research-oriented domains. This pattern mirrors broader global and African LIS trends, where the shift from custodial to facilitator roles remains uneven.

6.1 A Strong Ethical and Service Foundation

Librarians excelled in Social Justice, Gateway Knowledge, Information Resources, and Lifelong Learning & Continuing Education reflected in the top tier (Table 3) reflecting a robust ethical, user-centred, and learning-oriented professional culture. These strengths align with core LIS values emphasised in global frameworks such as the ALA Core Competencies and are essential for maintaining inclusive, responsive services in a changing environment (Thomas, 2023). This strong foundation provides a credible platform upon which to build more advanced, digitally focused capabilities.

6.2 Transitional Competencies

Competencies in Technological Knowledge, Reference & User Services, Organisation of Recorded Knowledge, Management & Administration, and Knowledge Management & Systems Thinking fell within the mid-range (Table 3). This indicates staff can perform core operational functions but lack the advanced proficiency required for innovation, digital leadership, and strategic impact. The concentration of strategic and managerial skills primarily among senior staff further highlights a developmental gap and a potential risk to organisational resilience and succession planning, a pattern also noted in studies of community college and African academic libraries (McCarthy, 2021; Raju, 2020).

6.3 Critical Gaps in Digital and Research Spheres

The most severe deficits lie in digitally intensive and research-support competencies in the bottom tier highlighted in Table 3 and further presented in table 4. With AI & Emerging Technologies Awareness (0% proficient), Open Science & Scholarly Communication (0–17% proficient), Research Data Management (0–17% proficient), and Research & Evidence-Based Practice (12–29% proficient). These gaps reflect a significant lag in adopting roles that are now central to academic librarianship globally (Yang et al., 2025; Andrikopoulou et al., 2022). The complete absence of AI literacy proficiency limits the library's ability to engage with transformative tools or guide users in an AI-augmented information landscape. Similarly, deficiencies in digital metadata management (24% proficient) and bibliometrics hinder effective stewardship of digital collections and evidence-based research support, a misalignment also observed in other African contexts (Badenhorst & Raju, 2023; Mubofu, 2025).

The low competency in Research Data Management (RDM) and Open Science mirrors findings from South Africa (Badenhorst & Raju, 2023) and Tanzania (Mubofu, 2025), where librarians struggle to transition from custodial to research partner roles. The inability to support data management plans (DMPs) or manage institutional repositories undermines the library's potential to enhance the visibility and impact of university research—a key opportunity in the African context (Jain & Akakandelwa, 2016).

6.4 Professional Development and Application Gaps

Although staff show strong motivation for lifelong learning, the gap between training engagement and practical application particularly among paraprofessionals suggests that professional development is often not translated into practice. This resonates with McCarthy's (2021) identification of systemic barriers such as lack of time, funding, and structured mentorship. Without applied, hands-on training and institutional support, awareness alone will not bridge competency gaps. Furthermore, the concentration of strategic skills among senior staff highlights a leadership pipeline risk, while the overall competency profile signals a misalignment between LIS education and workplace demands, a concern also noted by Raju (2021). For Karatina University, this calls for a need for targeted upskilling in AI, RDM, and open science, supported by policy-level investment in continuous professional development.

6.5 Implications for Library Strategy

The findings suggest that the library's evolution into a dynamic academic partner depends on leveraging existing strengths especially in ethics, user service, and learning culture to address critical gaps in AI, RDM, open science, and digital scholarship. Without targeted development in these areas, the library risks remaining marginal to the university's research and innovation mission. This presents the urgent need for structured, applied training and institutional investment in continuous professional development, particularly in regions where infrastructural and curricular constraints amplify competency divides (Jain & Akakandelwa, 2016; Bouaamri et al., 2022).

6.6 Desired Capacity Development Initiatives

The identified gaps are not merely a lack of skills but a strategic risk to the library's relevance. Addressing them requires a targeted, multi-level approach. Based on the research findings, and staff's demonstrated commitment to lifelong learning, the following capacity development initiatives are proposed as most critical.

Foundational Digital Scholarship Programmes

This focuses on structured series of workshops to collectively address the top four gaps (AI, Open Science, RDM, and Research). Based on the competencies under study, these specifically include: Introduction to AI concepts and ethics for libraries; Managing Institutional Repositories and promoting Open Access; Research Data Management fundamentals and DMPs; and Using bibliometric tools for research assessment. Targeting all the staff would be more effective than one-off trainings, building a cohort of staff with shared foundational knowledge in these interrelated areas.

Hands-on Technology Immersions and Tool Training

As indicated by the gap between learning and application in lifelong learning, staff need supported practice to translate new knowledge into daily work. This proposes a shift from theoretical awareness to practical applications which was revealed as a gap in this study. This would include practical, hands-on sessions using specific software and platforms the library owns or plans to adopt (such as institutional repository software, DMP online tools, data visualisation software). This would also address the gap in digital metadata management.

Mentorship and Community of Practice Framework

There is a need to bridge the leadership and strategic gaps identified in management and systems thinking. This can be done through pairing junior staff with senior staff on strategic projects; and creating regular forums for sharing knowledge and challenges related to new competencies. This builds a leadership

pipeline, facilitates tacit knowledge transfer, and fosters a collaborative culture essential for navigating institutional change, as recommended by findings in the literature (Raju, 2020).

Strategic Advocacy for Institutional Support

There is a need to address the root causes identified in global studies, such as budget constraints.

These research findings could be useful to advocate for a dedicated budget line for continuous professional development and for integrating identified competencies into institutional performance and development plans. Empowering librarians requires systemic support. Without institutional investment in training and time, individual efforts will be insufficient to bridge these significant gaps.

7. Conclusion

This study set out to assess the 21st-century core competencies of librarians at Karatina University through the lens of an enhanced ALA core competency framework. The study was guided by three research questions. The findings provide a clear and institution-specific profile of both strengths and critical gaps that carry important implications for professional development and library strategy in Kenya and similar contexts.

In response to RO1, librarians demonstrated strong proficiency in foundational and values-based competencies of Social Justice, Gateway Knowledge, Information Resources, and lifelong learning, reflecting a strong ethical and user-centred professional culture. However, critically low ratings were observed in emerging, digitally intensive areas such as AI awareness, Research Data Management, Open Science, and Digital Metadata Management.

Addressing RO2, the most significant gaps hindering modern service delivery are, in order of priority: (i) AI & Emerging Technologies Awareness (0% proficient), (ii) Open Science & Scholarly Communication (0–17%), (iii) Research Data Management (0–17%), (iv) Research & Evidence-Based Practice (12–29%), and (v) Digital Metadata Management (24%). These deficiencies align with regional trends observed in Tanzania, South Africa, and Nigeria, and point to a systemic lag in adopting roles essential for research support and digital innovation.

Finally, in relation to RO3, bridging these gaps requires more than one-off training. It demands a structured, multi-level capacity development strategy that includes foundational upskilling, hands-on technology immersion, mentorship, and institutional advocacy, all supported by dedicated funding and policy integration.

The findings of the Karatina University library staff mirrors the broader African library landscape at a digital crossroads. While strong in tradition and ethics, the library's transition into a dynamic partner in the university's research mission depends on urgent, targeted investment in the identified priority competencies. Without this, the promise of a 21st-century African library will remain unfulfilled.

8. Recommendations

To translate these findings into actionable change, the following phased recommendations are proposed for Karatina University and similar institutions.

i) Short-Term (0–12 months): Foundational upskilling and awareness

- Conduct a series of practical workshops on AI concepts and ethics, institutional repository management, Research Data Management (DMPs), and bibliometric tools such as Scopus, Google Scholar Metrics.

- Implement hands-on sessions using existing software such as reference management tools, and basic data visualisation platforms to improve digital metadata and research support skills.
- Establish a monthly learning circle where staff share insights from recent trainings and discuss applications to daily tasks.

ii) Medium-Term (1–3 years): Building leadership and collaboration

- Launch a structured mentorship programme pairing junior staff with senior librarians to work on digital and research-support projects, for instance, setting up an institutional repository, developing RDM guides.
- Create a Community of Practice (CoP) for continuous peer learning, challenges sharing, and innovation in service delivery.
- Integrate competency goals into individual performance plans to align professional growth with library strategic objectives.

iii) Long-Term (3–5 years): Institutional mainstreaming and sustainability

- Advocate for a dedicated annual budget line for librarian continuous professional development, covering certifications, conferences, and specialised courses.
- Collaborate with Kenyan LIS schools to review and modernise curricula, integrating AI literacy, data curation, open science, and digital pedagogy.
- Work with university leadership to formalise the library's role in research support through policy recognition and resource allocation, ensuring librarians are recognised as essential partners in the academic mission.

These recommendations emphasise that empowering librarians is not just about basic training and awareness, rather, a strategic imperative requiring institutional commitment, structured learning pathways, and sustained investment. By building on existing strengths and systematically addressing critical gaps, Karatina University Library can transform into a future-ready hub of knowledge, innovation, and research support.

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University Libraries in Uganda and Tanzania at New Crossroads: Exploring the Research Data Management (RDM) Kwanza Project

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Abstract

University libraries in Uganda and Tanzania are undergoing a paradigm shift as they transition from traditional information stewardship to active participation in the research data management lifecycle. Many opportunities in the 21st century involve the adoption of new technologies and innovative library services, yet rapid technological change and financial constraints leave many African academic libraries struggling to keep pace. As a result, Ugandan and Tanzanian academic libraries and information services find themselves at a crossroads, needing to adapt to global trends while addressing limited access to digital technologies, research data, and resources. In response, Hasselt University in Belgium, in collaboration with universities in East and South Africa, is conducting an International Training Programme (ITP) funded by VLIR-UOS. This intensive training course, known as RDM Kwanza, focuses on Research Data Management (RDM) throughout the research lifecycle. This paper shares insights from the programme, highlighting how it supports knowledge dissemination and equitable access to digital research data, contributing to socio-economic transformation in East Africa and beyond. Drawing on a reflective autoethnographic research design, direct engagement with course participants, and project documentation, the paper details the selection of candidates, partnering institutions, course delivery, content, and facilitators, and argues that Ugandan and Tanzanian libraries' infrastructural and policy constraints uniquely position them to anchor RDM implementation through partnership, advocacy, and skill development. The findings suggest that while infrastructural and policy limitations remain, structured capacity-building and network-based learning can position university libraries as central actors in national RDM ecosystems. The paper concludes with recommendations for the sustainable integration of RDM into research support services across the region.

Keywords: *research data management, Uganda, Tanzania, university libraries, international training programme.*

1. Introduction

Globally, the research ecosystem is undergoing transformation due to open science mandates, digital scholarship, and the exponential growth of data-intensive research. University libraries, which were traditionally custodians of scholarly outputs, are now expected to play central roles in the management, curation, and preservation of research data. These academic libraries have historically supported scientific research by collecting, organising, maintaining, and providing access to research materials for researchers. Building on their expertise in conventional cataloguing, classification, indexing and maintenance of institutional repositories, these libraries ought to take a dominant and central role in research data management and data curation for research data sharing and reuse (Masinde et al., 2021). Research Data Management (RDM) can basically be defined as the process of collecting, organising, documenting, storing, preserving and sharing research data to support the research ecosystem of an institution (Amanullah & Abrizah, 2023; Buhomoli & Onyancha, 2025).

In East Africa, this evolution presents both opportunities and challenges. The region's higher education sector is expanding rapidly, but the infrastructural and policy frameworks for research data are still in development. Indeed, this is not unique to East Africa: a study conducted in 43 countries in Sub-Saharan Africa revealed that organisations or institutions did not have a formally established process for storing research data beyond the life cycle of the project (Kabanda et al., 2023). Consequently, libraries in this sub-region are at a new crossroads: how to transition from traditional roles in information access toward leadership in Research Data Management (RDM).

This paper examines how the RDM Kwanza project contributes to institutional readiness for RDM in Uganda and Tanzania, and identifies key enablers and barriers for sustainable RDM integration. Kwanza is a Swahili word that means "first". This project literally aims to prioritise RDM. The RDM Kwanza project is an International Training Programme funded by VLIR-UOS, training 16 RDM stewards. By the end of this project, the RDM stewards are expected to be equipped with skills in RDM institutional readiness and RDM policy framework design, and with RDM professional capacity. This paper aims to highlight lessons learned from the RDM Kwanza project and propose practical pathways for regional collaboration and capacity building in RDM.

This paper is grounded in the concept of institutional readiness for Research Data Management (RDM), which refers to an institution's capacity to plan, implement, and sustain RDM practices across the research lifecycle. Institutional readiness is shaped by three interrelated dimensions: (1) Policy and governance frameworks, which define expectations for data stewardship; (2) Infrastructure and technological capacity, including repositories, storage systems, and data security mechanisms; and (3) Human and organisational capacity, encompassing skills, roles, and professional cultures that support data management. The RDM Kwanza project is examined as a capacity-building intervention that strengthens these dimensions through training, community formation, and cross-institutional collaboration. By applying this framework, the paper analyses how libraries transition from traditional custodianship toward proactive roles in enabling open, responsible, and equitable research data practices.

2. Research Data Management and the Library Role

Research Data Management encompasses the organisation, storage, preservation, and sharing of data collected during research. Globally, RDM is recognised as a critical component of open science and responsible research. In many countries, RDM is a shared topic amongst libraries and the research coordination offices. Indeed, funders, publishers, and government agencies are increasingly mandating researchers to develop data management plans and make their research data openly accessible, shareable and reusable (Masinde et al., 2021). The libraries excel in metadata, data curation, archiving, processing

and retrieval. Cooperation with the research coordination offices is essential, as they have close proximity to researchers and research practices. Their involvement is required to ensure that data management planning is done at the start of a research project. Given their expertise in metadata, information policy, and digital preservation, libraries are natural facilitators of RDM services.

However, in the Uganda and Tanzanian context, the adoption of RDM is shaped by several contextual factors:

- *Limited digital infrastructure*, particularly for data storage and repository systems;
- *Evolving national research policies,* often lacking explicit mandates for data sharing;
- *Human resource constraints*, including insufficient training in data curation and data ethics;
- *Emerging research cultures*, where data is viewed as proprietary and not yet routinely shared.

These contextual realities inform how libraries conceptualise and operationalise RDM services.

3. Comparative Context

Below is a comparative context of RDM between university libraries in Tanzania and Uganda.

3.1 Tanzania

In Tanzania, universities such as the University of Dar es Salaam (UDSM) and Sokoine University of Agriculture (SUA) have engaged in RDM-related capacity-building projects, often supported by international partnerships. The Tanzania Commission for Science and Technology (COSTECH) promotes open science through policy dialogue, but institutional adoption remains uneven. Katabalwa, Bates & Abbott (2021) report that in Tanzania, research data sharing is relatively new. There is little or no data sharing in governmental agencies, no open data repositories for research, and no research data sharing policy at any agricultural institution in Tanzania. There is generally a low level of RDM literacy among higher learning institutions in Tanzania, and a shortage of skills and knowledge in teaching RDM courses (Mosha & Ngulube, 2023a). A study conducted among postgraduate students at Nelson Mandela African Institution of Science and Technology indicated that less than half of the respondents were aware of and were using open Research Data Repositories, such as Zenodo, Dataverse, Dryad, OMERO, GitHub and Mendeley (Mosha & Ngulube, 2023b). The library is, however, beginning to integrate RDM concepts into information literacy programmes and explore repository-based data storage, though still at a pilot scale.

3.2 Uganda

Uganda is still developing a deeper understanding of the RDM concept. There is no concrete evidence of any legal, policy, guidelines, or ethical framework for the re-use of research data. There are, however, some clauses on RDM in many collaborative medical research protocols with European and American universities, although many of them are not applicable locally in Uganda. Furthermore, there is neither an institution nor a course that provides RDM skills, and there is no research data set repository in the country (Mukiibi, 2016). Ugandan universities are, however, gradually recognising the importance of RDM, especially as funders such as Makerere University Research and Innovations Fund (Mak-RIF) begin to emphasise accountability and reproducibility. A study conducted in six universities revealed that 74.8% of the staff admitted that RDM was a new concept and that their universities lacked initiatives to establish it (Ongaya et al., 2023). Mbarara University of Science and Technology Library has initiated internal training workshops on RDM in collaboration with the International Association of Social Science Information Service and Technology (IASSIST). There are also isolated research projects which have set up data repositories to manage data sets generated from their project research. However, incon-

sistent internet connectivity, limited funding, and the absence of national open data policy frameworks generally hinder rapid RDM progress at the national level.

4. Research Methodology

This is a qualitative study which used a reflective autoethnographic research design. Autoethnography is a social research design that explores the researchers' personal experiences, memories, reflections and connects them to the wider cultural, social meaning and understanding (Chang, 2016). The RDM Kwanza programme followed an exploratory, iterative and needs-driven capacity-building approach. An initial training framework was jointly developed by the project partners, based on key dimensions of institutional RDM readiness. Participants were selected not only based on their interest and experience in RDM but also considering institutional commitment and their potential to act as RDM change agents within their home institutions.

According to Maréchal (2010), autoethnography involves self-observation and reflexive investigation where the researchers gained a deeper understanding of the RDM Kwanza group learning culture. Autoethnographic research is increasingly becoming popular in qualitative research has it allows more creativity and innovation (Doloriert & Sambrook, 2011). Autoethnographic researchers generate rich knowledge which is shared through interactive writing and collaborative processes (Lapadat, 2009). The RDM Kwanza programme was deliberately designed as an adaptive rather than a fixed training trajectory. While the initial framework provided a common basis, its implementation was progressively refined in response to participant feedback, emerging learning needs, institutional and national contexts, and differences in participants' professional roles and expertise. Experiences from established RDM practices and other international capacity-building initiatives further informed this process. This iterative approach allowed the programme to address context-specific needs while maintaining a common RDM framework across participating institutions.

In addition, knowledge development was combined with peer learning and network building, recognising that sustainable RDM capacity depends not only on individual competencies but also on institutional embedding and professional communities. The interaction between a common training framework, continuous feedback and contextual adaptation therefore constitutes the exploratory autoethnographic approach underpinning the RDM Kwanza programme.

5. VLIR-UOS International Training Programme

The Vlaamse Interuniversitaire Raad (VLIR-UOS) (2025) is a leading Flemish funding body for scholarships and short- and medium-term International Training Programmes (ITP), in partnership with academics from Flanders and partner institutions in Africa, Latin America, and Asia, focused on global sustainable development. The ITPs are designed to enable VLIR-UOS partners to establish intensive, interactive, and practice-oriented training courses. These courses target professionals interested in global sustainable development, or those seeking to enhance their higher education management skills. VLIR-UOS aims to create a supportive, inclusive and networked learning environment in which individual scholars, professionals, and academics acquire transversal skills and state-of-the-art knowledge on sustainable development. The RDM Kwanza project is a three-year ITP funded by VLIR-UOS, running from September 2024 to August 2027.

5.1 The Role of the RDM Kwanza Project

The RDM Kwanza project aimed to introduce participants to the principles and practices of Research Data Management (RDM). It is hoped that these participants will serve as catalysts for cultural change

when supported by institutional leadership. The project underscored the importance of phased implementation: starting with awareness, followed by policy development, infrastructure design, and service integration. The overall objectives and rationale of the training were to support the RDM trainees to:

- Understand the importance of RDM
- Develop Data Management Plans (DMPs)
- Comprehend the roles and skills for RDM
- Provide information on best practices of RDM tools and techniques
- Undertake data sharing, support privacy and ethics
- Engage in a network of RDM stewards and advocates

5.2 RDM Kwanza Course

This project commenced in October 2024 with a planning meeting at the University of Hasselt. The planning meeting involved the project promoter from the University of Hasselt, RDM experts from Belgium and South Africa, and co-promoters from Uganda and Tanzania. During this meeting, they discussed the call for applicants, eligibility criteria, selection criteria, and the associated modalities.

A call for the course was launched on the University of Hasselt website (https://www.uhasselt.be/en/research/research-funding/rdm-kwanza). The same information was also shared on the websites of the partnering institutions, such as Mbarara University of Science and Technology and the Nelson Mandela African Institution of Science and Technology. Other methods were also used to publicise this call, such as sharing the link on several mailing lists of research-based communities and information and data managers, as well as on social media platforms such as WhatsApp, Facebook and X (formerly Twitter).

The project received a total of 39 applications, of which 25 were from Tanzania and 14 were from Uganda. Preparations were made to select the top 16 candidates from among all these applicants. Online interviews on Google Meet were conducted, and the interviewing panel was made up of the RDM Kwanza team from Belgium, Uganda, Tanzania and South Africa. The team agreed to select the best-suited candidates based on selection criteria agreed at the planning meeting at the University of Hasselt. The criteria focused on parameters such as relevant education qualifications, basic knowledge of RDM, participation in data management activities, demonstration of passion for RDM, and self-drive. Eight candidates were from Uganda, and eight were from Tanzania. The gender aspect was also considered, as there were eight males and eight females. The selection of participants ensured equal representation from both male and female librarians. Table 1 below shows the Ugandan and Tanzanian universities from which the 16 trainees of the RDM Kwanza project were selected.

Table 1

Universities From Which RDM Kwanza Participants Were Selected

Uganda	No.	Tanzania	No.
Mbarara University of Science and Technology (MUST)	1	The Nelson Mandela African Institution of Science and Technology (NM-AIST)	3
Makerere University (Mak)	2	Ardhi University (ARU)	1
Kyambogo University (KyU)	1	University of Dodoma (UDOM)	1
Busitema University (BU)	1	Mzumbe University (MU)	1
Mountains of the Moon University (MMU)	1	University of Dar es Salaam (UDSM)	1

Uganda	No.	Tanzania	No.
Lira University (LU)	1	Sokoine University of Agriculture (SUA)	1
Bishop Stuart University (BSU)	1		
Total	**8**		**8**

The RDM Kwanza project also strived to empower participants from diverse backgrounds. The project, therefore, promoted inclusivity and equitable access to RDM training. For the Ugandan case, the project involved six public universities and one private university. Owing to the limited number of training slots (16), other countries in East Africa could not be considered, in order to avoid the project being spread too wide and too thin on the ground. The focus was therefore placed on Uganda and Tanzania so that each country could have a substantial number of 8 RDM stewards by the end of the project. Figure 1 below shows a map of East Africa (Uganda and Tanzania) with the locations of the universities from which the RDM participants were selected.

Figure 1

Locations of the Universities Participating in the RDM Kwanza Project



Key	
ARU	Arthi University
BMU	Bishop Stuart University
BU	Busitema University
KyU	Kyambogo University
LU	Lira University
Mak	Makerere University
MMU	Mountains of the Moon University
MU	Mzumbe University
MUST	Mbarara University of Science and Technology
NMAIST	Nelson Mandela African Institution of Science and Technology
SUA	Sokoine University of Agriculture
UDOM	University of Dodoma

6. Course Delivery Methods

The RDM Kwanza International Training Programme used a blended learning approach and diverse pedagogical choices that involved both online and face-to-face sessions.

6.1 Online Sessions

The participants attended two-hour online lectures held once every two weeks. These lectures are normally conducted on Monday afternoons from 2:00 pm to 4:00 pm East African time. For example, from February to July 2025 the participants covered two modules online. The first module was Introduction to Research Data Management and had four sessions (What is RDM? Why RDM? Overview of the services of a data steward, and status of RDM at the students' universities). The second module was Basics of Research Data Management and had five sessions (open data; FAIR principles; data management

plans; open-source tools in RDM; and RDM security). The facilitators made the sessions interactive, and participants actively engaged in discussions about RDM principles and practices. A screenshot of one of the online sessions is shown in Figure A1 in the Appendix.

The training aimed not only to increase the participants' knowledge of RDM but also to build heightened enthusiasm for implementing RDM practices in their respective institutions. The facilitators did this by actively engaging them in discussions about their countries' RDM landscapes. The participants responded by sharing insights on existing policies, challenges, and ongoing initiatives. This knowledge exchange proved invaluable for identifying common challenges and opportunities for collaboration. The diversity of perspectives enriched discussions and allowed participants to learn from each other's experiences, fostering a collaborative spirit that is hoped will benefit their future RDM endeavours.

All the online sessions were recorded as YouTube videos. The project plans to make them more interactive and include them on a Moodle platform, managed by MUST, together with all the other RDM educational resource materials developed by the project. Some of the other materials include guidelines, checklists, and templates tailored to the specific needs of the participants. Uploading them on Moodle or an open-access Learning Management System (LMS) provides a platform for practical tools that participants can reference as they implement RDM practices in their institutions. This LMS also provides access to other individuals interested in learning about RDM, allowing them to access and learn at their own pace. The feedback from the RDM participants so far has indicated that these materials were instrumental in their learning process and helped bridge the gap between theory and practice.

6.2 Face-to-Face Session

As already alluded to earlier, the RDM Kwanza International Training Programme was conducted both online and face-to-face. The project organised face-to-face training in South Africa to allow the participants to interact directly with RDM professionals. Through this face-to-face session, valuable insights and best practices in RDM were shared with the participants, enriching their understanding of effective RDM strategies. The project facilitated the travel of all the participants from Uganda and Tanzania, plus the facilitators from Belgium and South Africa. They were booked at Afrique Boutique Hotel in Ruimsig, Johannesburg. They were officially invited by the University of Witwatersrand in conjunction with the University of South Africa (UNISA).

The participants arrived for hands-on training with the RDM experts from the University of Witwatersrand. These sessions included presentations from RDM experts and representatives from the Data Intensive Research Initiative of South Africa (DIRISA), focusing on designing Data Management Plans, as well as a presentation from Dataverse. The experts shared best practices and case studies, allowing participants to see real-world applications of the concepts discussed. This direct engagement has encouraged participants to adopt similar frameworks and approaches in their home institutions, enhancing the overall effectiveness of RDM practices across the region.

The participants visited the RDM sections of the University of Witwatersrand (Wits) and the World-Wide Information Services at Roodepoort. The team also visited the RDM operations at UNISA. These study visits offered participants practical insights into established RDM practices. They observed the implementation of research data repositories, such as Figshare, gaining firsthand experience of how these systems operate. The visits facilitated discussions around the challenges and successes of implementing RDM systems in different contexts. Inspired by these experiences, participants expressed interest in exploring similar systems for their own institutions, enhancing their capacity for effective RDM and contributing to a culture of data stewardship. Some of the pictures from these visits are shown in Figures A2–A5 in the Appendix.

Other visits included Maropeng, the Cradle of Humankind, and the Sterkfontein and Wonder Caves in South Africa, where cameras capture data in the caves with the help of artificial intelligence. The study visit climaxed at the Carnivore, where the team had a social event to unwind. Two more face-to-face sessions are scheduled to take place at Makerere University in Uganda and at NM-AIST in Arusha, Tanzania. The rationale for these face-to-face sessions is to create more time for practical hands-on sessions and the exchange of RDM learning experiences. It is hoped that, during these sessions, demo data repositories will be developed and participants will receive more practical, hands-on attention. The project also plans to support the development of national DMP-online platforms in Tanzania and Uganda (similar to the Belnet solution in Flanders).

7. RDM Infrastructural Support

The project has so far offered three laptops to the co-promoters in the South. Plans are underway to send a fourth laptop. The project will also support the southern partners with projectors and a public address system. All this equipment will be used to promote the RDM culture in the institutions and to facilitate RDM training.

8. RDM Community Building

A central component of the RDM Kwanza project is the intentional fostering of national and regional communities of practice around Research Data Management. Community building in this context refers to establishing ongoing professional networks in which librarians, data stewards, research support officers, and researchers share knowledge, exchange experiences, and collaboratively address common challenges in data stewardship. This process aligns with the notion of communities of practice, where sustained peer exchange plays a critical role in supporting professional identity and cultural change (Wenger, 1998; Cox, 2005). Such communities are essential for sustaining RDM capacity beyond the training programme itself, as they promote peer learning, mutual support, and the gradual integration of RDM into institutional research culture.

The collaboration between universities in Uganda, Tanzania, and South Africa fosters a network of researchers committed to improving RDM practices across the region. This interconnectedness enhances knowledge sharing and collaboration, driving collective progress in research data management. The RDM status in the respective countries acts as a starting point for implementing RDM in their institutions and ultimately creates a firm foundation for a vibrant RDM community at the national level. This exchange of RDM knowledge has fostered a collaborative learning environment. This project explores the drivers of RDM adoption, institutional readiness, policy environments, capacity gaps, and collaborative opportunities.

The project emphasises digital solutions for RDM, reducing reliance on paper and promoting environmentally friendly practices. Training on digital repositories supports sustainable research practices by minimising waste associated with traditional data management. The RDM Kwanza project's southern coordinators and the participants have developed national and regional communities. The Open Research Data Community (WhatsApp group) in Tanzania already contains 76 members. Three online sessions on RDM were presented by different participants.

One of the RDM experts from Belgium visited Tanzania and Uganda, particularly to initiate discussions on RDM community building. The expert started in Tanzania and visited Ardhi University and NM-AIST. Following those engagements, Tanzania has established a research community called the Tanzania Open Research Community (TORC), where each participant from the project has had the opportunity to present what they have learned so far. An online meeting was held with Tanzanian library directors,

during which the setup of the National Data Management Plan (DMP) was presented. Each university was requested to submit its requirements for the DMP (DMP-Tanzania). Initial planning for the installation of a Research Data Repository using Dataverse has commenced. Key stakeholders have been identified, the technical requirements have been outlined, and discussions on data governance and user training have been initiated.

In Uganda, the RDM expert visited Makerere University, where joint meetings were held with the Consortium of Uganda University Libraries (CUUL) and the Research and Education Network of Uganda (RENU). There were discussions on how to convert the recorded videos of the RDM sessions into Open Educational Resources (OER) and upload them to the Learning Management Systems (LMS) of the partner institutions. A lightning talk on building an RDM community in Uganda was presented at the 5th Annual Research and Dissemination Conference, organised by CUUL at the Imperial Hotel in Kampala, Uganda.

On an international level, the RDM Kwanza team members have signed up for the Open Education in Research Data Management to accelerate open and responsible science policy and implementation in Higher Education Institutions (OERDPI) project (https://www.vliruos.be/accelerating-higher-education-management), which aims to support the project members in designing RDM policies for their institutions. This OERDPI project also has other components of training and deepening RDM competencies among participating members. It is also sponsored by VLIR-UOS and has members from Europe, Asia, South America, and Africa.

9. RDM Kwanza Survey

The RDM Kwanza trainees were tasked with conducting an RDM survey in their institutions. The survey tool was a standard tool adopted from an earlier RDM study conducted in Flanders. The tool collects a number of RDM aspects, such as the type of researchers in the institutions (graduate students or academic staff), their disciplines, qualifications, positions, attitude towards RDM, the type of research data, volume of data, storage facilities, documentation, anonymisation, data loss and recovery, and licences, among others. The collected data will be analysed and presented at institutional, national and regional level and will guide the implementation of the RDM strategy at both the institutional and national level.

10. RDM Kwanza Project Challenges

Although the RDM Kwanza project has achieved considerable successes, it has also encountered some hardships. The initial timeline for the face-to-face training sessions faced delays due to logistical challenges. The delays hindered the earlier plan; however, the programme was later adjusted, with lectures taking place on a weekly basis to catch up on the lost time.

Some participants complained about the slow or poor internet connection at their institutions. The poor connectivity disrupted the online lectures, sometimes resulting in poor sound and video quality. This was addressed by revisiting the recorded sessions whenever participants faced interrupted delivery due to poor internet connectivity.

11. Discussion

The findings of this study show that Ugandan and Tanzanian university libraries are positioned at a pivotal moment in the evolution of the research landscape. The increasing emphasis on open science, funder mandates for transparency, and demands for responsible data stewardship are reshaping expectations for how research data is handled and governed. Within this context, university libraries are being called

upon to shift from peripheral support roles toward more active and strategic positions in the research ecosystem. This aligns directly with the institutional readiness framework guiding this study, which emphasises the combined development of policy, infrastructure, and human capacity as preconditions for sustainable Research Data Management (RDM).

The first dimension, *policy and governance*, is emerging gradually. Participants in the RDM Kwanza programme reported growing awareness of the need for institutional RDM policies and guidelines, and several have initiated discussions with research offices, ethics committees, and university leadership. Although formal policy development remains limited, the project has contributed to the early stages of policy dialogue by equipping librarians and research support staff with the language, rationale, and advocacy strategies necessary to articulate the importance of data stewardship within institutional governance structures.

The second dimension, *infrastructure and technological capacity*, is progressing more unevenly due to resource constraints. Study visits and exposure to established RDM environments, such as those at the University of the Witwatersrand and UNISA, helped participants conceptualise what mature data services look like in practice. However, many partner institutions continue to face challenges linked to repository configuration, server capacity, data security, and reliable network connectivity. Efforts to pilot Dataverse-based repositories and explore the development of national DMP online platforms in Uganda and Tanzania represent promising early steps; however, these developments will require continued investment and strategic planning to become stable and scalable.

The most significant progress to date has occurred in the third dimension, *human and organisational capacity*. The project fostered professional identity among participating librarians and emerging data stewards, who now report increased confidence in engaging researchers, developing Data Management Plans, and leading institutional conversations about RDM. Importantly, the programme has also cultivated national and regional communities of practice, enabling participants to exchange expertise, co-solve problems, and sustain momentum beyond the structured training period. This collective dimension suggests that libraries are not only developing technical competencies but are also reshaping professional cultures to support research transparency and data reuse.

Taken together, the evidence indicates that institutional readiness for RDM in Uganda and Tanzania is developing, with human capacity and networked collaboration growing more rapidly than policy and infrastructure. While systemic challenges remain, the early outcomes of the RDM Kwanza project demonstrate the potential for university libraries to become central actors in shaping responsible, equitable, and sustainable research data ecosystems in the region. Continued progress will depend on strategic policy alignment, targeted infrastructural investment, and the sustained strengthening of cross-institutional communities of practice.

12. Recommendations

Based on the learning experiences of the RDM Kwanza project, below are the recommended measures that can be taken to improve the RDM landscape in East African libraries, particularly in Uganda and Tanzania.

i) Develop institutional RDM policies aligned with national research strategies (Chigwada & Ngulube, 2024). A major determinant of RDM success is the alignment of institutional and national policies. Neither of the two countries currently has a comprehensive national policy mandating RDM. Institutional research policies mention data archiving, but operational guidelines are minimal.

ii) Invest in capacity building through continuous professional development, regional training

hubs, and integration of RDM in LIS curricula. Capacity building is perhaps the most pressing need. Librarians traditionally trained in cataloguing and reference services now require competencies in data curation, metadata for datasets (e.g., Dublin Core, DataCite), research ethics, and data visualisation. Kenya's library schools have begun integrating RDM into their curricula, while Ugandan and Tanzanian universities rely largely on workshops and externally funded training programmes.

iii) Enhance advocacy and awareness to shift researchers' attitudes towards open data sharing. There is a need for East African higher education institutions to establish a department for research data management that spearheads advocacy and awareness of RDM among researchers (Ongaya et al., 2023).

iv) Infrastructure and technology: digital infrastructure remains a significant challenge across the region. While universities possess institutional repositories for theses and publications, few are configured for datasets. Limited server capacity, unreliable power supply, and data security concerns constrain large-scale RDM initiatives. Cloud-based solutions are gaining interest but raise issues of data sovereignty and cost sustainability.

v) Collaboration and networks: regional collaboration is emerging as a key enabler. Networks such as the Consortium of University Libraries in Kenya (CULK) and the Consortium of Uganda University Libraries (CUUL) are exploring joint RDM initiatives. Cross-border partnerships, including the African Open Science Platform (AOSP), have created opportunities for training and the sharing of infrastructure. Through such collaborations, interoperable repository platforms can be adopted and explored, allowing infrastructure models to be shared across institutions. However, coordination and sustainability remain challenges.

13. Conclusion

As Ugandan and Tanzanian universities, institutions of higher learning, and research institutes expand their research output, the stewardship of data becomes a critical responsibility, more so for their institutional libraries. University and research libraries, with their established mandates for knowledge organisation and access, are strategically positioned to lead RDM implementation. The transition, however, requires visionary leadership, policy support, and sustained investment in infrastructure and human capacity. By embracing RDM, East African research libraries can redefine their relevance in the digital research era, transforming from custodians of information to enablers of data-driven scholarship.

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Appendix

Figure A1

Screenshot of an RDM Kwanza Online Lecture



Figure A2

iRDM Kwanza Face-to-Face Session at Afrique Boutique Hotel in Ruimsig



Figure A3

RDM Kwanza Team Visiting the University of Witwatersrand in Johannesburg



Figure A4

RDM Kwanza Team Attending an RDM Session at the University of South Africa in Pretoria



Figure A5

RDM Kwanza Team Visiting the World-Wide Information Services at Roodepoort



INNOVATION IN LIBRARY AND INFORMATION SERVICE

Redefining Academic Libraries in the Era of Digital Transformation and Disruptive Technologies

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Abstract

The emergence of the Fourth Industrial Revolution (4IR) and the subsequent introduction of Library 4.0 technologies in the library space mark a transformative era in the library and information science (LIS) field. As technology continues to drive the world's interconnectedness, academic libraries are undergoing an extraordinary evolution. Once primarily associated with physical books and resources, academic libraries as institutions of knowledge and learning are embracing this new era with a renewed sense of purpose. This has profoundly influenced academic libraries, prompting a need to redefine their services and purpose to better meet the evolving information needs of their clientele. The study objectives were to determine the level of preparedness among LIS professionals for the emerging roles of the 4IR, the threats and vulnerabilities associated with Library 4.0 technologies, and strategies to mitigate these threats and vulnerabilities. The study used the Unified Theory of Acceptance and Use of Technology to understand the adoption, acceptance, and use of library-based technologies and digital resources, focusing on how LIS professionals' intentions and behaviours regarding new technologies are influenced. A systematic review methodology was used to gather and analyse all available evidence. The findings revealed that the adoption of 4IR technologies in the library environment has immensely benefited academic libraries, creating smart libraries that align with contemporary user needs and enhance information provision and services. However, the 4IR technologies have also had a SWOT effect on academic libraries, offering significant gains but also presenting threats and vulnerabilities. Many remedial strategies were identified for implementation. The findings contribute towards awareness and adoption of Library 4.0 technologies and to more research.

***Keywords**: fourth industrial revolution, library 4.0, library transformation.*

1. Introduction

The emergence of the Fourth Industrial Revolution (4IR) and the subsequent introduction of Library 4.0 technologies in the library space mark a transformative era in the library and information science (LIS) field. As technology continues to drive the world's interconnectedness, the role of academic libraries is undergoing an extraordinary evolution. According to Narayanan (2024), technological advancements have significantly influenced the domains of information processing and dissemination in academic libraries, fundamentally altering the landscape of knowledge creation, access, and engagement. As such, Ogba and Ikeazota (2021) and Kaddu and Ssekitto (2023) noted that, once primarily associated with physical books and resources, academic libraries, as institutions of knowledge and learning, are embracing this new era with a renewed sense of purpose and evolving into more than just repositories of books.

With the integration of 4IR technologies into the library space, Kaddu and Ssekitto (2023) observed the arrival of overwhelming data, which has been met with enthusiasm by LIS professionals. The new era has provided a catalyst, enabling academic libraries to shift from a collection-based model to a more broadly service-based one, one that is diversified enough to cater to the ever-evolving information needs of 21st-century users. According to Adjei and King (2024), the 4IR is transforming libraries, leading to the concept of Library 4.0, which integrates technologies into the library space to enhance services and information access. The fourth industrial revolution (4IR) itself is characterised by breakthroughs in Artificial Intelligence (AI), Cloud computing, the Internet of Things, Virtual reality and Augmented reality, which have demanded a redefinition of the library's purpose and services (Isiaka et al., 2024). This evolution requires libraries to adapt their infrastructure, services, and staff competencies to meet the demands of a rapidly changing technological landscape. This has profoundly influenced libraries and driven the need to redefine their services and purpose, as well as the acquisition of new skills by LIS professionals to meet their clientele's evolving information needs (Isiaka et al., 2024, p. 582). Additionally, this library transformation drive has enabled academic libraries to adapt to the ever-changing digital age and, in the process, evolve their physical spaces and expand services better suited to the 21st-century user. Library transformation, whether through the adoption of digital resources, online services, or technology integration, helps expand academic library services and enhance the user experience by creating collaborative spaces, fostering community engagement, and adopting a user-centric approach to service formulation and delivery (Nasir & Tyagi, 2023). This, however, entails the evolution of LIS professionals' roles to encompass digital resources and information management experts, data analysis and research support, and community engagement experts. This shifts the academic library's role from being a centre with a static collection of books to a dynamic hub for research, learning, and collaboration (Nasir & Tyagi, 2023, p. 7). Needless to say, it also presents its own challenges and opportunities, including the digital divide, ethical considerations, funding and resource constraints, and investments in training and professional development (Nasir & Tyagi, 2023; Adjei & King, 2024). According to Kaddu and Ssekitto (2023, p. 139) "these challenges also extend to encompass issues such as intellectual freedom, intellectual property rights, privacy, and equitable access to information". Thus, whilst these technological advancements have significantly impacted the trends in information generation, dissemination, and service delivery in academic libraries, they also drive academic libraries to think in other terms.

However, while technological developments are moving at a trailblazing pace, the preparedness of LIS professionals in academic libraries to keep pace with these developments needs to be explored. Thus, Isiaka et al. (2024) noted that whilst 4IR technologies offer academic libraries significant gains, they also pose threats and vulnerabilities, and many academic libraries are still trying to find a 'centre pivot'. Further complicating the roles of LIS professionals in the information lifecycle is the fact that the information-seeking behaviour of library users has fluctuated over the past few years in response to technological lethargy and the era of disruptive technologies, which have penetrated every sphere of human life and the library landscape (Nasir & Tyagi, 2023). In the face of these technological developments, academic libraries are at the intersection of navigating the electronic library landscape and finding 'true north' in this evolving LIS field (Kaddu & Ssekitto, 2023). This rapid and innovative approach has presented the library field with the opportunity to think beyond established norms and create new possibilities, setting new standards or breaking new ground. For academic libraries to fully benefit from the gains of the fourth industrial revolution (4IR) and the library 4.0 environment, characterised by breakthroughs in high-tech, a redefinition of academic libraries' purpose and services, as well as the traditional roles of Library and Information Science (LIS) professionals, is required (Isiaka et al., 2024). Thus, academic libraries need to move along with others and remain relevant to their communities. To reposition academic libraries in the era of digital transformation and disruptive technologies, libraries must evolve beyond traditional roles and embrace new technologies and user-centred approaches, ensuring that technologies are accessible, fair, and aligned with the values of the profession (Isiaka et al., 2024; Ibrahim, 2025).

The study objectives were to determine the preparedness of LIS professionals in the emerging roles of academic libraries in the 4IR. Additionally, the study aimed to investigate the threats and vulnerabilities associated with Library 4.0 technologies and the strategies that academic libraries could employ to mitigate these risks. Thus, the study was guided by the following research questions:

- What is the LIS professionals' level of preparedness for the emerging roles of academic libraries in the fourth industrial revolution?
- What are the threats and vulnerabilities associated with Library 4.0 technologies?
- What strategies can academic libraries employ to mitigate risks associated with Library 4.0 technologies?

2. Methodology

The study used the Unified Theory of Acceptance and Use of Technology (UTAUT) theoretical framework. A theoretical framework supports methodology by providing a logical foundation for research choices, guiding the selection of appropriate methods, shaping data analysis, and ensuring a coherent approach that links the study to existing knowledge. UTAUT is a prominent model widely used to understand technology adoption in educational contexts, particularly in higher education (Granic, 2022). The UTAUT model can be applied to understand technology adoption and the acceptance and use of library-based technologies and digital resources, focusing on how LIS professionals' intentions and behaviours toward using new technologies are influenced by performance expectancy, effort expectancy, social influence, and facilitating conditions, the model's four key constructs and moderators (Xue et al., 2024). The UTAUT was used for this study because the new roles that LIS professionals in academic libraries are adopting are being influenced by the 4IR and the resultant Library 4.0 technologies. Thus, their adoption of new roles in academic libraries can best be measured and described by examining the acceptance and use of those technologies using UTAUT constructs.

A systematic review methodology was used to gather and analyse all available evidence. The systematic review, employing the UTAUT as a theoretical framework, adheres to standard systematic review methodologies and specifically utilises the UTAUT constructs to structure the search, data extraction, analysis, and discussion of findings (Xue et al., 2024). A systematic review is a structured and thorough approach to gathering and analysing all available evidence on a specific research question, using explicit methods to identify, select, and synthesise research studies (Chapman, 2021). This process aims to provide a comprehensive and unbiased overview of current knowledge on a specific topic, enabling evidence-based conclusions. As the LIS profession navigates the landscape of new technologies and their applicability in academic library settings, prior contemporary literature helps assess and deepen understanding of LIS professionals' levels of participation in the 4IR and the new Library 4.0 environment. In essence, a systematic review is a rigorous and transparent approach to synthesising existing research evidence, providing a robust basis for informed decision-making and identifying areas where further research is needed. For data collection instruments and procedures, the study used contemporary journal articles and book chapters to generate findings. After collecting, compiling, and analysing the data, patterns and insights were identified and mapped to the research question themes. The data were gathered using the Google Scholar search engine, employing the following search terms and inclusion and exclusion criteria as highlighted in Table 1 below. The data was analysed based on the UTAUT's performance expectancy, effort expectancy, social influence, and facilitating conditions constructs.

Table 1

Research Search Criteria

Search terms	Inclusion criteria	Exclusion criteria
Librarians' preparedness for the fourth industrial revolution; Librarians' preparedness for the emerging roles of the fourth industrial revolution; Academic libraries' preparedness in the fourth industrial revolution; Threats and vulnerabilities of Library 4.0 technologies; 4IR Library challenges; Mitigating threats and vulnerabilities of Library 4.0 technologies; Strategies for academic libraries in the fourth industrial revolution	Articles; Year of publication 2023-2025; Relevance sorting (1-10 results) for each search term	Case law; Year of publication 2022 and below; Relevance sorting (11 and above results) for each search term

3. Results

A total of thirty articles were retrieved in response to the first research question, using three different search terms. Sixteen articles were removed as duplicates, leaving a total of fourteen articles for analysis. A total of twenty articles were retrieved in response to the second research question. Seven articles were removed as duplicates, leaving a total of thirteen articles for analysis. A total of twenty articles were retrieved in response to the third research question. Six articles were removed as duplicates, leaving a total of fourteen articles for analysis. Table 2 below presents a summary of the search narrative for the study.

Table 2

Search Narrative Summary

Research question	Search terms	Total results	Duplicate results (per RQ)	Included results (per RQ)
Research question 1	Librarian's preparedness for the fourth industrial revolution	10	16	14
	Librarian's preparedness for the emerging roles of the fourth industrial revolution	10		
	Academic libraries' preparedness in the fourth industrial revolution	10		
Research question 2	Threats and vulnerabilities of Library 4.0 technologies	10	7	13
	4IR Library challenges	10		
Research question 3	Mitigating threats and vulnerabilities of Library 4.0 technologies	10	6	14
	Strategies for academic libraries in the fourth industrial revolution	10		

Note. "Duplicate results" and "Included results" are totals for each research question (shown once per group), not per individual search term; "Total results" is reported per search term.

3.1 LIS professionals' Preparedness in the Fourth Industrial Revolution

The 4IR has pushed libraries to modernise, reach the next level in their profession, and make a statement on the big stage. As the pace of technological change quickens, LIS professionals are increasingly recognised as leaders in translating emerging technologies into meaningful academic impact. Various studies noted that the 4IR revolution is characterised by breakthroughs in Artificial Intelligence (AI), Cloud computing, the Internet of Things, Virtual reality and Augmented reality, which have demanded a redefinition of the academic library's purpose and services. To start with, Artificial intelligence is a broad field of computer science that focuses on creating systems and machines and, in the process, developing intelligent agents that can perceive their environment and are capable of reasoning, making decisions, performing tasks, and predicting future trends that would typically require human intelligence (Isiaka et al., 2024). AI is already reshaping academic libraries by streamlining workflows, enhancing metadata and enriching the user experience. Big data technologies utilise data analytics to inform decisions by enabling the collection, storage, and analysis of vast datasets that are too complex to process and analyse with traditional data management and processing tools (Isiaka et al., 2024, p. 5). Cloud computing refers to storing and accessing data across the internet using remote servers and computing resources, which can typically be used to execute library processes like cataloguing, circulation, and digital collections (Ashikuzzaman, 2024). It allows access to library data to be more flexible and accessible compared to traditional methods that rely solely on local servers. The Internet of Things (IoT) connects everyday objects and devices to the internet, enabling them to operate remotely and collect, exchange, and transmit data (Isiaka et al., 2024). Lastly, Virtual and augmented reality create immersive experiences that alter how users perceive and interact with the physical and digital worlds, such as virtual tours and educational games. Virtual reality immerses users in a simulated environment, while augmented reality overlays digital information into the real world (Isiaka et al., 2024, p. 8). LIS professionals' preparedness in the above fourth industrial revolution technologies largely hinges on the UTAUT's four key constructs: performance expectancy, effort expectancy, social influence, and facilitating conditions.

The UTAUT performance expectancy construct addresses the degree to which LIS professionals believe that using a new system will enable them to improve their job performance. Ten of the fourteen studies noted that the majority of LIS professionals were prepared to implement 4IR technologies. This was in the hope that these technologies would help them achieve better job performance. However, 60% of the studies noted that academic libraries had not yet applied any 4IR technologies, despite being aware of their benefits. This was because most libraries were not adequately prepared to implement 4IR technologies. Additionally, most studies found that LIS professionals had not yet grasped the extent to which 4IR technologies would affect staff performance and library service delivery. Some studies held that LIS professionals may be less inclined to adopt technology due to the likelihood that technologies such as AI may lead to workforce polarisation and result in significant job losses in academic libraries. The UTAUT effort expectancy construct deals with the degree of ease associated with using a new system. Most studies (70%) have reported that adapting to new technologies requires staff to continuously update their skills to use these new Library 4.0 systems with ease. The UTAUT social influence construct addresses the degree to which LIS professionals perceive that stakeholders believe they should utilise the new system. The majority of studies (60%) indicated organisational and societal pressures advocating that the library system embraces contemporary technologies in library service delivery.

The UTAUT facilitating conditions construct addresses the degree to which LIS professionals believe that their organisation's technical infrastructure and support are in place to facilitate the use of the new system. Against this background, the participation of LIS professionals in 4IR technologies was significantly influenced by the enablers of this construct, which seemed to be the cornerstone for redefining academic libraries in this era of digital transformation and disruptive technologies. LIS professionals' inability to keep up with the rapid pace of new technologies and the challenge of implementing them were

noted by most studies as issues in the 4IR revolution in academic libraries. Under facilitating conditions, most studies have highlighted that the use of Library 4.0 technologies in academic libraries presents a variety of challenges, including a lack of suitable infrastructure, an unpredictable power supply, and an increase in alternative information sources. The majority of studies have revealed technological lethargy in libraries and a critical need to improve LIS professionals' skills in using 4IR technologies to reduce the skills gap. Most studies highlighted the lack of management and executive support as a factor influencing the uptake of Library 4.0 technologies, often due to insufficient budgets and funding frameworks. Financial resources and reduced fiscal space hinder academic libraries from fully participating in the digital transformation journey. Academic libraries often face budget constraints, which can limit their ability to invest in essential infrastructure, such as ICT hardware and software, staff development, and the implementation of innovative services. Additionally, as the roles of LIS professionals have shifted from being information custodians to information scientists, this shift requires staff development of skills. 80% of the studies highlighted that the need for LIS professionals to acquire multiple skills and knowledge to operate in this 4IR era is key to the survival of the information profession. This can hinder the library's ability to meet the evolving needs of its users and remain relevant in a rapidly changing information landscape. The results revealed that academic libraries often lag behind technological advancements due to struggles with implementation costs, integrating new systems with existing ones, and the time required to train staff and update systems.

3.2 Threats and Vulnerabilities of the Fourth Industrial Revolution

The majority of studies (80%) observed that, as academic libraries navigate the benefits of the 4IR and the rapid advancements in Library 4.0 technologies it brings, LIS professionals encounter several challenges that potentially impact their operations, services, and overall effectiveness. The primary vulnerability challenges for academic libraries in the 4IR were reported to be centred on data privacy and cybersecurity, intellectual property, financial and infrastructural limitations, and a significant skills gap among staff. As a result, the studies noted that rapid technological change in the 4IR poses significant vulnerability challenges for academic libraries across various areas. This is against the backdrop that, as the pace of technological advancements continues to accelerate, academic libraries must continually keep pace with the latest trends, software updates, and hardware upgrades to provide relevant, up-to-date services. The majority of studies have raised concerns about data privacy and cybersecurity, particularly in light of the threats and vulnerabilities posed by the fourth industrial revolution. This was a result of LIS professionals' increased dependence on 4IR technologies, making academic libraries vulnerable to data breaches, unauthorised access, and cyberattacks. Legal and reputational risks stemming from a data breach can lead to severe penalties if the academic library fails to comply with data protection regulations, and can also cause significant harm to the institution's reputation and user trust.

On the other hand, most studies (80%) found that ethical considerations are crucial components when implementing Library 4.0 technologies in academic libraries and that they are among the major vulnerabilities of the fourth industrial revolution. These include privacy concerns, algorithmic bias and information accuracy, intellectual property, and data security issues, all of which pose significant challenges that need to be addressed. Academic libraries possess sensitive user information, and the 4IR raises concerns about data privacy and cybersecurity. Safeguarding user data and complying with privacy regulations are significant challenges of the 4IR. The digital environment raises questions about copyright and licensing agreements for digital content, forcing academic libraries to navigate complex legal issues to ensure the compliance and ethical use of digital resources. About half of the results also highlighted that the digital divide remains a significant challenge in modern societies, and consequently, in academic libraries. This ranges from access to technology to the skills needed to navigate the digital world, which raises ethical concerns about access to information. Notably, the gap between well-resourced academic libraries in the developed world and under-resourced ones in the developing world was exacerbating existing inequali-

ties in access to information and services. A significant vulnerability was identified as stemming from the human element, and a corresponding change in mindset is necessary, as the rapid pace of technological change outpaces the development of necessary skills, resulting in a deficiency in Library 4.0 skills. The general feeling was that there is a general lack of specialised skills and knowledge among LIS professionals to cope with and leverage new technologies effectively in this 4IR era. Additionally, the same number of studies noted that, with the increasing shift toward digital resources, libraries face challenges in preserving digital materials for the long term due to the volatility of the internet sites and webpages, as reported by most studies. Ensuring the accessibility and authenticity of digital content over time is a complex task that requires careful planning and resources from academic libraries. Other threats and vulnerabilities highlighted by the studies included changing user expectations and deficiencies in the policy framework. Users now demand seamless, personalised, and technology-driven services, leaving many academic libraries vulnerable. A failure to meet these evolving user expectations makes libraries vulnerable to becoming irrelevant in an increasingly competitive information landscape. A significant number of studies highlighted policy deficiencies as a vulnerability of the 4IR. Thus, many academic libraries were found to lack the necessary procedure manuals, policies, and strategic frameworks to guide the ethical and practical implementation of 4IR technologies within their library spaces.

3.3 Strategies for Academic Libraries in the Fourth Industrial Revolution

There are various strategies that academic libraries can employ to mitigate risks, threats, and vulnerabilities associated with Library 4.0 technologies in the 4IR. There was a general consensus that LIS professionals need to comprehensively prepare and implement measures to stabilise the library in the face of 4IR, employing various strategies. Results from 75% of the studies revealed that policy development was critical to the implementation and participation of 4IR technologies. Thus, academic libraries needed to start developing procedure manuals and policies for Library 4.0 technologies, such as AI and big data. On the other hand, the majority of studies noted that the innovative role of academic libraries appears to be underrepresented, thereby affecting their ability to make significant contributions to the technological agenda discourse. Academic libraries should be included in discussions of the technological discourse agenda on the international stage, from initial planning to implementation. To counter constraints in contemporary physical spaces, 60% percentage of the studies indicated that academic libraries need to creatively utilise their existing spaces and remodel them to accommodate their evolving technological needs. However, the adoption of artificial intelligence would reduce the need for human involvement in several library tasks, potentially leading to staff being transferred to other areas of the library. Additionally, continuous staff development is a critical function in academic libraries, enhancing knowledge and skills in this 4IR era and increasing LIS professionals' abilities to improve job performance, ensuring they remain competent and adaptable to changing needs. Several studies recommended that academic libraries should invest in continuous professional development programmes to equip LIS professionals with contemporary skills to leverage 4IR technologies effectively. This will also enable academic libraries to meet changing user expectations while maintaining their core values of inclusivity, accessibility, and community engagement. Lastly, half of the studies proposed introducing postgraduate LIS courses on contemporary library practices, which would, among other things, incorporate the application of Library 4.0 tools.

4. Discussion

Academic library users have transitioned from passive users to expecting seamless access to information and online resources, as well as personalised, technology-driven services. However, LIS professionals in the 4IR environment must meet these expectations while upholding their core values of inclusivity, accessibility, and community engagement. The majority of LIS professionals are prepared to implement 4IR technologies, in the hope that these technologies will help them achieve better job performance.

However, a significant number of academic libraries have yet to apply 4IR technologies because they are not adequately prepared to implement them. This preparation ranges from LIS professionals who are yet to grasp the extent to which 4IR technologies will affect staff performance and library service delivery, to those who are concerned that AI and similar technologies may lead to polarisation in the workforce and result in significant job losses in academic libraries (as supported by Amoah & Minishi-Majanja, 2023). Adapting to new technologies requires staff to continuously update their skills to use these new Library 4.0 systems with ease. However, while training and professional development programmes are essential, they can be time-consuming and may require additional funding, which is a constraint for most academic libraries.

Although the studies explicitly discussed UTAUT's performance expectancy and facilitating conditions constructs related to LIS professionals' preparedness for the 4IR, they focused solely on effort expectancy and social influence. Thus, the evidence included in the review had more strengths for the former two constructs and limitations for the latter two constructs. Under the performance expectancy construct, the majority of LIS professionals were prepared to implement 4IR technologies, expecting these technologies to improve job performance outcomes. This was despite the fact that many academic libraries had not yet implemented any 4IR technologies due to inadequate preparation. Under the effort expectancy construct, adapting to new technologies requires staff to continuously update their skills to use these new Library 4.0 systems with ease. Under the social influence construct, organisational and societal pressures were evident, advocating that the library system adopt contemporary technologies for library service delivery. The facilitating conditions for implementing Library 4.0 technologies appeared to be the cornerstone for redefining academic libraries in this era of digital transformation and disruptive technologies. LIS professionals' inability to keep up with the rapid pace of new technologies and the challenge of implementing them were noted as issues in the 4IR revolution in academic libraries. The use of Library 4.0 technologies in academic libraries presents a range of challenges, including inadequate infrastructure, unreliable power supply, and increased reliance on alternative information sources. Lack of management and executive support was a factor influencing the uptake of Library 4.0 technologies and full participation in the digital transformation journey by academic libraries, often due to insufficient budgets and funding frameworks. This budget limitation was impeding academic libraries' ability to invest in necessary hardware, software, staff development, and implement innovative services to meet the evolving needs of their users and remain relevant in a rapidly changing information landscape. Technological lethargy in libraries and a critical need to improve LIS professionals' skills in using 4IR technologies are necessary to reduce the skills gap. This will enable LIS professionals to acquire multiple skills and knowledge to operate in this 4IR era, and is key to the survival of the information profession.

Regarding the threats and vulnerabilities of the 4IR, LIS professionals encountered several challenges that potentially impacted their operations, services, and overall effectiveness (Isiaka et al., 2024). The primary vulnerability challenges for academic libraries in the 4IR were reported as centred on data privacy and cybersecurity, intellectual property, financial and infrastructural limitations, and a significant skills gap among staff. This is against the backdrop that, as the pace of technological advancements continues to accelerate, academic libraries must continually keep pace with the latest trends, software updates, and hardware upgrades to provide relevant, up-to-date services. The increased dependence of LIS professionals on 4IR technologies has made academic libraries vulnerable to data breaches, unauthorised access, and cyberattacks. This presented academic libraries facing possible legal and reputational risks stemming from a data breach and failure to comply with data protection regulations. Privacy concerns, algorithm bias and information accuracy, intellectual property, and data security issues pose significant challenges in academic libraries and need to be addressed. Thus, ethical considerations are crucial components when implementing Library 4.0 technologies in academic libraries and are one of the major vulnerabilities of the 4IR. Changing user expectations and deficiencies in the policy framework were other threats and vulnerabilities in academic libraries. Users now demand seamless, personalised, and

technology-driven services, leaving many academic libraries vulnerable. A failure to meet these evolving user expectations makes libraries vulnerable to becoming irrelevant in an increasingly competitive information landscape.

Academic libraries need to navigate the benefits of the 4IR and the rapid advancements in Library 4.0 technologies it brings through employing various strategies. The 4IR technologies are rarely developed with a direct focus on library institutions; thus, academic libraries need to develop strategic internal documents on the application of AI and other technologies within their libraries. As technology evolves rapidly and new Library 4.0 tools supporting research and library activities are launched at an increasing pace, academic libraries should not rely on a trial-and-error approach but rather adopt a strategic approach. Thus, academic libraries need to continuously exhibit that they are thinking in terms of the fundamentals of digital transformations. Therefore, the focus of academic libraries' future strategy, as much as a technological one, should shift to digital transformation as a cultural and workforce priority. Policy and procedure manual development is a key strategy for this digital transformation, enabling academic libraries to align their workflows with the ethical issues arising from the 4IR. To counter ethical threats and the vulnerability of the 4IR, LIS professionals need to be conscientised about the profession's ethical framework at both the library and the national LIS association levels. This will enable them to navigate the ethical challenges of the 4IR and apply sound ethical practices when working with Library 4.0 tools. Additionally, continuous staff development is a critical function in academic libraries, enhancing knowledge and skills in the 4IR era and increasing LIS professionals' abilities to improve job performance, ensuring they remain competent and adaptable to changing needs. This will also enable LIS professionals to meet changing user expectations while maintaining their core values of inclusivity, accessibility, and community engagement. However, this requires academic libraries to carefully plan, collaborate, and commit to continuous improvement to thrive in the 4IR while continuing to provide valuable services to their communities. Introducing post-graduate courses in contemporary library practices, which will incorporate, among other things, the Library 4.0 tools application, is another strategy library schools could implement.

5. Conclusion and Recommendations

Therefore, the study recommends that:

- Academic libraries need to continuously provide on-the-job training programmes. There is a crucial need for ongoing training, reskilling, and upskilling programmes tailored to 4IR competencies to ensure LIS professionals can effectively navigate the complexities posed by the 4IR and provide tech-savvy services and support.
- Academic libraries should strengthen digital access infrastructure by advocating for increased funding and partnerships with sister libraries, funding agencies, and international LIS agencies to support infrastructure upgrades
- Academic libraries need to conscientise LIS professionals on sound professional ethics practices through advocacy, awareness, and staff development. Academic libraries need to develop technological hotspots guided by their values, principles, characteristics, and development priorities.

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Inclusive Higher Education in Ghana: Are Academic Libraries Leading the Way?

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Abstract

Academic libraries play a critical role in advancing inclusivity within higher education by ensuring equitable access to information and learning resources. Access to technology has become an indispensable pillar in libraries' inclusivity in higher education. This study investigates the readiness of academic libraries in Ghanaian higher education institutions to support students with disabilities. Guided by the IFLA Guidelines for Library Services to Persons with Disabilities and aligned with the United Nations Sustainable Development Goals (SDGs 4 and 10), the study employed a qualitative research design that included semi-structured interviews with fifteen academic librarians and observations of library facilities and services across twelve universities in Ghana. The findings reveal that librarians' commitment to inclusive education contributes significantly to institutional efforts aimed at increasing the enrolment and participation of students with special needs in higher education. While some academic libraries have established basic accessibility features, such as ramps, elevators, designated learning spaces, braille, and other assistive technologies, they still fall short of meeting international standards for inclusivity. The study recommends the necessity for increased investment, technological innovation, exploitation of external funding opportunities, and professional development to enhance the capacity of academic libraries in fostering inclusive and equitable higher education in Ghana.

Keywords*: inclusive education, academic libraries, special needs students, assistive technologies.*

1. Introduction

Inclusive education, rooted in the universal principles of human rights and social justice, advocates for equitable access to quality learning opportunities for all learners, regardless of ability or circumstance. This educational philosophy is reinforced by global frameworks, such as the United Nations' Sustainable Development Goals (SDGs), particularly Goals 4 and 10, which call for inclusive and equitable education and promote reduced inequalities across social systems. These frameworks underscore that inclusivity in education is both a moral imperative and a developmental priority.

In alignment with these international commitments, Ghana has undertaken significant policy reforms to promote the rights and inclusion of persons with disabilities. Through the ratification of the United Nations Convention on the Rights of Persons with Disabilities (CRPD) and the enactment of the Persons with Disabilities Act, 2006 (Act 715), the country has established a legislative foundation for inclusion in education and society. However, data from the 2021 Population and Housing Census (Ghana Statistical Service, 2021) indicate that persons with disabilities comprise approximately 8% of Ghana's population, yet only around 2% are enrolled in tertiary education. This disparity highlights the persistent structural and institutional barriers that hinder equitable participation in higher education.

The Ghanaian government has integrated inclusive education policies across various levels of the education system, with emphasis on higher education institutions (Naami & Mort, 2023). Initiatives such as the free education policy aim to remove financial barriers and promote social inclusion, thereby advancing the nation's socioeconomic development goals (Jardinez & Natividad, 2024). These policies are founded on the belief that education is a fundamental human right and that its transformative potential is fully realised only when all learners, regardless of disability, can participate meaningfully and benefit equitably.

Despite these efforts, achieving inclusivity in higher education remains challenging. Recent studies indicate an increase in the enrolment of students with disabilities (Hamad, 2023), but sustaining this trend depends on robust institutional support systems, particularly within academic libraries. Libraries are vital to inclusive education, as they facilitate equitable access to information, knowledge, and learning resources. SDG Target 4 specifically calls for the construction and upgrading of educational facilities that are disability-sensitive and inclusive.

Academic libraries constitute a fundamental component of higher education, functioning not only as custodians of information but also as active agents in promoting equitable access to knowledge. Within the framework of inclusive education, their mandate increasingly encompasses the provision of accessible resources, assistive technologies, and supportive learning environments that address the diverse needs of all students (Ariya et al., 2024; Price, 2022).

The rapid advancement of emerging technologies, particularly artificial intelligence (AI), has further expanded the potential of libraries to deliver adaptive and personalised services, thereby enhancing learning experiences for students with disabilities (Melo-López et al., 2025; Mwantimwa & Msoffe, 2025). Despite these developments, empirical evidence on the practical application of AI-driven solutions within academic library services remains limited, especially in the Ghanaian context.

In Ghana, academic libraries continue to operate within constraints that challenge the realisation of inclusive education goals. These include deficiencies in accessibility infrastructure, inadequate development of inclusive collections, and limited professional capacity among librarians to effectively support users with disabilities (Acheampong et al., 2020; Ayiah, 2017). While the integration of assistive and AI technologies presents a promising avenue for addressing some of these barriers, their adoption has been inconsistent and insufficiently documented.

Against this background, this study examines the preparedness of academic libraries in Ghanaian higher education institutions to meet the information and learning needs of the growing number of students with disabilities.

1.1 Objectives of the Study

The study was based on four key objectives, including:

- assess the adequacy of inclusive learning facilities in academic libraries of Ghanaian higher education institutions.
- investigate inclusive library resources and services available for students with special needs.
- explore the availability and integration of assistive and AI technologies that enhance accessibility and learning support.
- identify challenges faced by academic libraries in implementing inclusive education support services.

2. Theoretical Framework

The study is grounded in international frameworks and educational theories that support the development of inclusive library services. Central to this framework are the International Federation of Library Associations and Institutions (IFLA) Guidelines for Library Services to Persons with Disabilities (IFLA, 2022) and the United Nations Convention on the Rights of Persons with Disabilities (UN, 2006), both of which emphasise equitable access to information as a fundamental human right. The framework is further reinforced by the United Nations Sustainable Development Goals (SDGs), particularly SDG 4, which promotes inclusive and equitable quality education, and SDG 10, which aims to reduce inequalities. Together, these global instruments provide a normative foundation for fostering accessibility, equity, and inclusion within academic library systems worldwide. Within this context, the IFLA model identifies five core domains for inclusive library development: architectural accessibility, inclusive services and activities, accessible library collections, staff capacity, and adaptive technologies. These domains provide a comprehensive lens through which the study evaluates the inclusivity of Ghanaian academic libraries.

Inclusive Education Theory (Ainscow & Miles, 2008) further informs this framework, emphasising systemic institutional reforms that accommodate the diverse needs of learners. This theoretical foundation underlines the importance of integrating technology and human-centered design into library services. The framework thereby ensures a rights-based, context-sensitive, and globally aligned approach to analyzing inclusivity in library systems.

3. Literature Review

3.1 Inclusive Facilities in Academic Libraries

Academic libraries play a pivotal role in inclusive higher education by providing equitable access to information resources. Inclusive physical design is central to this mission. According to SDG 4, achieving quality education for all requires accessible infrastructure that meets the diverse needs of learners, including those with disabilities (United Nations, 2015). Studies by Hamad (2023), Ariya et al. (2024), and Smadi (2022) highlight the significance of universally designed spaces that support independent navigation, comfort, and participation.

Key architectural features such as ramps, elevators, wide aisles, and ergonomic furniture facilitate accessibility for users with mobility challenges. However, research reveals that many academic libraries, particularly in developing countries, have yet to meet universal design standards (Selema et al., 2025; Ayoung et al., 2020). Insufficient infrastructure often limits access for students with disabilities, undermining inclusivity goals and contributing to educational inequality.

3.2 Availability of Inclusive Library Resources and Services

Inclusive libraries extend beyond physical access to encompass equitable access to diverse information resources. Academic libraries are increasingly diversifying their collections through multiple delivery modes, print, digital, and audiovisual formats, to support varied learning needs (Atuase & Filson, 2024; Hamad, 2023). Alternative-format materials such as large-print texts, Braille documents, audiobooks, and accessible e-books are essential in ensuring that students with disabilities can fully engage with academic content (Manwiller & Crozier, 2024).

Digital platforms and library websites also play a role in remote access, particularly for students unable to physically visit the library. However, many library websites remain poorly optimised for assistive technologies such as screen readers and voice recognition tools (Chijioke et al., 2020). These barriers can exclude students with visual or cognitive impairments from accessing necessary learning materials.

3.3 Provision of Assistive Technologies

Assistive technologies are critical enablers of inclusion, allowing students with sensory or physical impairments to access academic materials. Common tools include screen readers (e.g., JAWS, NVDA), magnifiers, speech-to-text programmes, and FM hearing systems (Ariya et al., 2024; Sutar & Hande, 2021). Although such technologies have expanded access, they remain unevenly distributed across institutions, and their use is often restricted to a few students (Hamad, 2023).

AI technologies are increasingly recognised for their potential to advance inclusivity. They can personalise learning experiences, improve resource retrieval, and automate text-to-speech and translation functions (Hussein et al., 2025; Carruba et al., 2024). Shahzad et al. (2024) note that AI integration can transform library services by improving accessibility, user satisfaction, and efficiency. Nevertheless, empirical evidence on the adoption of AI for supporting students with disabilities in libraries remains limited, especially in the Ghanaian context.

3.4 Librarian Competencies in Assistive and AI Technologies

The provision of inclusive library services is contingent upon librarians' competencies. As Dube et al. (2024) and Cox et al. (2024) argue, librarians must be skilled in emerging technologies, including AI, to effectively support users with diverse needs. Professional development in areas such as ethical data use, digital literacy, and accessibility is therefore essential. However, studies indicate persistent gaps in librarian training, particularly in developing contexts where AI literacy and special education awareness are limited (Pionke, 2024; Lo, 2024). Da Silva et al. (2024) emphasise that enhancing librarians' technological proficiency is a strategic pathway for improving service delivery. In Ghana, research assessing librarians' competencies in using inclusive technology is limited. This highlights the need for structured professional development programmes and institutional investment in training.

3.5 Challenges of Inclusive Library Services

Despite progress, substantial barriers remain in achieving full inclusivity in academic libraries. Research conducted in various African contexts identifies several challenges, including inadequate infrastructure, a lack of assistive technologies, limited funding, and insufficient awareness among both staff and users (Selema et al., 2025; Eneya et al., 2021). Acheampong et al. (2020) further report that Ghanaian libraries struggle to maintain accessible collections due to financial and technical constraints. While inclusive education policies encourage universities to expand access, their implementation at the library level is often hampered by resource limitations.

Consequently, students with disabilities continue to rely on peer support rather than institutional resources to access information (Filippou et al., 2025). Addressing these challenges requires targeted investment, strategic partnerships, and policy enforcement to transform libraries into truly inclusive learning environments.

4. Methodology

This study employed a qualitative research design to examine the preparedness and practices of academic libraries in supporting students with disabilities in Ghanaian higher education institutions. The qualitative approach facilitated an in-depth exploration of librarians' experiences, institutional capacities, and perceptions of inclusivity within the academic library environment.

Fifteen (15) librarians from twelve public universities across Ghana were purposively selected. This was based on their professional experience and leadership positions, which enabled them to provide informed perspectives on inclusive library services. The sample size was guided by the principle of data saturation, ensuring that insights were captured without redundancy.

Data were collected through semi-structured telephone interviews, supplemented by direct on-site observations of library facilities and services. The interviews focused on key themes including accessibility infrastructure, assistive technologies, the adoption of artificial intelligence (AI), and staff training for disability support. Observational data provided contextual evidence regarding library spaces, service practices, and user engagement, allowing for triangulation between different data sources.

The researchers followed ethical standards throughout the research process. They obtained approval from the relevant institutions for data collection. Participants were fully informed about the purpose of the study and were provided with consent forms to sign. Additionally, the researchers ensured that confidentiality and anonymity were maintained, and participation was entirely voluntary.

Data analysis was carried out using thematic analysis to identify recurring patterns and relationships that emerged from the interviews and observations. The credibility and trustworthiness of the findings were strengthened through member checking, expert validation, and the maintenance of an audit trail documenting analytical decisions. Triangulation of interview and observational data further enhanced the validity of the results by integrating multiple perspectives on library inclusivity and accessibility.

4.1 Data Analysis

The participants of the study were members of the Association of University Librarians, indicating representation from research-intensive institutions. These participants had between 5 and 25 years of professional experience and were actively involved in providing library resources and services to a diverse user base, including students with special needs. Each participant was assigned a unique identifier (Lib1–Lib15) to preserve anonymity.

Theme 1: Library Users with Special Needs

Higher education institutions admit students with special needs as part of their enrolment process. In response, university libraries offer services tailored to support the learning requirements of these students. The initial interview questions focused on identifying the presence and accessibility of services for students with special needs within university libraries. The librarians identified a specific student disabilities population that they provide library support services to, including visual and hearing impairments, as well as physical handicaps. Selected excerpts from respondents are presented in the Table below.

Table 1

Response to Availability of Users with Special needs in Libraries

Participant	Response	Summary of Theme
Lib 1	the library serve students with varying forms of disabilities including visual impairment, auditory, physical disabilities	library users include students with various disabilities.
Lib 7	The library has users who have mobility challenges, and cognitive or learning disabilities	library users include students with various disabilities.
Lib 15	The university has a growing population of students with special educational needs such as individuals with visual, auditory, physical, and learning disabilities.	library users include students with various disabilities.

Theme 2: Availability of Inclusive Infrastructure and Facilities

Inclusive library services encompass both physical accessibility and support mechanisms designed to accommodate students with diverse learning needs. This study explored the extent to which academic libraries in Ghana provide inclusive features that support students with disabilities. Respondents reported the existence of physical infrastructure intended to enhance accessibility, such as ramps, elevators, and designated reading areas. These features indicate a growing institutional commitment to reducing physical barriers and promoting architectural inclusivity for students with various impairments.

Despite these efforts, significant gaps remain. Many libraries lack purpose-built, disability-friendly washrooms, functional elevators, and adaptive furniture for users with physical disabilities. In several cases, libraries have no elevators at all, while existing ones are often non-functional, thereby restricting access to resources located on upper floors. Observational data further revealed the absence of auditory support systems for users who are hard of hearing, as such aids are typically provided only upon medical recommendation and not integrated into library facilities. Additionally, most libraries lack automatic doors and inadequate space to accommodate the growing population of students with special needs.

Table 2

Response to Library Inclusive Infrastructure and Facilities

Respondent	Response	Summary of Theme
Lib 5	The library has disability ramps to ensure accessible entry for students with special needs.	library infrastructure designed for inclusive access library facilities have limited navigable interior spaces. Lack of inclusive wash room
Lib 9	The library building is accessible via ramps, and while the interior layout is generally navigable, the narrow spacing between shelves makes it difficult for wheelchair users to move freely.	library infrastructure designed for inclusive access library facilities have limited navigable interior spaces. Lack of inclusive wash room
Lib 10	Our library has a designated quiet reading area for students with special needs,	library infrastructure designed for inclusive access library facilities have limited navigable interior spaces. Lack of inclusive wash room
Lib 13	Unfortunately, the library's washrooms are not equipped with special toilet facilities, which limits comfort and dignity for some users.	library infrastructure designed for inclusive access library facilities have limited navigable interior spaces. Lack of inclusive wash room
Lib 14	The library has an elevator in place, but it frequently breaks down. This creates serious accessibility challenges for students with mobility issues.	library infrastructure designed for inclusive access library facilities have limited navigable interior spaces. Lack of inclusive wash room

Theme 3: Inclusive Library Collection and Services

The provision of academic library resources and services is expected to address the diverse information and learning needs of all students. Another objective was to assess the extent of inclusive collections and services provided by academic libraries. The responses from librarians revealed that library collections were not available in accessible formats for students with visual or hearing impairments. As a result, many students depend on colleagues to read printed materials and explain lecture notes aloud. Although many library websites now provide electronic resources to complement traditional print collections, accessibility for students with disabilities remains limited. Some libraries have braille facilities; however, their use is minimal and often confined to specific purposes. Furthermore, the observation indicated that few libraries had braille machines, but there were not enough, compelling students to wait for their turn to use them. Some excerpts from respondents are found in Table 3.

Table 3

Response to Inclusion Resources and Services

Respondent	Response	Summary of Theme
Lib 4	Our library is yet to acquire enough assistive technologies to support visually impaired users; most of our resources are still in print format	Limited inclusive library collection Limited access to e-resources Lack of inclusivity to library websites
Lib 9	The library does not have audio or digital versions of some text or course books for visual impaired students.	Limited inclusive library collection Limited access to e-resources Lack of inclusivity to library websites
Lib 13	We only produce Braille copies for examination questions and answer scripts because of limited equipment	Limited inclusive library collection Limited access to e-resources Lack of inclusivity to library websites
Lib 14	This response pertains not only to our library but also to other library websites I have visited. These websites provide valuable electronic resources for learning; however, most are not compatible with screen readers. This limitation makes it difficult for visually impaired students to use these resources effectively.	Limited inclusive library collection Limited access to e-resources Lack of inclusivity to library websites

Theme 4: Availability of Assistive Technologies

Access to technology has become an indispensable pillar in promoting inclusivity within higher education. This growing reliance on digital tools has prompted an examination of the availability and accessibility of assistive technologies in academic libraries, particularly for students with special needs. The respondents revealed that academic libraries utilise various assistive technologies, including braille devices, open-source software such as screen readers, audio software, and speech-to-text tools installed in computers to enhance accessibility for visually impaired users accessing digital resources. However, these resources are limited in meeting the growing numbers and diverse learning needs of students with various disabilities. It was observed that computer devices were inadequate for the number of students with special needs. Also, respondents noted some assistive technologies, such as JAWS, are outdated, and

other software was unlicensed and primarily designed for students with visual impairments, neglecting those with other disabilities.

Furthermore, AI is a beacon of possibility for achieving educational outcomes. The respondent expressed enthusiasm for the potential of AI in supporting inclusive library services. They recognised AI's capacity for text-to-speech, speech-to-text, and Braille transcription, envisioning it as a transformative tool in the future of assistive technology in libraries. This theme highlights forward-looking awareness and adaptability. Some excerpts from respondents are in Table 4.

Table 4

Response to Availability to Assistive Technologies

Respondents	Response	Summary of Theme
Lib 1	Our library provides assistive devices for students with special needs, including Braille machines and screen readers; however, many of these tools are outdated and inadequately maintained, making them difficult for students to use effectively.	Limited assistive technologies Narrow focus on visual impairments free open-source software AI's potential for inclusive access to learning resources
Lib 9	Most of the assistive technologies we have cater to students with visual impairments. We rarely have tools that support students with hearing or other learning disabilities.	Limited assistive technologies Narrow focus on visual impairments free open-source software AI's potential for inclusive access to learning resources
Lib11	The screen-reading software installed on computers works for basic tasks, but it's only a trial version. Once it expires, students cannot use it effectively.	Limited assistive technologies Narrow focus on visual impairments free open-source software AI's potential for inclusive access to learning resources
Lib12	Recently, we started using some open-source software for students with print disabilities. It's not perfect, but it's a good starting point toward making our library more inclusive.	Limited assistive technologies Narrow focus on visual impairments free open-source software AI's potential for inclusive access to learning resources
	AI offers a lot of capabilities… it is possible to transcribe text into sound, audio, video, and even into Braille.	Limited assistive technologies Narrow focus on visual impairments free open-source software AI's potential for inclusive access to learning resources

Theme 5: Potential for Partnerships and External Support

Another theme that emerged is leveraging partnerships and grants to retool and expand inclusive library facilities to meet the growing number of students' special needs. This theme reflects proactive engagement by some libraries with external stakeholders to overcome financial and infrastructural barriers to

inclusive library services. Also, respondents perceived that enhancing inclusive library services could contribute to increasing the enrolment of students with special needs in higher education institutions. Some excerpts from respondents are presented in Table 5.

Table 5

Response to Strategies to Improve Inclusive Library Services

Respondent	Response	Summary of theme
Lib 5 Lib 11	The library can seek funding, support, partnership, and resources in collaboration with other organizations to retool library facilities for inclusivity.	Institutional support, funding through external partnership Inclusive library services as an enrollment driver
Lib 7	I am optimistic about leveraging partnerships, grants, and treaties such as the Marrakech Treaty to secure funding and resources for inclusive library services.	Institutional support, funding through external partnership Inclusive library services as an enrollment driver
Lib 9	Institutional support is key and Partnerships with NGOs would be very helpful for libraries purpose of inclusivity	Institutional support, funding through external partnership Inclusive library services as an enrollment driver
Lib 14	I think that improving library support services for students with developmental disabilities can serve as an enrollment drive to increase the number of students with special learning needs, thereby enhancing inclusion in institutions.	Institutional support, funding through external partnership Inclusive library services as an enrollment driver

Theme 6: Staff Competence in Inclusive Library Services

The data indicate that inclusive practices are not yet systematically implemented, but there exists a foundational capacity among library staff to support such initiatives. Staff possess relevant competencies, including training in special education and basic sign language skills, suggesting untapped potential for inclusive service delivery. However, this capacity remains informal and unevenly distributed. These findings underscore the need for structured interventions, particularly continuous professional development and enhanced institutional support, to effectively build, standardise, and sustain inclusive library services. Excerpts from respondents are presented in Table 6.

Table 6

Response to Staff Capacity Towards Inclusive Library Services

Respondent	Response	Summary theme
Lib 1	We haven't deliberately done anything in particular… but many of us are certified educators… we've done courses in special education	Staff competencies Inadequate training for inclusive library services
Lib 8	A number of my staff can sign… I can point to about two or three of them who can sign	Staff competencies Inadequate training for inclusive library services
Lib 15	There is potential among staff to provide inclusive services, but it needs to be strengthened through continuous professional development and institutional support.	Staff competencies Inadequate training for inclusive library services

5. Discussion of Findings

An inclusive library is a means of achieving inclusive education and an inclusive society. Library services aim to meet the needs of all users, while specialised services are designed to assist users with disabilities. An examination of types of on users with special needs in academic libraries shows libraries provide services based on the specific types of disabilities students enrolled by their institutions.

Essentially, libraries must prioritise enhancing infrastructure and adopting universal design principles, as outlined by the International Federation of Library Associations (IFLA), to advance SDG 4 and SDG 10 by achieving quality education and reducing inequality. Such measures are crucial in ensuring equitable access for all users, reflecting a commitment to inclusivity and social equity. The current study reveals that while academic libraries offer basic accessibility features, such as ramps and elevators to accommodate individuals with physical disabilities, they still fall short of meeting international inclusivity standards. The absence of crucial interior features such as adjustable tables, automatic doors, and sensor-operated restroom facilities limits students with various disabilities from fully engaging with educational resources. This shortfall creates barriers to equitable access, contradicting the findings of Ariya et al. (2024), Apryl (2022), and Smadi (2022), who emphasised the importance of ergonomic furniture and unobstructed aisles in fostering an inclusive library environment that allows all individuals to navigate the space effortlessly.

Academic libraries' information resources must be in alternative formats to support diverse learning preferences, abilities, and information needs (Hamad, 2023; Morris & Williamson, 2019). These resources must serve the learning and information needs of students with different disability groups. The study revealed that library resources remain largely inaccessible to students with visual and hearing impairments, resulting in a continued reliance on peer assistance for accessing academic materials. While some libraries have electronic resources and Braille machines, these provisions are limited in scope and lack systematic implementation. This finding is consistent with Acheampong et al.'s (2020) finding that libraries have limited collections in formats suitable for students with special needs.

The integration of assistive technologies has significantly improved access to academic library resources, fostering equity for students with disabilities (Hamad, 2023). Tools like screen readers and text-to-speech software are crucial in enhancing educational quality and enabling equal engagement with academic content (Ariya et al., 2024; Hamad, 2023; Sutar & Hande, 2021). The current study found that libraries rely on free, open-source software to support students with disabilities in accessing necessary resources. Some libraries have integrated such software to enhance access for students with print disabilities, indicating gradual progress toward greater inclusivity in higher education.

Academic librarians recognise AI's potential to personalise access through tools such as content recommendations and automated transcription services. Respondents perceive AI as a strategic innovation capable of bridging accessibility gaps and enhancing the learning experience for students with special needs, providing a promising direction for future development in library services. Librarians must be prepared to meet the growing number of students with special needs.

However, the study points out several challenges, including the limited availability of assistive workstations and the insufficient inclusivity of library websites. Many academic library websites are not fully optimised for assistive technologies, limiting students with disabilities from navigating and efficiently accessing resources. The absence of accessible design elements, such as alternative text for images, keyboard navigability, and compatibility with screen readers, can create significant barriers. Additionally, the study found that many libraries primarily focus on assistive technologies for visual impairments, neglecting other disabilities, such as auditory or cognitive impairments. This narrow focus limits the inclusivity of services and hinders equitable access to academic resources. Thus, while assistive technologies have made

strides in improving access, there remains much work to ensure that library services, including websites, are truly inclusive and meet the diverse needs of all students.

Evidently, to achieve genuine educational equity, academic libraries must design digital platforms, particularly those for learning and research, with universal accessibility as a primary focus. Ensuring that library websites are compatible with assistive technologies not only meets accessibility standards but also demonstrates a genuine commitment to inclusion, equal opportunity, and the democratisation of knowledge. This would help them meet the needs of growing number of students with special needs.

Another key theme emerging from the findings showed that library staff possess the foundational knowledge necessary to support inclusive services. There is the need for conscious institutional support for professional development aimed at fostering innovation in inclusive library practices. In line with this, Pionke (2024) and Liman et al. (2017) highlight a significant gap in the professional competencies of librarians, particularly in their ability to support individuals with special learning needs. Da Silva et al. (2024) further suggested enhancement of technological proficiency especially in AI as strategic for improving service delivery and addressing the diverse information needs of various user groups, including students with special educational needs. Therefore, enhancing AI literacy among librarians serves as a strategic approach to prepare for the potential increase in enrolment of students with special needs.

Moreover, other strategies to improve inclusive library services among higher educators include periodic needs assessment to determine the real information needs of students with special needs, to appropriately address these needs, and other suggestions involve benchmarking other well-endowed libraries for innovative inclusive library service delivery. Again, proper preparation is a key strategy for revamping and expanding inclusive library facilities to accommodate the anticipated increase in student enrolment with special needs. A key finding from the study is that librarians expressed uncertainty about their libraries' readiness to meet this demand. The reference to grants and international frameworks highlights the importance of global partnerships in fostering equitable access to library services for students with special needs. The emerging theme suggests that government funding, institutional support, the development of partnerships, and external funding opportunities are crucial for academic libraries to expand and upgrade their facilities to accommodate the growing population of students with special learning needs. However, academic libraries have yet to fully explore grant opportunities for external sponsorship to support the development of inclusive library services.

The findings represent participants' perceptions that strengthening inclusive library services can attract and support students with special educational needs, thereby increasing their enrolment in higher education institutions. Such perceptions highlight the strategic role of inclusive academic libraries in shaping institutional reputation and fostering equitable access to higher education. This perspective suggests that visible institutional efforts toward accessibility function not only as support mechanisms but also as promotional factors that demonstrate a university's commitment to diversity and inclusion.

6. Implications of Study

The study highlights that true inclusion depends on intentional investment in accessible design, staff capacity (especially in AI and assistive tools), and sustainable funding models. Without this, libraries risk reinforcing the very inequalities they aim to eliminate.

Ultimately, inclusive library services are not just support mechanisms but strategic drivers of educational equity and institutional relevance. The challenge is no longer whether inclusion matters, but whether institutions are willing to prioritise and operationalise it at scale.

7. Conclusion and Recommendations

Inclusive libraries are vital to promoting equitable access to education and fostering a just society. Although academic libraries have made progress in supporting students with disabilities, many still face challenges related to inadequate infrastructure, limited accessible resources, and insufficiently trained staff. Thus, expanding the use of assistive technologies and alternative-format materials remains essential. The growing adoption of artificial intelligence (AI) and digital tools offers new opportunities to enhance inclusivity and personalised learning.

The study emphasises that academic libraries should embed accessibility into the design of their services, spaces, and digital platforms, guided by universal design principles. Continuous professional development in AI and accessibility tools, along with strong institutional and governmental support, sustainable funding, and regular needs assessments, are key to advancing and sustaining inclusive library practices.

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Evaluating the Role of Student-Led Knowledge Ambassadors Programme in Enhancing Library Utilisation. A Case Study of the Ongwediva Campus Library

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Abstract

In an era where academic success depends on timely, quality, and relevant information, university libraries face increasing challenges in meeting the evolving needs of diverse users. The International University of Management (IUM) Library introduced the Library Knowledge Ambassadors Programme, an innovative peer-led service model that positions students as partners in promoting library use, creating awareness, and delivering information literacy support to fellow students. The objectives were to examine the activities and responsibilities of Knowledge Ambassadors, to assess the programme's influence on students' awareness and use of library services, to explore students' perceptions and effectiveness of the programme and to identify challenges affecting its implementation. A descriptive case study design using a concurrent mixed-methods approach was adopted. The study population comprised two library staff members, thirteen Knowledge Ambassadors, and ninety students. Stratified random sampling was used to select students, while purposive sampling was used to select library staff and Knowledge Ambassadors. Quantitative data were analysed using SPSS version 26, while qualitative data was analysed thematically. Findings revealed that Knowledge Ambassadors support library orientations, database navigation, referencing, book location, basic computer skills, and access to academic resources through the LMS. They also assist with routine and administrative tasks. The programme contributed to increased library usage, improved academic performance, enhanced presentation skills and confidence, and greater visibility of library services. However, challenges included time management, poor internet connectivity, limited computers, inadequate skills for supporting students with disabilities, and insufficient funding. The study recommended dedicated funding, targeted training, improved ICT infrastructure, dedicated training space, flexible duty schedules aligned with ambassadors' academic timetables, and train students on how to balance academic and programme responsibilities.

Keywords*: library utilisation, knowledge ambassadors programme, student engangement.*

1. Introduction

Academic libraries have moved beyond their traditional role as book repositories (Saharkhiz et al., 2017) to become active partners in teaching, research, and community engagement. Lasig et.al. (2025) reported that the libraries are a crucial component in molding the learning environment of any successful academic institution and for libraries to be relevant and efficient, their services must adapt to the changing requirements and preferences of its patrons. According to Suansah and Yusuf Setiawan (2024), excellent service is influenced by several elements that constitute an integrated whole, including speed, accuracy, friendliness, and comfort. The speed in question is the speed of service as consumers. The authors further noted that all users want fast accurate library services. When librarians help find the information materials needed quickly according to the needs of users, users will surely not only appreciate the help but will confidently come back again. This is because the speed and accuracy of service, accompanied by the hospitality of librarians, will make them feel welcome. Barata (2003, p.31) pointed out that service excellence consists of six main elements, they are: 1). Ability, 2). Attitude, 3). Appearance, 4). Attention, 5). Action, and 6). Responsibility. While Tjiptono (2002, p.58) cited that service excellence consists of four key elements: speed, accuracy, hospitality service, and comfort. In this study, service excellence will be described as the service given to library users which is based on or beyond the standard which considers speed, accuracy, hospitality service, and comfort as the key elements.

Over the years, the roles of librarians have evolved so have the demands for users increased. This transformation has given rise to a practice of engaging students as Library Knowledge Ambassadors, an initiative which began around the 19th century. The concept of Library Knowledge Ambassadors emerged as a response to the growing concerns regarding the underutilisation of electronic resources in academic libraries (Gikandi & Ndungu, 2018; Peter, 2013). Gikandi and Ndungu (2018) also noted that the Knowledge Ambassadors Programme in Kenya was largely born out of a growing concern about the unsatisfactory use of electronic information resources in the universities. This initiative aims to help with promoting the use of information services among their peers, (Appleton & Abernethy, 2013). The initiative has proven to be an effective strategy for increasing usage of libraries information resources both print and digital (e-resources). Additionally, it helps in widening students' involvement in outreach activities targeting their peers on and off-campus (Gartland, 2015; Schlak, 2017).

Equally, Halliday (2024) emphasised a need for libraries to work in true partnership with students to deliver library improvements in line with their priorities and those of their peers. According to Cook-Sather et al. (2017), it is very important to partner with students as they have innovative ways to reach their peers. Scripa and Spencer (2023) also observed that peer reference services benefit student employees, student researchers and librarians while Maxson (2019) noted that providing opportunities for peers to lead through teaching others has the potential to boost an individual's sense of confidence, leadership and improve their own learning, as well as give students' experiences to build upon and apply to their everyday lives and future careers. Additionally, Durazo-DeMoss et. al. (2023) noted that peers are viewed as more approachable, serve to decrease uneven power dynamics between teacher and student, and can relate to fellow students in ways librarians or other faculty cannot while Kibe and Kwanya (2015) on the other hand reported increased usage of information resources by users in the institutions as well as deepened user participation in the design, development and deployment of library services and products as benefits. Equally, Setiawan (2024) described the library ambassador programme as a collaboration strategy between students and librarians towards excellent service. The author noted that Library ambassadors are quickly able to represent librarians in providing comprehensive and excellent services so that users are greatly helped in meeting their needs. Library ambassadors are a solution and a new paradigm *agent of change* where students become literacy promoters to the academic community in their environment. Healey and Healey (2019) observed that such initiatives allow students to have a say and be fully involved in their education hence leading to transformation. According to Suansah and Yusuf

Setiawan (2024), Library Ambassadors serve as representatives of librarians, providing comprehensive and efficient services that support users in meeting their academic needs. Key to the objective of this study, Folostina et. al. (2024) observed that student ambassadors play a pivotal role in supporting inclusion in higher education as they offer university students from disadvantaged groups the opportunity to learn and develop alongside peers in an accessible and diverse academic environment as well as their fellow undergraduate peers who are considered underrepresented students.

The selection of student volunteers is dependent on a lot of factors for instance, Ali (2026) reported that selection of library ambassadors depended on key personality traits that influence advocacy and engagement effectiveness while Sulle, (2023) found self-confidence, self-motivation, ICT competencies, and information search competencies as well as communication skills as key traits for selecting knowledge ambassadors. Ashra et. al. (2022) stated that reading ambassadors were required to have an image branding component as this influenced the interest of visiting users. Most importantly, Levin et., al., (2022) noted that success of a student led ambassador programmes include ensuring widespread dissemination of the programmes, establishing clear expectations for ambassadors, equipping ambassadors with standardised promotional material, and promoting collaboration to collectively work towards addressing challenges. Furthermore, Gikandi and Ndungu (2018) emphasised a need to formalise and mainstream the programme as he observed that many were not formalised.

While the benefits this initiative are a lot, there are quite a lot of challenges that are encountered. Sulle (2023) reported factors low internet connectivity, inadequate mentorship, inadequate funds, lack of incentives, inadequate ICT facilities, and misconceptions about the accountability of student knowledge ambassadors. Kibe and Kwanya, (2015) found time constraints; misconception about the expectations of the ambassadors; inadequate infrastructure; and inadequate funding as being the major challenges experienced by this initiative. Hasty (2001) observed that while successful delivery of customer service skills in the library is an important component of public relations, the library student assistants are not often given formal training and recognition to ensure that the library's service philosophies receive full compliance.

1.1 Background of the Programme

The Ongwediva Campus Library is one of the eight Campuses of the International University of Management, which is situated in Ongwediva, within the Oshana Region Northern Namibia. The Library Knowledge Ambassadors Programme at this Campus was birthed out of a need to enhance the library operations and cut on the waiting period to attend to students since there are only two staff members overseeing the operationalisation of all library activities. This programme positions trained students as intermediaries who helps the library staff to promote library services, guide peers, train, enhance the visibility and relevance of the library. The Programme was officially launched on Friday, 26 April 2019 with the objective of empowering students volunteers willing to assist their peers in accessing and utilising library resources. Since its inception, more than 600 students have volunteered to participate in the programme. From the onset, the library staff trains these students as Training of Trainers (ToT) a process for developing instructors who can then train others. These student ambassadors have played an instrumental role in training their peers on how to access and use various electronic resources, how to access past examination papers and navigation of online databases. Most importantly, these services are extended to all students without any discrimination (male, female, old, young, marginalised, none-marginalised and students with disabilities) which fosters inclusivity. This study therefore sought to evaluate the role of the student-Led Knowledge Ambassadors Programme in enhancing library usage at the Ongwediva Campus Library.

1.2 Statement of the Problem

Although scholars such as Halliday (2024), Cook-Sather et al. (2017), have stressed a need for Libraries to work in partnership with students particularly because students can effectively reach and engage their peers, the implementation of student-led library initiatives is not without challenges. Previous studies have reported several benefits associated with student ambassador and peer-led programmes, including increased student engagement, improved access to library services, enhanced information literacy, and strengthened peer-to-peer learning (Scripa & Spencer, 2023; Maxson, 2019; Durazo-DeMoss et al., 2023; Kibe & Kwanya, 2015; Setiawan, 2024; Healey & Healey, 2019; Suansah & Yusuf Setiawan, 2024; Folostina et al., 2024). However, the effectiveness and sustainability of such programmes may be affected by several operational and institutional challenges. For example, Sulle (2023) identified low internet connectivity, inadequate mentorship, insufficient funding, lack of incentives, inadequate ICT facilities, and misconceptions regarding the accountability of student Knowledge Ambassadors as challenges affecting programme implementation. Similarly, Kibe and Kwanya (2015) reported time constraints, misconceptions about ambassadorial expectations, inadequate infrastructure, and insufficient funding. Other studies have identified heavy academic workloads, limited student engagement, time constraints, and difficulties in sustaining student participation as challenges to peer-led initiatives (Everett & Bischoff, 2021; Mama & Cansancio, 2024). In addition, Hasty (2001) observed that student library assistants are not always provided with adequate formal training and recognition, which may affect their ability to effectively support library service objectives.

Despite the growing evidence on student-led library initiatives internationally, there is no documented evidence on the implementation and effectiveness of Library Knowledge Ambassador programmes in Namibian universities. In particular, activities and responsibilities performed by Knowledge Ambassadors, their contribution to students' awareness and use of library services, students' perceptions of the programme's effectiveness and relevance, and the challenges affecting its implementation at the International University of Management (IUM) Library. This lack of empirical evidence makes it difficult to determine whether the programme is adequately meeting students' information and library service needs and what improvements may be required to strengthen its effectiveness and sustainability. The present study therefore seeks to address this gap by examining the Library Knowledge Ambassadors Programme at IUM.

2. Objectives

2.1 Main Objective

To evaluate the role of the student-Led Knowledge Ambassadors Programme in enhancing library utilisation at the Ongwediva Campus Library.

2.2 Specific Objectives

- To examine the activities and responsibilities carried out by the Knowledge Ambassadors.
- To assess how the programme influences students' awareness and use of library services.
- To explore student perceptions of the effectiveness and relevance of the Knowledge Ambassadors programme.
- To identify challenges faced by both ambassadors and library users that affect the programme's implementation.

3. Methodology

A descriptive case study design was adopted for this study using concurrent mixed-methods approach. The study population comprised of two assistant librarians, thirteen (13) Library Knowledge Ambassadors and ninety students. Student comprised of none-marginalised, students from marginalised communities and students with disabilities. Quantitative and qualitative data were collected simultaneously (Creswell, 2003). Stratified random sampling was used to sample ninety (90) students while key informants who comprised of Library staff members and Student Library Knowledge Ambassadors were purposively sampled.

Quantitative data was collected using an online google form which comprised of closed-ended questions while an interview guide comprising of semi-structured questions was used to collect qualitative data from key informants. Quantitative data was analysed using SPSS version: 26 while Qualitative data was analysed using thematic analysis because it was effective in identifying, analysing, and reporting patterns that emerge within qualitative data. All interview responses were audio-recorded with permission, transcribed verbatim, and coded to generate themes that reflected the distinct narratives of participants. Secondary data from document review was also incorporated to complement and contextualise the primary data. All participants were informed of the study's purpose, their voluntary involvement, and their right to withdraw at any time, and each provided written informed consent. Pseudonyms and strict anonymity procedures were used to protect participant's identities, and all collected information was used solely for the study. To ensure trustworthiness, the researcher applied credibility, transferability, dependability, and confirmability criteria, supported by prolonged engagement, thorough documentation, and attention to potential biases. Detailed descriptions of the research context and participant characteristics, along with an audit trail and reliance on participant narratives, further strengthened the study's rigour.

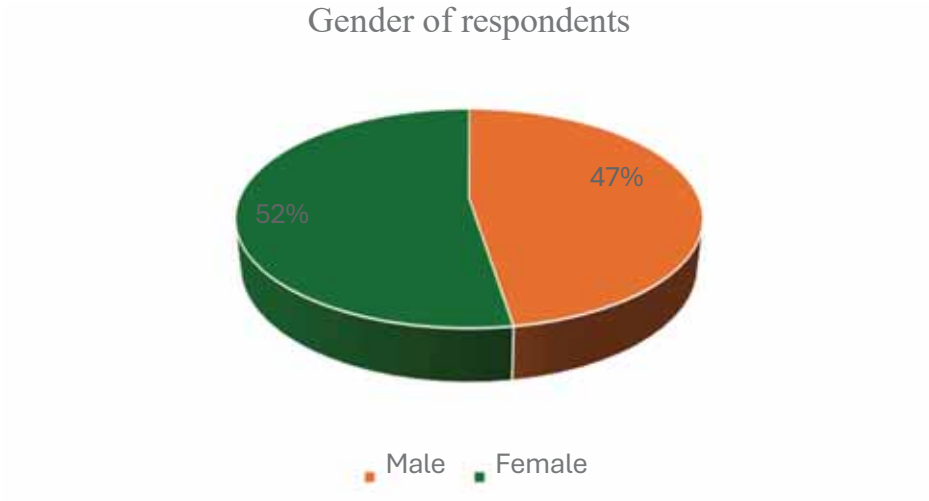
4. Findings and Discussions

4.1 Demographic information

The findings presented in this section included responses obtained from both interviews and from the online survey. A total of thirteen Library Knowledge Ambassadors were interviewed. From the thirteen, seven were female while six were male. Majority of the ones interviewed were third years while five were second years and two were fourth years. Quantitative data collected from the online survey showed that that most respondents were second-year students (31.1%), followed by first- and third-year students (27.8% each), fourth-years (7.8%), and postgraduates (5.6%). The results suggested that first- and second-year students used the library more frequently, likely due to enthusiasm after orientations, while third- and fourth years visited the library mainly when there was a need.

Furthermore, results from the online survey revealed that a total of ninety (90) students responded to the survey. The figure below shows the number of respondents that participated in the online survey. It can be observed that 52% of the respondents were female while 47% were male. As shown in the figure, 87.8% of respondents were non-marginalised, 7.8% were marginalised, and 4.4% were students with disabilities. Figure 1 below shows the gender of the participants.

Figure 1
Gender of respondents

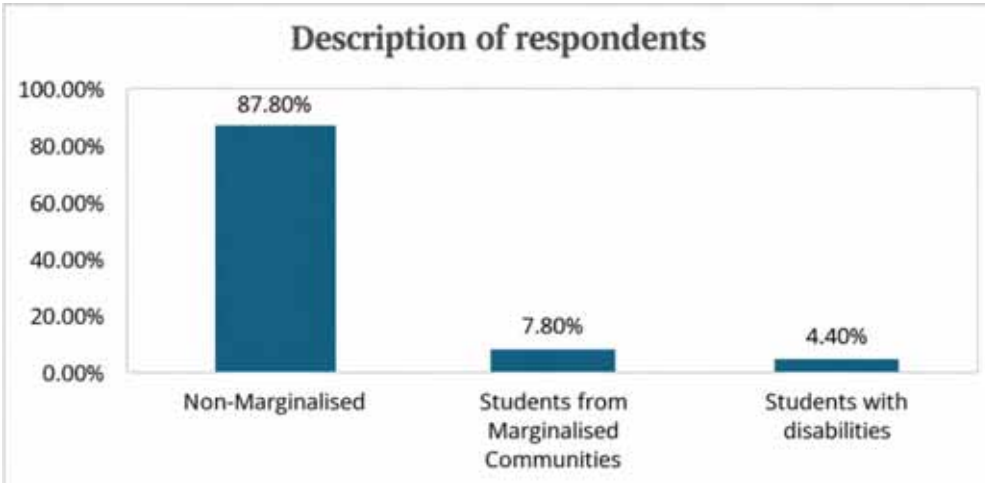


Description of Respondents

Based on the results emanating from figure 2; about 87.80% of the respondents were non-marginalised indicating that they constituted most of the study participants while 7.80% were from marginalised students and 4.40% were students with disabilities. The findings suggest that the study captured the perspectives of students from different backgrounds hence ensured inclusivity.

Figure 2

Description of participants



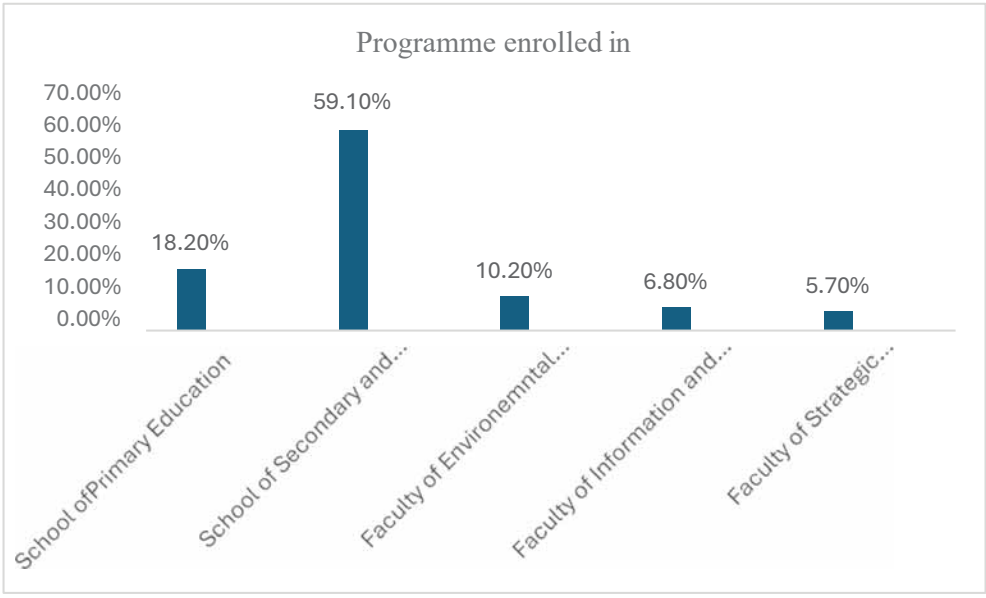
Name of programme enrolled in

Respondents were asked to state the type of programme they were enrolled in. the results reviewed that many respondents (59.1%) were enrolled in the School of Secondary and Postgraduate Education, followed by 18.2% from the School of Primary Education, 10.2% from the Faculty of Environmental

Management and Sustainability Sciences, 6.8% from the Faculty of Information and Communication Technology, and 5.7% from the Faculty of Strategic Management and Business Administration. Figure 3 shows the respondents' respective programmes.

Figure 3

Name of programme enrolled in



4.2 Knowledge of the programme, duration of service and reason for joining

From the qualitative responses, the study found that majority of the respondents indicated that they got to know about the programme through their daily library visits, while others indicated that they heard about the programme during orientation sessions or from library staff. Respondents were asked how long they had served as Library Knowledge Ambassadors, many indicated that they had served for three years, while two indicated four years and the rest stated one year. One respondent shared their reason for joining, highlighting personal motivation to support fellow students:

"*My interest in helping other students ignited the desire for me to join the programme" P1.*

4.3 Awareness of Roles and Responsibilities

Participants were asked if they knew their roles and responsibilities. all of them asserted that they were fully aware of their roles and responsibilities because upon joining, library staff members highlight their roles and responsibilities. They are further trained as Training of Trainers in various areas. Thereafter, with the guidance of the library staff members, they started training others. The participants all indicated that they served as library staff to be the bridge between the library and their fellow students. All of them highlighted that they are involved in carrying out the following tasks; Orientations for first years, hosting Library Open Week, assisting fellow students with training such as referencing using software's such as Zotero and Mendeley, navigating through the databases, locating books in the library, basic computer training, library rules, accessing past examination papers on LMS, developing a table of content, assist with maintaining order in the library etc. putting chairs in order, assisting at the parcel section,

help fellow students on how to apply for NSFAS, how to enrol modules on LMS. The breadth of these responsibilities reveals a highly integrated model in which student ambassadors complement library staff and contribute significantly to the library's outreach, academic support, and inclusivity efforts.

Contrary to the study findings, Gikandi and Ndungu (2018) noted that the Knowledge Ambassadors Programme in Kenya was largely born out of a growing concern about the unsatisfactory use of electronic information resources in the universities. While (Appleton & Abernethy, 2013) reported that the initiative aimed at helping with promoting the use of information services among their peers and (Gartland, 2015; Schlak, 2017) observed that it helped in widening students' involvement in outreach activities targeting their peers on and off campus. The differences in the roles could be attributed to the gap identified in respective libraries. Equally, as observed, the situation at Ongwediva where only two staff members are responsible for overseeing the operationalisation of library activities may not be the case in other libraries hence what may seem to be a problem in the current study could not actually be the reality of another institution.

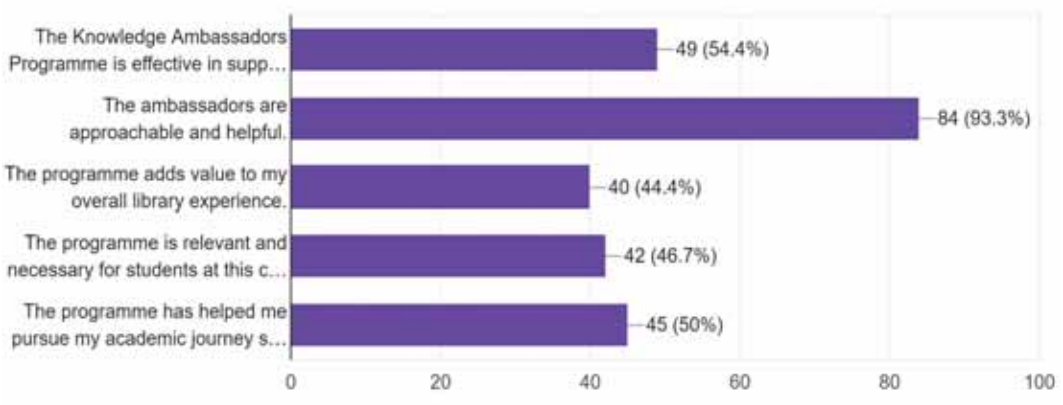
Equally, Azmir and Salim (2024) observed that some librarians collaborate with students specifically in research writing an activity not highlighted as a primary role for Knowledge Ambassadors in the current study. Seeing that the library is operated by two assistant librarians, perhaps publishing is not yet their priority while in other libraries, it may be a priority hence the collaboration that may exist.

4.4 Perception of the Programme

The assessment of the programme's impact showed that 93.3% of respondents were satisfied, noting that the Ambassadors were approachable and helpful. 54% reported that the programme effectively supported their academic needs, while 50% stated it helped them pursue their studies more smoothly. Additionally, 46% considered the programme relevant and necessary for students at the campus, and 44% felt it added value to their overall library experience. Figure 4 illustrates these perceptions and the programme's impact

Figure 4

Perception of the programme



Similarly, Durazo-DeMoss et al. (2023), also affirmed that students often perceive their peers as more approachable, helping to reduce hierarchical barriers between librarians and students and facilitating learning in ways that faculty or staff may not.

4.5 Support provided to students and impact of the programme

The library staff members and Library Knowledge Ambassadors were asked to indicate the influence level of the programme. The results revealed that there has been an increase in the usage of library. The Library staff members state that they had also observed students who are serving in this programme taking up leadership positions e.g. about six Knowledge Ambassadors were elected to serve in the Student Representative Council (SRC). It was reported that the programme had helped boost confidence of many students and they noted an improvement in the students' academic performance and presentation skills. One staff member stated that;

> *"Our library usage has increased significantly. Support from the library ambassadors has improved efficiency and productivity, as students no longer need to wait for assistance, which has sped up library operations. I have also seen greater awareness of our services and a growing interest among students to join the programme. Students prefer being trained by their peers, as it allows easy follow-up in class. Finally, I have observed the ambassadors build a strong, cohesive team where everyone feels a sense of belonging." Staff-1*

Another responded by stating that:

> *"I remember that when the Ongwediva library was outside the Campus, very few students used to use the library but through the efforts of the Library Knowledge Ambassadors came in and created awareness and encouraged our fellow students on the befits of using the library and there was an increase in the usage" Staff-2*

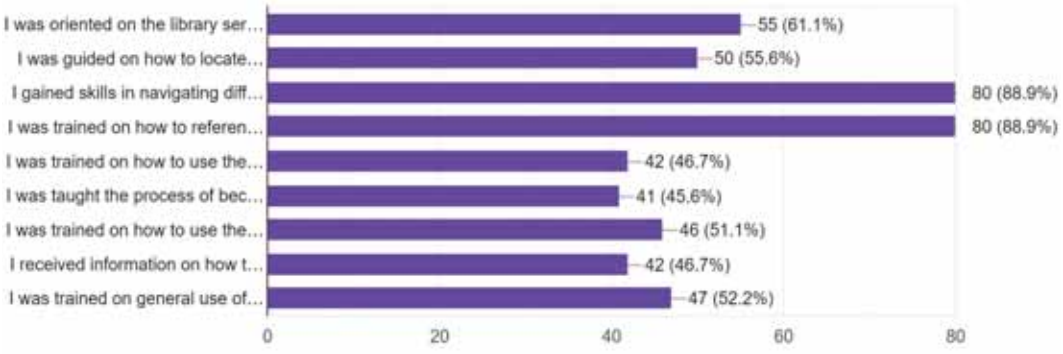
And lastly, one of the respondents indicated that because the programme pushes them to be critical thinkers and skilful before they can transfer those skills to others,

> *"The programme has helped me improve my ICT and presentation skills" P4*

Results from the online survey further revealed that 80.9% of respondents gained skills in navigating both open and subscribed databases and were trained in referencing using Zotero. 55% reported receiving orientation on library services, while 50% learned how to locate books on the shelves. About 47% received basic computer training, 42% were trained on using the OPAC and the "Ask the Librarian" feature, and 41% were taught how to become Knowledge Ambassadors. Figure 5 illustrates the support provided to students by the library ambassadors.

Figure 5

Support provided to students



The above results were in agreement with the findings reported by Gamlath and Wilson (2017) who highlighted that student-led initiatives promote knowledge sharing and peer learning, particularly in collaborative academic activities such as group assessments, which in turn support improved academic outcomes. Similarly, Barber (2020) reported that library ambassadors in Southampton Solent University mainly assisted with tracing information resources and providing IT-related services. Equally, Ma and Feng (2018), confirmed that student-led ambassador programmes foster peer-to-peer learning, innovation, and support for students from underserved communities.

4.6 Challenges that hinder effective implementation of the programme

Respondents were asked to state the challenges faced by Knowledge Ambassadors when implementing their activities and the participants outlined the following as being the main challenges they faced. Results from the interviews revealed the following challenges.

- Power outages delay effective implementation of the session with fellow students.
- Limited participation by students
- Time constraint as they must balance academic work with their responsibilities.
- Limited library space
- Staff capacity
- Lack of relevant skills to deal with students with disabilities

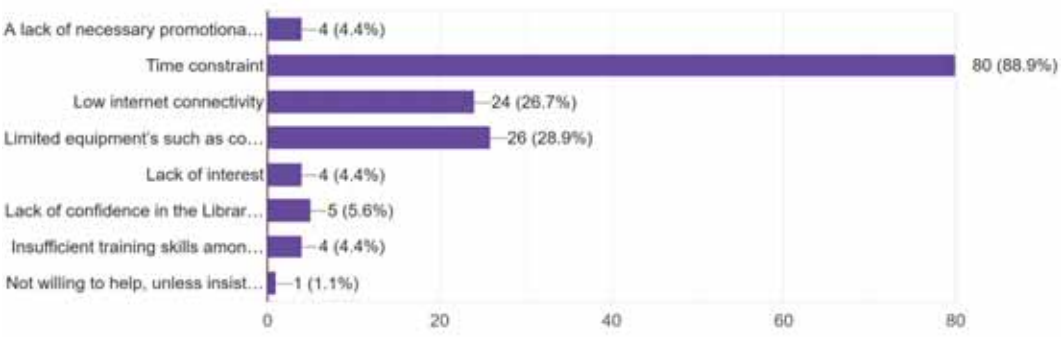
One of the staff members indicated that, while they strive for inclusivity,

> *"There is a need for equipment's such as assistive technologies (speech-to-text software) to accommodate the blind, and training to staff members for us to know how to engage with such groups of students is needed". Staff-1*

While the results from the online survey showed that challenge majority cited time management as being the main challenge. Figure 6 showed that 88.9% of respondents, followed by limited equipment such as computers (28.9%) and low internet connectivity (26.7%). Less common issues included lack of promotional materials, low student interest, insufficient skills, and low confidence (each 4.4%), while only 1.1% indicated that some ambassadors might be unwilling to help. Figure 6 below shows the challenges encountered.

Figure 6

Challenges encounter



These findings align with earlier studies by Kibe and Kwanya (2015), Everett and Bischoff (2021), Sulle and Wema (2023) and Mama and Cansancio (2024), who also identified time constraints, academic

workload, low student engagement, and infrastructural barriers as key challenges in peer-led or student-support programmes. This similarity reinforces the idea that such challenges are common across institutions and contexts. However, unlike the current study, these authors additionally highlighted misconceptions about ambassador roles, inadequate mentorship, inadequate funds, lack of incentives and misconceptions about the accountability of student knowledge ambassadors. and inadequate funding as major obstacles. The absence of these issues in the current findings may indicate stronger role clarity and better institutional support at the Ongwediva Campus Library compared to other contexts. On the other hand, Lasig et al. (2025) pointed out that despite the library being a crucial component in moulding the learning environment of any successful academic institution, there was a need to increase membership base of staff for them to effectively meet the demanding needs of students. This shows that staff capacity remains crucial in effectively implementing such programmes. Most importantly, the results also reveal a skills gap among staff regarding support for students with disabilities, as well as insufficient specialised equipment. While previous studies did not address these inclusivity challenges, the present findings highlight a critical need for training and resources to ensure that all users-including those with disabilities are fully accommodated within the programme.

5. Study's Implications

The study has important implications for the Ongwediva Campus Library and the wider academic community. A student-led Knowledge Ambassadors Programme can enhance outreach, improve information literacy, and increase use of library resources while reducing staff workload. It offers a scalable, cost-effective peer-learning model that could be expanded to other campuses. The study also contributes to literature on peer-led initiatives in academic libraries by showing how student-driven programmes influence user engagement. Future research could explore longitudinal impacts, cross-campus comparisons, and strategies to promote digital resources and virtual library services.

6. Conclusions

This study demonstrated that the student-Led Knowledge Ambassadors Programme plays a significant role in enhancing library utilisation at the Ongwediva Campus Library. Through increased awareness, improved information literacy support, and strengthened peer engagement, the programme contributed to greater student interaction with library resources and services. The findings highlight the value of peer-led initiatives in academic libraries and suggest that continued investment in such programmes can further improve student learning experiences and be able to overcome challenges that are currently encountered. Overall, the programme has proven to be an effective model for promoting library use and fostering a supportive academic environment.

7. Recommendation

The study recommends that the Ongwediva Campus Library strengthen and institutionalise the student-Led Knowledge Ambassadors Programme, as it has proven effective in enhancing library awareness and utilisation.

- There is a need for a dedicated budget to support the programme.
- There is need to improve ICT infrastructure
- There is a need for a dedicated training space
- There is a need for Library staff to develop flexible duty schedules aligned with ambassadors' academic timetables.
- There is a need for Library staff to train students on how to balance academic and programme responsibilities.
- There is a need to train library staff on how to assist students with disabilities.

- There is a need for Library staff should develop a monitoring and evaluation system to track the programme's impact and identify areas for improvement.
- Rewards to be given to students who volunteer in this programme e.g. certificates.

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DATA, ANALYTICS, AND CYBERSECURITY IN LIBRARIES AND INFORMATION

Data Veracity as a Catalyst for Perceived Reliable Library Research Data Services Among Graduate Students

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Abstract

Graduate students rely on academic and research libraries as dependable sources of accurate and trustworthy information to support their learning and research. However, in today's increasingly data-driven academic and research environment, the reliability of library services depends not only on effective service delivery but also on the veracity (quality) of data, particularly its truthfulness, traceability, and transparency. Despite this shift, limited empirical research has examined the influence of the dimensions of data veracity on graduate students' perceptions of reliable library research data services (PRLS). This non-experimental, cross-sectional quantitative study examined the collective and individual effects of data veracity dimensions on PRLS among eighty-six graduate students at the University of Zambia. Data were collected through an online survey and analyzed using multiple linear regression. Findings revealed that data veracity dimensions collectively influenced PRLS. Traceability, truthfulness, and transparency were significant predictors, with traceability demonstrating the strongest influence. The findings reveal that verifiable and transparent data practices are of great significance to the quality of library research data services. Libraries should therefore prioritize data-provenance tracking while strengthening transparent and truthful data practices to enhance the quality of research data services.

Keywords: *data quality, data veracity, perceived reliability, research data services.*

1. Introduction

Graduate students rely on academic and research libraries as sources of credible and trustworthy information to support learning and research. They provide research data services that support the management, curation, preservation, discovery, sharing, and reuse of research data underpinning scholarly inquiry (Schmidt et al., 2024; Tenopir et al., 2020). As libraries expand these services, their reliability may depend not only on the availability and accessibility of research data but also on whether users perceive such services as trustworthy and dependable for scholarly use. This raises an important question about the role of data veracity in shaping graduate students' perceptions of reliable library research data services.

1.1 Perceived Reliable Library Research Data Services (PRLS)

Research data services include research data support that academic and research libraries provide across the research data lifecycle. These services include data management planning, organisation and documentation, curation and preservation, and data sharing and reuse (Cox and Pinfield, 2014; Tenopir et al., 2014). Reliability is central to the delivery of these services, since it reflects the library's ability

to provide research data services dependably and accurately (Parasuraman et al., 1988). In this study, reliability is understood as users' perceptions that library research data services are credible, consistent, and dependable. It also reflects their confidence that these services provide accurate, trustworthy, and transparent research support for their research data needs.

However, the reliability of research data services depends not only on how well libraries deliver these services but may also depend on the quality and trustworthiness of the research data they support. When research data are credible, verifiable, and trustworthy, users may have greater confidence in the services through which they access and use them. Thus, the veracity of research data may contribute to users' perceptions of reliable library research data services.

Accordingly, this study conceptualises PRLS as graduate students' perceptions of the extent to which libraries provide research data services that are dependable and accurate to support accessing and using trustworthy research data. Dependability and accuracy of service are therefore central attributes of PRLS, reflected in providing services as promised, delivering them at the promised time, and maintaining error-free records (Parasuraman et al., 1988).

1.2 Data Veracity

Data veracity, one of the five commonly recognised characteristics of big data, has been defined in relation to "uncertainty due to data inconsistency & incompleteness, ambiguities, latency, deception, model approximations" (Reimer & Madigan, 2019, p. 1291). Broadly, veracity concerns the credibility and trustworthiness of data and the extent to which users can have confidence in them for their intended purposes (Assiri, 2020; Lukoianova & Rubin, 2014; Reimer & Madigan, 2019). Berti-Equille and Borge-Holthoefer (2016) extend this conceptualisation by framing data veracity around the challenge of distinguishing reliable and trustworthy data from conflicting, erroneous, or potentially false information, emphasising truth discovery and the trustworthiness of data sources. Similarly, Lukoianova and Rubin (2014) relate veracity to data quality and credibility and identify objectivity, truthfulness, and credibility as important dimensions for assessing veracity.

Data veracity has been extensively studied in big data systems and data-intensive environments, including social media platforms, web-based systems, and healthcare systems (Assiri, 2020; Berti-Equille & Borge-Holthoefer, 2016; Reimer & Madigan, 2019). These studies have largely focused on data uncertainty, inconsistencies, errors, provenance, credibility, and trustworthiness. However, less attention has been given to data veracity within information science, particularly in relation to the quality and trustworthiness of research data. This gap is important as academic and research libraries increasingly support the management, discovery, access, and reuse of research data. Understanding data veracity in this context can help establish whether research data supported through library services are sufficiently trustworthy for scholarly use.

Building on these conceptualisations, the present study conceptualises data veracity as a three-dimensional construct comprising truthfulness, traceability, and transparency. Truthfulness refers to the extent to which research data accurately and faithfully represent what they purport to represent (Lukoianova & Rubin, 2014), enabling users to assess their credibility and freedom from distortion, errors, or misleading representations. Traceability concerns users' ability to establish and verify the origins and transformations of research data throughout their lifecycle through documented provenance. Provenance captures information about data origins and processing history, thereby supporting traceability and reproducibility (Gierend et al., 2023)including electronic patient data from German medical data integration centers (DICs. Transparency complements these dimensions through well-documented methods, procedures, and processes by which research data are generated, processed, and managed. Transparent data practices provide contextual information about provenance, collection and processing methods, limitations, and

conditions of reuse, enabling users to evaluate data for responsible use (Weissgerber et al., 2024; Wilkinson et al., 2016).

Together, these dimensions provide users with evidence for determining whether research data can be understood, verified, trusted, and responsibly reused. Data veracity is therefore treated in this study as the predictor construct, represented by truthfulness, traceability, and transparency.

1.3 Data Veracity and Perceived Reliable Library Research Data Services

The relationship between data veracity and perceived reliable library research data services (PRLS) rests on the premise that users' perceptions of research data services may be shaped partly by the quality and trustworthiness of the data libraries provide. A library may provide efficient mechanisms for accessing research data, but users may still question the reliability of its research data services if the data cannot be verified, traced, or understood through transparent documentation and processing information. On the other hand, research data that are perceived as truthful, traceable, and transparent may strengthen users' confidence in the services through which those data are supported.

Thus, data veracity and PRLS are conceptually distinct but related. Data veracity represents attributes through which the trustworthiness of research data can be evaluated (Berti-Equille, 2016; Berti-Equille & Ba, 2016)exchanged, and consumed. User-generated content on the Web is massive, highly dynamic, and characterized by a combination of factual data and opinion data. False information, rumors, and fake contents can be easily spread across multiple sources, making it hard to distinguish between what is true and what is not. Truth discovery (also known as fact-checking, whereas PRLS represents users' perceptions of the dependability and accuracy of the library research data services supporting their scholarly activities (Parasuraman et al., 1988; Wang & Strong, 1996). The present study proposes that higher perceptions of data veracity are associated with stronger perceptions of reliable library research data services.

However, despite the growing role of academic libraries in supporting research data, limited empirical attention has been given to whether and to what extent data veracity predicts graduate students' perceptions of reliable library research data services (PRLS). In particular, little is known about the collective contribution of data veracity dimensions to PRLS, the unique contribution of each dimension, and which dimension contributes most strongly to perceived reliability among graduate students. Addressing these relationships is important for identifying the data attributes that libraries should prioritize when developing and delivering trustworthy research data services. The current study addresses the following research questions:

- To what extent do data veracity dimensions collectively predict graduate students' PRLS?
- To what extent does each data veracity dimension individually predict PRLS?
- Which data veracity dimension contributes most strongly to PRLS?

1.4 Conceptual and Theoretical Foundations

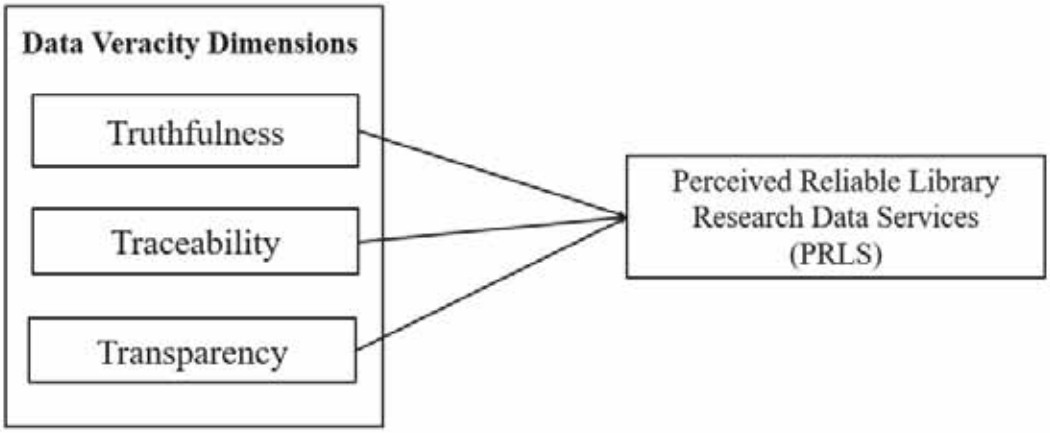
This study is anchored in Wang and Strong's (1996) Data Quality Framework (DQF) and the Parasuraman et al.'s (1988) SERVQUAL model. Wang and Strong conceptualise data quality from the perspective of data consumers and organise data quality attributes into four broad categories: intrinsic, contextual, representational, and accessibility quality. This study centers on intrinsic value to understand whether data possess quality in their own right. It is postulated that graduate students may judge research data as truthful, traceable, and transparent, which can make it credible and trustworthy for scholarly use. Parasuraman et al.'s (1988) SERVQUAL model complements DQF by explaining the perceived reliability of library research data services. Parasuraman and colleagues conceptualise service quality through several dimensions, including reliability, which refers to the ability to perform the promised services dependably and accurately. In the library perspective, reliability reflects graduate students' perceptions of dependable

and accurate research data support. These two frameworks help establish theoretical logic linking data veracity to PRLS.

Collectively, DQF and SERVQUAL explain the data-quality attributes underlying users' judgments of data veracity and their perceptions of service reliability. Drawing on these two theoretical foundations and the reviewed literature, this study conceptualises data veracity as the predictor construct, operationalised through truthfulness, traceability, and transparency, and PRLS as the outcome construct. The study hypothesises that data veracity dimensions collectively and individually predict PRLS and that their relative contributions may differ. These hypothesized relationships constitute the study's conceptual framework, presented in Figure 1.

Figure 1

Conceptual Framework Showing the Hypothesized Influence of Data Veracity Dimensions on PRLS



2. Methods

2.1 Study Design

This study employed a non-experimental, cross-sectional, quantitative survey design to examine the predictive power of the three data veracity dimensions on PRLS. Specifically, the study assessed the collective and individual influence of data veracity dimensions on PRLS among graduate students. The design was appropriate for quantifying relationships among variables and testing predictive hypotheses using statistical techniques. A multiple linear regression was used to examine the collective and individual contributions of the three predictors.

2.2 Participants and Sampling

The current study is derived from a larger project that examined the data and information literacy competencies of graduate students enrolled at the University of Zambia (UNZA). Master's and doctoral students with prior experience accessing data and information resources through the institutional databases were included. This was determined by a brief screening questionnaire embedded in the online survey. Given the nature of participant recruitment, a convenience sampling technique was employed. A total of eighty-six (86) eligible graduate students were invited to participate. Participation was voluntary, and students were required to provide informed consent electronically before completing the survey.

2.3 Instrument/Measures

A structured, self-administered questionnaire was designed using five-point Likert-type items (1 = Strongly Disagree to 5 = Strongly Agree). For the current study, relevant items were extracted from the original dataset to operationalise the two primary constructs: (1) Data Veracity, comprising truthfulness, traceability, and transparency, and (2) perceived reliable library research data services (PRLS), comprising users' perceptions of the dependability and consistency of library research data services. Before data collection, the instrument was pretested to assess internal consistency and construct reliability. Truthfulness (α = .863), traceability (α = .897), and transparency (α = .906) demonstrated high internal consistency, while PRLS showed excellent internal consistency (α = .937). The overall instrument also demonstrated high internal consistency (α = .889). Sampling adequacy was excellent (KMO = .923), and Bartlett's test of sphericity was statistically significant, χ^2 (190) = 1812.11, $p < .001$, indicating that the data were suitable for factor analysis.

2.4 Data Analysis

Data were coded and analysed using IBM SPSS Statistics Version 31.0. Descriptive statistics, including means and standard deviations, were used to summarize the study variables. Multiple linear regression was conducted to assess the predictive relationship between the three data veracity dimensions and PRLS. Both unstandardized (B) and standardized (β) coefficients, standard errors (SE), and p-values were reported, with significance set at $p < .05$. Regression assumptions were assessed before analysis. Linearity and homoscedasticity were examined using standardized residual and predicted-value plots, normality through the distribution of residuals, independence of errors using the Durbin–Watson statistic, and multicollinearity using tolerance and variance inflation factor (VIF) statistics. Diagnostics revealed tolerance values ranging from .178 –.381 and VIF values ranging from 2.622 – 5.628. Although the VIF for traceability was high, this didn't warrant exclusion of the predictor from the model. Therefore, no substantial violations of these assumptions were observed. The relationship was modeled using the following equation:

$$PRLS = \beta_0 + \beta_1 (Truthfulness) + \beta_2 (Traceability) + \beta_3 (Transparency) + \varepsilon$$

where β_0 represents the intercept (expected value of PRLS when all predictors equal zero), β_1–β_3 denote the regression coefficients associated with truthfulness, traceability, and transparency, and ε represents the error term.

2.5 Ethical Considerations

Participants were provided with detailed information on the study's purpose, procedures, risks, and rights before giving their electronic consent. Anonymity and confidentiality were assured, and the right to withdraw at any stage without penalty or consequence. Since no personal or sensitive identifiable information was collected, the study did not require formal ethical clearance.

3. Results

A multiple linear regression (MLR) analysis was conducted to determine the extent to which the three data veracity dimensions (Truthfulness, Traceability, and Transparency) collectively and individually predicted PRLS. Before analysis, the dataset was screened for accuracy, completeness, and the presence of missing values. After data cleaning, all eighty-six (86) cases were retained for analysis since no missing or incomplete values were identified. Descriptive and inferential statistical analyses were computed using IBM SPSS version 31.0.

3.1 Descriptive and Correlational Analysis

Table 1

Descriptive Statistics and Pearson Correlations Among Study Variables

Variable	Mean	SD	PRLS	Truthfulness	Traceability
PRLS	3.48	1.14	—		
Truthfulness	3.84	1.02	.69***	—	
Traceability	3.33	1.13	.83***	.61***	—
Transparency	3.02	1.19	.76***	.54***	.81***

Note. PRLS = Perceived Reliable Library Research Data Services; *SD* = standard deviation. *** $p < .001$.

Table 1 presents the descriptive (mean scores and standard deviations) and correlational statistics for the four study variables. The mean value for PRLS ($M = 3.48$, $SD = 1.14$) suggests a moderate level of PRLS. Among the predictors, Truthfulness had the highest mean score ($M = 3.84$, $SD = 1.02$) followed by Traceability ($M = 3.33$, $SD = 1.13$), and lastly Transparency ($M = 3.02$, $SD = 1.19$). These findings indicate that while respondents generally rated the data veracity attributes positively, transparency was perceived less favourably.

Further, the table reveals that all three data veracity dimensions were positively and significantly correlated with PRLS. Traceability demonstrated the strongest correlation with PRLS ($r = .83$, $p < .001$), followed by transparency ($r = .76$, $p < .001$) and truthfulness ($r = .69$, $p < .001$). The data veracity dimensions were also positively intercorrelated, with the strongest relationship occurring between traceability and transparency ($r = .81$, $p < .001$).

3.2 Regression Analysis

A multiple linear regression (MLR) was conducted to examine the extent to which the three data veracity dimensions, both collectively and individually, predicted PRLS and to identify the strongest predictor.

Collective Prediction

Research question one examined the extent to which the three dimensions of data veracity, truthfulness, traceability, and transparency, collectively predict graduate students' perceptions of reliable library research data services (PRLS). A multiple linear regression analysis was conducted to assess their combined predictive effect on PRLS. The regression model results are presented in Table 2.

Table 2

Model Summary for Multiple Linear Regression Predicting PRLS

Model	R	R^2	Adjusted R^2	SE of the Estimate	R^2 change	F Change	df_1	df_2	Sig. F Change	Durbin-Watson
1	.872	.760	.751	.566	.760	86.673	3	82	<.001	2.212

Note: F = F-statistic (or F-ratio), *df* = degree of freedom; *R* = overall correlation; R^2 = proportion of variance; *SE* = Standard Error of the Estimate.

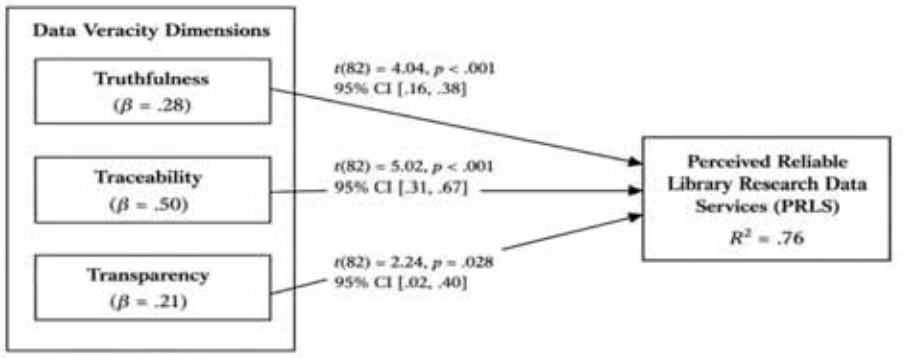
Table 2 shows that the data veracity dimensions (truthfulness, traceability, and transparency) collectively, strongly, and positively predicted perceived reliable library research data services (PRLS) (R = .872, R^2 = .760). The overall regression model was statistically significant, F(3, 82) = 86.673, p < .001, explaining 76.0% of the variance in PRLS. Furthermore, the Adjusted R^2 (.751) confirmed that the model was robust after accounting for the number of predictors. The Durbin–Watson statistic of 2.212 fell within the acceptable range (1.5–2.5), suggesting that the residuals are independent.

Individual Prediction

The second research question examined the extent to which each data veracity dimension individually predicts perceived reliable research data services (PRLS), while the third research question compared the standardized regression coefficients (β) to identify the strongest predictor in the model. The regression coefficients for the individual predictors are presented in the validated framework in Figure 2.

Figure 2

Regression Coefficients Predicting PRLS



Note: β = standardized regression coefficient; CI = confidence interval; R^2 = coefficient of determination; All regression coefficients are statistically significant at p < .05.

Figure 2 shows that the three dimensions of data veracity: Traceability (β = .50, t = 5.02, p < .001), Truthfulness (β = .28, t = 4.04, p = <.001), and Transparency (β = .21, t = 2.24, p = .028) were significant predictors of PRLS. Due to its highest standardised regression coefficient (β = .50), *traceability* emerged as the strongest contributor to the model. These findings confirm that the three data veracity dimensions significantly predict PRLS and that Traceability contributes most strongly among the three significant dimensions.

4. Discussion

4.1 Main Findings

This study examined the extent to which data veracity dimensions collectively and individually predict perceived reliable library research data services (PRLS) among graduate students. The findings highlight a strong, positive, and statistically significant association between data veracity and graduate students' PRLS. The multiple linear regression model was significant, F (3, 82) = 86.673, p < .001, explaining 76% of the variance in PRLS. All the three predictors, Traceability (β = .50, t = 5.02, p < .001), Truthfulness (β = .28, t = 4.04, p <.001), and Transparency (β = .21, t = 2.24, p = .028) were significant contributors. Traceability emerged as the strongest predictor, followed by truthfulness and transparency. These results confirm that traceable, truthful, and transparent research data influence users' perceptions of reliable library research data services.

4.2 Interpretation of Findings

The findings of this study demonstrate that the reliability of library services is closely associated with service quality and align with Ho and Crowley's (2003) study, which revealed that users' perceptions of reliability are affected by their ability to locate materials and access accurate library records. This shows that research data that are truthful, traceable, and transparent can strengthen users' perceptions of reliable library research data services (Wantara, 2015). The strong contribution of traceability further suggests that users' ability to establish data origins, authorship, and transformations is particularly important for perceived reliability. The findings also support Wang and Strong (1996) Data Quality Framework by demonstrating that perceived reliability depends on users' assessment of the quality of the underlying data, consistent with the framework's view that information quality is determined by intrinsic, contextual, representational, and accessibility attributes.

Furthermore, beyond traceability, graduate students are more likely to trust library research data services when they perceive that the library-provided research data are truthful and transparent. Hernon et al. (1999) also hold that service quality depends on aligning user expectations with clearly communicated, transparent performance. They further state that continuous assessment of library services through user-centred models such as SERVQUAL helps identify performance gaps and guide improvement efforts that enhance satisfaction and long-term trust in library research data reliability. This perspective is also confirmed in a study by Sahu (2007), who emphasised the importance of continuous quality improvement and user-centred information delivery. According to Sahu, advocating systematic feedback and service assessment mechanisms ensures that libraries consistently meet users' evolving expectations. These findings therefore extend the traditional service quality framework by integrating data veracity into the reliability construct, showing that graduate students' reliability in library research data services depends on traceable, trustworthy, and transparent data sources.

4.3 Implications

Theoretical Implications

Theoretically, this study advances Data Quality Framework (DQF) by empirically validating that intrinsic data attributes (such as truthfulness, traceability, and transparency) serve as measurable determinants of perceived reliability of library research data services. It further expands the SERVQUAL reliability dimension beyond operational accuracy to incorporate veracity-oriented data attributes, [re]defining reliability as a function of both service consistency and data integrity. This integration contributes to a new conceptual understanding of reliability within data literacy studies in information science, where users' trust is anchored not merely in service responsiveness or staff performance, but in their ability to evaluate the quality, provenance, and transparency of research data as core components of informed and reliable data use in libraries.

Practical Implications

In practice, the findings indicate that the perceived reliability of library research data services depends on how effectively libraries manage and communicate the integrity of their research data. The strong predictive power of traceability highlights the role libraries play in fostering data-literate environments where users can locate, evaluate, and interpret the origin of datasets through robust metadata, audit trails, and documentation detailing data creators, collection methods, and version histories. Libraries should enhance Truthfulness by implementing rigorous data validation procedures and Transparency through clear communication of data management plans [DMPs]. Cultivating a culture of data integrity and openness can improve user confidence, engagement, and loyalty. Finally, embracing veracity-centred practices can increase the visibility and institutional recognition of libraries (Frandsen & Sørensen,

2020; Wolff-Eisenberg, 2017), positioning them as key contributors to academic accountability and research excellence. The multicollinearity diagnostics (VIF < 6) confirm the model's validity; the study limitations, including its single-institution focus, are addressed below. .

4.4 Limitations and Future Work

Although multicollinearity diagnostics indicated no severe multicollinearity, the study's focus on a single instructional setting (University of Zambia) and a relatively small sample (N = 86) limits the generalizability of the results to other academic and research contexts. Additionally, the cross-sectional design limits causal interpretations of the relationships between data veracity dimensions and perceived reliable library research data services. This study also relied on self-reported perceptions of graduate students, which may be subject to response and perceptual biases. Future studies should therefore examine these relationships across multiple institutions and larger, more diverse samples, and consider longitudinal or mixed-methods designs to provide a more comprehensive understanding of how data veracity contributes to reliable library research data services in various library contexts, over time.

5. Conclusion and Recommendation

5.1 Key Contributions

This study demonstrates that the reliability of research data services within academic and research libraries is intricately tied to users' ability to trace the provenance, truthfulness, and transparency of data. The significant effects of traceability, truthfulness, and transparency have a substantial influence on users' perceptions of reliability. The study also shows that highly regarded datasets foster users' confidence in library services. Therefore, strengthening data veracity mechanisms within library systems can enhance users' critical engagement with data, thereby advancing data literacy in practical settings.

5.2 Theoretical and Practical Recommendations

This study recommends that libraries should prioritise integrating veracity-centred practices into their operational frameworks. This can be achieved by strengthening data traceability through comprehensive metadata documentation and audit trails, ensuring accuracy through rigorous data validation processes, and promoting transparency by openly communicating data-handling procedures. Furthermore, embedding data veracity metrics within service quality evaluations enables libraries to demonstrate measurable contributions to research accountability, open science, and informed data use. By fostering a culture of data integrity and openness, libraries can enhance user trust, increase engagement, and reinforce their position as indispensable partners in the academic and research ecosystem.

Conflict of Interest

The author has no conflict of interest to disclose.

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Declaration of Generative AI and AI-Assisted Technologies in Writing

During the preparation of this work, the author used ChatGPT (v5.2) and Grammarly (v1.2.2). Grammarly supported editing, proofreading, and language refinement, while ChatGPT assisted in ideation. However, AI tools and AI generative technologies were not used to write the paper. The analysis, synthesis, and overall content were solely the responsibility of the author, who independently wrote, reviewed, and edited, and therefore takes full responsibility for the final content of this manuscript.

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Data Privacy and Information Security Among Academic Libraries in Africa: A Systematic Review

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Abstract

This systematic review examines data privacy and information security practices in academic libraries across African higher learning institutions (HLIs), highlighting the unique challenges these institutions face and how to address them. African academic libraries manage a wide range of data, including personally identifiable information (PII), research outputs, and institutional records, while increasingly adopting digital platforms, AI tools, and immersive technologies such as metaverse environments. The review synthesises findings from multiple databases, including Scopus, Web of Science, Taylor & Francis, Emerald Insight, and Google Scholar, retrieving 494,835 peer-reviewed articles. The findings indicate that data privacy and information security are treated as interdependent priorities, encompassing technical safeguards (such as encryption, access controls, firewalls, and secure authentication), policy development aligned with national and international regulations, staff and user training, and ethical oversight. However, significant challenges persist, including limited staff awareness, low budget, infrastructural constraints, weak institutional governance, dependence on third-party vendors, low user digital literacy, and inconsistent compliance with legal frameworks. The review also identifies effective strategies adopted by African libraries, such as multi-layered security measures, privacy-centric policies, staff capacity building, user education programmes, vendor management, and collaborative approaches to digital governance. These findings underscore the need for context-specific solutions that integrate technical, organizational, human, and ethical dimensions to safeguard sensitive information. The review has practical implications for library administrators, policymakers, and educators, providing guidance on resource allocation, robust data protection policies, capacity-building initiatives, and fostering a culture of privacy and information security within African academic libraries.

***Keywords**: academic libraries, cybersecurity, data privacy, digital literacy, information security.*

1. Introduction

Academic libraries play a central role in higher learning institutions (HLIs), supporting teaching, learning, and research by providing information resources, digital services, and access to research outputs. With the growing adoption of digital technologies, these libraries now handle increasingly large volumes of sensitive data, including patrons' personal identifiers, authentication logs, circulation records, usage analytics, and research datasets (Greenhall, 2019; Li et al., 2020; Masenya & Ngulube, 2019; Zirra et al., 2019; Nakaziba & Ngulube, 2024). The digital transformation of library services through institutional repositories, online databases, cloud-based systems, and Artificial Intelligence (AI)-enabled tools has amplified the need to safeguard data privacy and ensure robust information security. These

practices are essential for maintaining user trust, protecting intellectual property, and upholding ethical and legal responsibilities in the digital academic environment (Henen, 2025; IFLA, 2019; Saha, 2024). Data privacy in African academic libraries primarily concerns protecting the personal information of users, research outputs, and institutional records from unauthorised access or misuse (Vashishth et al., 2024). It encompasses ethical, legal, and professional obligations to safeguard sensitive information while supporting intellectual freedom and equitable access to resources (Pedley, 2022). Information security complements data privacy by providing the technical and organizational mechanisms, such as encryption, firewalls, secure authentication, access controls, audit trails, and anonymisation, that ensure the confidentiality, integrity, and availability of data (Kokila & Reddy, 2025; Mishra et al., 2025). In practice, these two concepts are intertwined, particularly with the integration of digital learning platforms, AI tools, and immersive technologies, which generate more sensitive data, including behavioural and biometric information (Achuthan et al., 2025; Lai et al., 2025).

2. Data Privacy and Information Security in Academic Libraries

The rapid advancement of digital technologies and the increasing use of artificial intelligence (AI) have heightened concerns about data privacy and information security in library and information services. Many academic libraries rely on commercial digital platforms that collect substantial amounts of user information and may share data with third parties, creating risks to privacy, intellectual freedom, and democratic participation. The IFLA Statement on Privacy in the Library Environment emphasises that privacy is fundamental to the library profession and that libraries have a responsibility to determine what user data are collected, how they are managed and secured, and which external services are appropriate (IFLA, 2019). However, monitoring data-collection practices by vendors and government entities remains challenging. Academic libraries manage diverse sensitive information, including personal information, research outputs, institutional records, and user data (Maiwada, 2019). African academic libraries therefore serve as custodians, educators, and facilitators of responsible data management. Their responsibilities include acquiring, organising, accessing, retaining, and securely disposing of physical and digital information (Bansal et al., 2016; Wieringa et al., 2021). The increasing adoption of online catalogues, digital repositories, cloud-based systems, and AI-enabled platforms has expanded both the volume and sensitivity of data managed by libraries (Nakaziba & Ngulube, 2024; Otike, 2023). Data privacy focuses on the responsible collection, use, management, and protection of confidential information, while information security provides technical and organisational safeguards, including encryption, firewalls, secure authentication, and access controls (Henen, 2025; Saha, 2024). Without effective safeguards, libraries remain vulnerable to phishing, hacking, data breaches, and ransomware. These vulnerabilities are intensified by inadequate infrastructure, limited resources, and insufficient staff training in many African contexts (Kiilu & Nzuki, 2016; Lubua et al., 2022; Kotoroi, 2023). Furthermore, digital repositories and emerging technologies create additional privacy and trust concerns that require stronger governance and protection mechanisms (Al Shobaki et al., 2020; Bamgbose et al., 2025). Consequently, robust privacy and security frameworks are essential for protecting sensitive information, maintaining user trust, fulfilling ethical and legal obligations, and supporting responsible technological innovation.

3. Methodology

3.1 Research question

The review is guided by the primary research question: "How do academic libraries address data privacy and information security to enhance users' access to and use of their resources and services?"

3.1 Inclusion and Exclusion Criteria (Table 1)

Table 1

Inclusion and Exclusion Criteria

Criteria	Inclusion	Exclusion
Focus	Data privacy and information security	Studies not focused on data privacy and information security
Type of publication	Peer-reviewed articles	Non-peer-reviewed articles
Population	Academic libraries	Non-academic libraries
Language	Articles published in English	Articles not published in English
Time frame	Articles published between 2015 and 2025	Articles published before 2015 and after 2025
Study design	Quantitative, qualitative, mixed-methods studies	Theoretical analyses, longitudinal studies

The 2015–2025 timeframe encompasses contemporary studies that reflect advances in digital library systems, rising cybersecurity threats, and evolving data protection laws. It includes major regulatory developments, such as the General Data Protection Regulation (GDPR) and African laws like the Protection of Personal Information Act (POPIA), the Nigeria Data Protection Regulation (NDPR), and Kenya's Act, as well as the rapid digital transformation in academic libraries and the related privacy challenges.

3.2 Search strategy

A comprehensive search strategy was developed to identify relevant literature for the review. The search was conducted across multiple academic databases, including Scopus, Web of Science, Taylor and Francis, Emerald Insight, and Google Scholar. Keywords and subject headings were combined using Boolean operators (AND, OR) to capture studies related to data privacy, information security, and academic libraries.

3.3 Screening Process

The screening and selection of studies were conducted using CADIMA, an online tool for systematic reviews (Kohl et al., 2018). After importing all search results into CADIMA, duplicate records were removed. The remaining studies underwent a two-stage screening process:

- Title and abstract screening: Each record was assessed against the predefined inclusion and exclusion criteria to determine its relevance.
- Full-text screening: Studies that passed the initial screening were reviewed in full to confirm eligibility.

Throughout the process, CADIMA was used to document decisions, track reasons for exclusion, and ensure transparency and reproducibility. The final set of included studies was then exported for data extraction and synthesis.

3.4 Quality Assessment

A quality assessment of 22 studies on data privacy and information security in African academic libraries was conducted using the Newcastle-Ottawa Scale (NOS) (Luchini et al., 2017), evaluating research design, methodological rigor, sample adequacy, data collection, ethical considerations, contextual rel-

evance, and clarity of findings. Of these, 9 studies (40%) were high quality, 10 (44%) moderate, and 3 (16%) low quality. Most studies were credible, supporting the validity of the synthesised findings. However, gaps in methodological rigor and reporting were noted.

3.5 Data Extraction

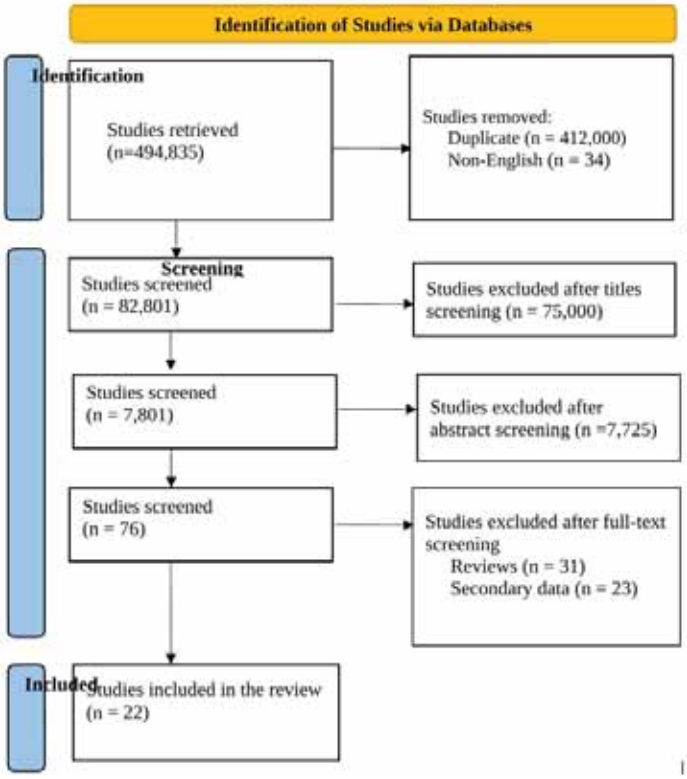
The data extraction process involved developing a structured data extraction form to ensure consistency and systematically capture key information across the included studies. Extracted information encompassed study characteristics such as author(s), year of publication, country, library type, and study design; types of data managed, including PII and research outputs; data privacy and information security measures, covering technical, organizational, policy-related, and ethical aspects; challenges encountered, such as limited staff awareness, infrastructural constraints, and gaps in compliance; as well as strategies and recommendations implemented. To minimise bias, extraction was conducted independently by two reviewers, with any discrepancies resolved through discussion or consultation.

4. Results

Out of 494,835 peer-reviewed articles retrieved, 22 studies met the inclusion criteria established for this review. Accordingly, the PRISMA framework, which stands for Preferred Reporting Items for Systematic Reviews and Meta-Analyses (Asar et al., 2016; Moher et al., 2009), was applied to systematically document the identification, screening, and selection processes of these studies (Figure 1).

Figure 1

PRISMA Flow Diagram



4.1 Data Privacy Practices

Data privacy practices in academic libraries across Africa are increasingly recognised as core ethical, professional, and legal responsibilities closely linked to information security, institutional governance, intellectual freedom, and user trust. Libraries serve as custodians of sensitive information, including personally identifiable information (PII), research outputs, and institutional records. Effective privacy practices enable users to access information freely without fear of surveillance, judgement, or misuse, thereby supporting intellectual freedom and equitable access (Wong & Chiu, 2024; Hess et al., 2025; Kachota et al., 2025; Tsekea & Mandoga, 2025). As digital technologies, AI tools, and immersive systems such as metaverse platforms are increasingly adopted, libraries' responsibilities intensify because these technologies may collect behavioural, biometric, and usage-pattern data requiring rigorous ethical oversight (Oladokun et al., 2025). Many African academic libraries are implementing technical safeguards to protect sensitive information. These include encryption, secure authentication, fine-grained access controls, audit trails, and secure storage. A study at a major research university documented encryption, secure authentication, and fine-grained access controls to ensure the confidentiality and integrity of patron and institutional data (Hess et al., 2025). Similarly, a digital repository initiative at a large East African university demonstrated the use of audit trails and secure storage to protect research outputs and restrict access to authorised users (Kachota et al., 2025). These practices demonstrate the convergence of data privacy and information security in library operations. Beyond technical measures, libraries are developing data-handling policies aligned with local and regional legal frameworks. In Ghana, academic libraries established protocols for data retention, anonymisation of research participant information, and oversight of third-party vendor services in accordance with national data protection legislation (Avuglah et al., 2021). In southern Africa, institutions have integrated legal requirements, including POPIA, into internal policies governing digital library use and user consent (Moyana & Chuma, 2023). These measures strengthen lawful, transparent, and ethical data stewardship.

Staff training and user education are also central to privacy protection. Librarians participate in workshops on ethical data management, cybersecurity hygiene, and emerging risks associated with AI-enhanced platforms (Dewa, 2025). Universities also provide sessions for students and researchers on safe digital practices and personal data rights (Latif et al., 2025). Such initiatives strengthen institutional capacity and foster a culture of privacy and secure information use. Emerging technologies create both opportunities and responsibilities. In Nigeria, an AI-powered learning platform was implemented with a data governance policy covering user consent, data minimisation, and secure storage (Oladokun et al., 2025). In South Africa, a pilot immersive learning environment used anonymised user logs and encrypted sessions to safeguard participant privacy while supporting innovative pedagogical approaches (Tsekea & Mandoga, 2025). Overall, African academic libraries are increasingly adopting holistic privacy frameworks integrating ethical commitment, technical safeguards, policy compliance, and capacity building. This approach protects the confidentiality, integrity, and availability of information, builds user trust, supports equitable access, and reinforces libraries as secure and reliable knowledge environments (Oladokun et al., 2025; Tsekea & Mandoga, 2025; Gupta, 2025). It also supports responsible innovation while strengthening institutional accountability and safeguarding users' rights in digital environments.

4.2 Information Security

Information security in academic libraries is a foundational framework for protecting data privacy and ensuring the confidentiality, integrity, and ethical use of patrons' information. Technically, libraries use firewalls, encryption, antivirus software, audit trails, authentication systems, access controls, intrusion detection, and anonymisation to protect digital systems and sensitive data (Moyana & Chuma, 2023; Musa & Yelwa, 2025; Hess et al., 2025). With the expansion of AI-driven services, libraries increasingly

employ continuous monitoring, synthetic data, predictive intelligence, and vendor security evaluations (Tsekea & Mandoga, 2025; Oladokun et al., 2025). African examples demonstrate the importance of these measures. The National Archives and Records Service of South Africa (NARSSA), for example, uses firewalls, audit trails, and strong passwords, supported by compliance with POPIA and cybersecurity laws (Moyana & Chuma, 2023). Similarly, metaverse libraries in Nigeria require encryption and monitoring to secure immersive digital environments (Oladokun et al., 2025). Organizational and procedural measures are important. These include privacy policies, risk assessments, incident response plans, staff training, and governance frameworks that promote secure data handling (Katulić, 2023; Ali et al., 2025). South African universities, for instance, are required to establish POPIA-aligned governance structures to protect personal data (Netshakhuma, 2020). However, African studies reveal institutional readiness gaps. Tanzanian academic libraries face weak policies, inconsistent practices, and limited technical infrastructure, undermining data protection (Kachota et al., 2025).

Librarians' ethical and professional responsibilities constitute a core dimension of information security. Librarians protect patron privacy, promote digital and privacy literacy, advocate ethical technology use, and safeguard intellectual freedom (Latif et al., 2025; Hess et al., 2025). Staff training, awareness, and a culture of responsible data handling are therefore essential. In Ghana, Avuglah et al. (2021) identified significant gaps in librarians' and students' awareness of security procedures, showing how human factors can weaken privacy protection. Zimbabwean studies similarly emphasise secure communication systems and technical controls to prevent unauthorised access during online interactions (Chisita et al., 2025). Despite their importance, information security practices face challenges, including limited budgets, inadequate infrastructure, insufficient training, weak privacy policies, vendor non-compliance, and partial adherence to legal frameworks (Ali et al., 2020; Musa & Yelwa, 2025). These challenges are pronounced in lower-resourced African institutions, where staff preparedness and institutional support remain limited (Dewa, 2025; Ajagekar, 2024). Information security and data privacy are inseparable: technical controls protect systems and data, organizational processes promote accountability and compliance, while human and ethical practices ensure responsible information stewardship.

4.3 Library Roles

Academic libraries play multifaceted roles, integrating professional, educational, legal, ethical, and technological responsibilities to safeguard information, empower users, and support institutional goals. At their core, libraries serve as protectors of privacy and ethical custodians of data, ensuring the confidentiality, integrity, and responsible use of personal, institutional, and digital information (Avuglah et al., 2021; Katulić, 2023; Latif et al., 2025; Tsekea & Mandoga, 2025). Avuglah et al. (2021) note that Ghanaian academic libraries safeguard patron privacy, communicate clear policies, educate staff and users on privacy rights, enforce responsible data practices, provide secure access to resources, and build trust by integrating professional, ethical, and educational responsibilities in the management of sensitive information. Libraries also act as custodians and managers of information, overseeing the acquisition, organisation, storage, access, and secure disposal of both physical and digital resources, including personal data and digital knowledge assets such as repositories and AI-enhanced tools (Ali et al., 2025; Ajagekar, 2024; Dewa, 2025; Hess et al., 2025; Okike & Adetoro, 2019). Okike and Adetoro (2019) highlight that Nigerian university libraries strike a balance between accessibility and protection, maintaining system security, educating users on information risks, and managing IT operations while safeguarding privacy. Libraries also function as educators, promoting digital literacy, privacy awareness, ethical technology use, and cybersecurity best practices among staff and patrons, fostering responsible and safe information behaviour (Esh, 2025; Rysavy & Michalak, 2019; Tsekea & Mandoga, 2025). Tsekea and Mandoga (2025) emphasise that Zimbabwean university libraries support teaching and learning through AI-enhanced services, advocate for the ethical use of AI and academic integrity, implement secure digital tools, safeguard user data, and promote equitable access to minimise AI bias. Through

policy development and advocacy, libraries establish and enforce guidelines, ensure compliance with regulatory frameworks (e.g., GDPR, POPIA), manage risks, and oversee vendor agreements, aligning institutional operations with legal, ethical, and security standards (Latif et al., 2025; Ali at al., 2025). Technologically, libraries adopt secure digital systems, AI platforms, and emerging technologies while monitoring cyber threats, promoting safe digital practices, and enhancing service delivery (Oladokun et al., 2025; Ajagekar, 2024; Tsekea & Mandoga, 2025; Esh, 2025). Additionally, libraries act as strategic collaborators, partnering with ICT units, legal experts, professional networks, and external stakeholders to strengthen governance, ensure service continuity, and advance institutional digital transformation (Moyana & Chuma, 2023). By upholding principles of trust, transparency, equity, and intellectual freedom, libraries ensure fair access, the ethical use of information, the protection of user rights, and the preservation of cultural and scholarly heritage (Moyana & Chuma, 2023; Katulić, 2023; Tsekea & Mandoga, 2025). Collectively, these roles position academic libraries as essential knowledge hubs, ethical stewards, and technological enablers, central to teaching, learning, research, and secure information management in the digital era.

4.4 Challenges

Academic and university libraries in Africa face complex challenges in managing data privacy and information security, as well as in adopting emerging technologies. Limited awareness and training among library staff on privacy, cybersecurity, and legal frameworks remain a critical concern. Ali, Jabeen, and Ur Rehman (2025) note that librarians have only moderate knowledge of data protection laws, with gaps in their understanding of digital rights, the GDPR, and evolving privacy practices. In South Africa, Netshakhuma (2020) reports that the ineffective implementation of POPIA is driven by a lack of staff understanding, poor stakeholder collaboration, and inadequate ICT controls. Similarly, Igbinovia and Ishola (2023) highlight that poor management support and low cybersecurity skills hinder effective protection of digital resources in Nigerian universities. Resource limitations exacerbate these challenges. Libraries often rely on outdated infrastructure, weak access controls, limited budgets, and poor network connectivity (Ajagekar, 2024; Tsekea & Mandoga, 2025; Moyana & Chuma, 2023). Digitalisation further increases risks. Hess et al. (2025) observe that greater use of online platforms and databases results in more sensitive patron data, heightening vulnerability to breaches. In Nigeria, Oladokun et al. (2025) identify emerging threats in metaverse libraries, including identity theft, phishing, malware, and unauthorised access. Reliance on third-party vendors and cloud platforms raises additional concerns about data control, compliance, and ethical use (Tsekea & Mandoga, 2025). Organizational and institutional factors also impede data security. Weak management support, limited ICT collaboration, and poor institutional frameworks constrain effective cybersecurity (Igbinovia & Ishola, 2023; Ajagekar, 2024; Dewa, 2025). Cultural barriers, such as low prioritisation of privacy, resistance to change, and weak policy enforcement, increase vulnerabilities (Kachota et al., 2025; Netshakhuma, 2020). Legal and ethical complexities add further strain, requiring navigation of POPIA, GDPR, emerging AI regulations, and copyright and licensing obligations (Tsekea & Mandoga, 2025; Musa & Yelwa, 2025). Technological limitations persist, including outdated hardware and software, limited backups, and inadequate network security (Ajagekar, 2024; Okike & Adetoro, 2019; Oladokun et al., 2025). AI adoption introduces new challenges, such as algorithmic bias, evaluation of AI-generated content, inclusivity, and academic integrity (Tsekea & Mandoga, 2025). Insufficient staff training and low user awareness of cybersecurity risks compound these issues (Chisita at al., 2025). User-related challenges, including low privacy literacy, unsafe digital behaviours, and poor understanding of consent, further threaten data security (Ali et al., 2020; Hess et al., 2025; Rysavy & Michalak, 2019). African university libraries must therefore implement robust technical safeguards in conjunction with staff training, user education, awareness campaigns, and the strict enforcement of ethical policies to protect sensitive information (Musa & Yelwa, 2025; Chisita at al., 2025).

4.5 Recommendations

Academic libraries are encouraged to adopt a multi-layered and integrated approach to privacy, data protection, and cybersecurity, combining technical, organizational, human, and policy-oriented measures. A foundational strategy involves developing clear, comprehensive, and accessible policies that align with national and international regulations. These policies should address data collection, retention, and use; interactions with vendors; digital services; and emerging technologies, including AI. For instance, South African archival institutions, such as NARSSA, are guided by POPIA to ensure institutional compliance, while Ghanaian academic libraries are encouraged to implement written privacy policies that are communicated effectively to staff and users (Moyana & Chuma, 2023; Netshakhuma, 2020; Avuglah et al., 2021). Technical safeguards and ICT infrastructure form another critical layer. Libraries are advised to implement encryption, multi-factor authentication, access controls, anonymisation, firewalls, intrusion detection systems, and modernised IT systems to reduce security risks. Emerging technologies, such as blockchain, biometrics, virtualisation, and AI-driven threat detection, are increasingly recommended to strengthen cybersecurity (Esh, 2025; Latif et al., 2025; Okike & Adetoro, 2019). In practice, South African archives have upgraded ICT systems and monitoring solutions to enhance security and ensure compliance with national legislation (Moyana & Chuma, 2023). Equally important is staff training and capacity building. Continuous professional development programmes and workshops equip librarians with knowledge on cybersecurity, privacy regulations, digital literacy, and the responsible use of AI. Collaboration with IT specialists, cybersecurity experts, and industry professionals further enhances staff competencies (Igbinovia & Ishola, 2023; Gupta, 2025; Dewa, 2025). African universities, such as those in Ghana and Zimbabwe, have implemented training programmes for staff and students to enhance privacy awareness, promote the ethical use of AI, and foster safe digital practices (Avuglah et al., 2021; Tsekea & Mandoga, 2025). User education and privacy literacy are also central. Awareness campaigns, workshops, and orientation programmes help users adopt safe digital behaviours, understand data privacy principles, and engage ethically with technology. Integrating privacy literacy into broader information literacy initiatives empowers users to protect their own data and interact responsibly with digital services (Rysavy & Michalak, 2019). For example, Zimbabwean universities offer programmes that emphasise the ethical use of AI, digital literacy, and equitable access (Tsekea & Mandoga, 2025). Effective data governance and ethical oversight are crucial. Libraries are advised to conduct internal audits, appoint data privacy officers, monitor compliance, and establish incident reporting mechanisms. Policies should incorporate risk-based approaches, disaster recovery plans, and accountability measures (Latif et al., 2025; Hess et al., 2025; Okike & Adetoro, 2019). The challenges South African universities face in implementing POPIA underscore the importance of structured oversight and internal governance (Netshakhuma, 2020). Collaboration and professional networking further strengthen privacy and cybersecurity practices. Working with IT departments, legal teams, professional associations, and peer libraries enhances technical support, policy development, and knowledge sharing (Chisita at al., 2025; Igbinovia & Ishola, 2023). Ghanaian libraries, for example, engage with national library associations and data protection authorities to promote privacy literacy and advocacy (Avuglah et al., 2021). Finally, responsible adoption of AI and emerging technologies requires clear policies, staff training, ethical oversight, and monitoring mechanisms to prevent misuse, mitigate bias, and uphold academic integrity (Tsekea & Mandoga, 2025; Esh, 2025). Libraries are encouraged to employ predictive modelling, blockchain, and AI-based cybersecurity tools to anticipate threats and optimise resources. Emphasising data minimisation, transparency, and ethical culture, collecting only essential data, informing users about its use, and promoting accountability among staff remain core principles. Ghanaian and South African libraries exemplify these practices by prioritising informed consent, transparent communication, and vendor compliance to safeguard user privacy (Avuglah et al., 2021; Moyana & Chuma, 2023).

5. Discussion

The findings underscore that data privacy and information security are inseparable pillars of responsible academic library practice in Africa, forming the foundation for ethical, professional, and legal stewardship of sensitive information. African academic libraries are increasingly custodians of extensive personal, institutional, and research data. The expansion of digital platforms, artificial intelligence (AI), and immersive technologies such as metaverse environments has heightened the need for integrated privacy and security measures (Oladokun et al., 2025; Tsekea & Mandoga, 2025). Libraries have an ethical obligation to protect user data, uphold intellectual freedom, and maintain trust, particularly as emerging technologies introduce risks such as behavioural tracking, biometric data collection, and algorithmic bias (Hess et al., 2025; Kachota et al., 2025; Wong & Chiu, 2024). In practice, African libraries employ layered technical safeguards, including encryption, secure authentication, multi-factor access controls, firewalls, intrusion detection, audit trails, and anonymisation, to protect the confidentiality, integrity, and availability of user data (Ajagekar, 2024; Dewa, 2025; Igbinovia & Ishola, 2023). Institutions such as NARSSA in South Africa demonstrate good practice by integrating these safeguards with compliance under POPIA and national cybersecurity frameworks (Moyana & Chuma, 2023). However, infrastructural limitations, outdated technologies, and resource constraints in Ghana, Nigeria, Zimbabwe, and Tanzania can hinder the implementation of effective security protocols, leaving library systems vulnerable to cyberattacks and unauthorised access (Avuglah et al., 2021; Netshakhuma, 2020; Kachota et al., 2025).

Human factors are equally critical to effective privacy and information security management. The review indicates that limited staff awareness, inadequate training, and insufficient knowledge of cybersecurity, data protection legislation, and ethical practices can compromise library security even when technical safeguards are in place (Ali et al., 2025; Okike & Adetoro, 2019). African libraries have therefore introduced capacity-building initiatives, including continuous professional development, workshops, and collaboration with ICT and cybersecurity experts, to strengthen staff competencies in managing traditional and emerging digital resources (Igbinovia & Ishola, 2023; Dewa, 2025; Tsekea & Mandoga, 2025). User education is similarly important because it enables patrons to understand privacy risks, use digital platforms responsibly, and adopt safer online practices (Rysavy & Michalak, 2019). Institutional policies, governance frameworks, and legal compliance further reinforce privacy and information security. African libraries increasingly align their practices with national and international frameworks, including POPIA, the Ghana Data Protection Act, and GDPR. Such frameworks support data retention procedures, anonymization, internal audits, vendor oversight, and incident reporting mechanisms (Moyana & Chuma, 2023; Katulić, 2023; Latif et al., 2025). Nevertheless, weak enforcement, fragmented governance, limited leadership support, and unclear institutional guidelines continue to constrain effective policy implementation, particularly in lower-resourced institutions (Avuglah et al., 2021; Netshakhuma, 2020; Kachota et al., 2025). Thus, compliance should not be viewed solely as a legal requirement but as an ongoing governance responsibility requiring institutional commitment, monitoring, and accountability.

The findings also demonstrate that libraries' responsibilities extend beyond technical and legal compliance to professional, ethical, and educational functions. Libraries serve as custodians of knowledge, educators in privacy and digital literacy, managers of IT and digital resources, and ethical overseers of emerging technologies (Ajagekar, 2024; Tsekea & Mandoga, 2025; Oladokun et al., 2025). They increasingly implement policies and training programmes that promote ethical AI adoption, equitable access, and responsible digital behaviour while collaborating with ICT departments, legal units, professional networks, and technology vendors to strengthen governance and service continuity (Gupta, 2025; Avuglah et al., 2021).

Despite these developments, persistent challenges remain. Limited budgets, outdated ICT infrastructure, inadequate technical expertise, insufficient staff training, weak policy enforcement, and dependence on third-party vendors increase libraries' vulnerability to privacy breaches and cybersecurity threats (Ajagekar, 2024; Netshakhuma, 2020; Oladokun et al., 2025). Emerging technologies further complicate this environment through algorithmic bias, privacy violations, and ethical dilemmas associated with AI-enabled platforms (Tsekea & Mandoga, 2025; Esh, 2025). Ali, Jabeen, and Ur Rehman (2025) identified inadequate staff knowledge and skills, budget constraints, insufficient ICT infrastructure and training, weak legal risk management practices, and inadequate risk mitigation procedures as major factors affecting libraries' preparedness for data breaches and privacy violations. Similar challenges were reported by Ali et al. (2024), Kiilu and Nzuki (2016), Kotoroi (2023), and Lubua, Semlambo, and Mkude (2022). Bashir (2023) similarly identified inadequate training and technical knowledge as major challenges for libraries seeking to protect patron privacy, particularly with the increased use of digital services.

The growth of cloud services, AI tools, and online repositories further exposes libraries to ransomware, phishing, unauthorised access, and data manipulation (Henen, 2025; Saha, 2024). At the same time, the increasing volume and complexity of research data, intellectual property, and sensitive academic communications create additional privacy and security risks when appropriate safeguards are absent (Al Shobaki et al., 2020; Bamgbose et al., 2025). The findings therefore support a multi-layered approach combining technical safeguards, comprehensive policies, continuous staff and user training, risk-based governance, ethical oversight, and collaboration with ICT, legal, and professional bodies (Okike & Adetoro, 2019; Latif et al., 2025; Dewa, 2025). African examples demonstrate progress, including strengthened ICT systems in South African archives, comprehensive privacy policies in Ghanaian universities, and the integration of ethical AI practices in Zimbabwean library services (Moyana & Chuma, 2023; Avuglah et al., 2021; Tsekea & Mandoga, 2025). Other studies emphasise the need for comprehensive and accessible data privacy and security policies aligned with national and international regulations, covering data collection, retention, use, vendor management, and emerging technologies (Bareh, 2022, 2024; Gupta, 2025; Hartman-Caverly & Chisholm, 2020). Overall, effective privacy and information security in African academic libraries requires coordinated technical, human, institutional, legal, and ethical measures rather than reliance on isolated controls.

5.1 Knowledge Generated

This systematic review enhances the understanding of data privacy and information security in African academic libraries, illustrating how privacy and security are interdependent and mutually reinforcing rather than separate operational issues. It highlights that these domains are shaped by ethical obligations, legal compliance, human capacity, and technical safeguards. By synthesising evidence from various African countries, the review provides context-specific insights that reveal how resource constraints, infrastructural disparities, and regulatory fragmentation uniquely influence practices in HLIs across the continent. Moreover, the review expands the privacy–security discourse by incorporating emerging technologies such as AI, cloud platforms, learning analytics, and metaverse environments, underscoring the emergence of new sensitive data types and the necessity for enhanced ethical and governance frameworks. A significant contribution of this review is its identification of human and organizational factors as primary sources of vulnerability, shifting the focus from technology alone to a broader socio-technical perspective on privacy and cybersecurity challenges. Additionally, the review documents adaptive practices led by African institutions and proposes a multidimensional governance approach that integrates technical controls, institutional policies, legal and ethical oversight, and capacity-building initiatives. Collectively, these contributions position academic libraries as key actors in data governance and provide evidence-based pathways for policy development, capacity enhancement, and future research within Africa's evolving digital higher education ecosystem.

6. Conclusion and Recommendations

Data privacy and information security are essential components of academic library management in Africa, especially as libraries increasingly adopt digital technologies, AI tools, online learning platforms, and immersive systems. These developments have expanded the range of sensitive data handled, making strong technical safeguards and ethical governance critical. This review demonstrates that many libraries have made significant progress by establishing policies, implementing technologies such as encryption, firewalls, secure authentication, and audit trails, and providing staff training to enhance cybersecurity awareness and promote responsible data handling. Case studies from institutions like the University of Cape Town and Makerere University demonstrate the value of coordinated strategies, including centralised data governance, multi-factor authentication, and continuous capacity building, in enhancing data protection and operational efficiency. However, significant challenges persist. Limited infrastructure, inadequate funding, staff skills gaps, inconsistent policy implementation, and increasing cyber threats continue to create vulnerabilities. Strengthening institutional support, improving compliance with national and international data protection frameworks, and promoting ongoing professional development remain essential. Ultimately, African academic libraries must adopt a holistic approach that integrates legal compliance, technological innovation, staff competency, and user education. Such an approach ensures the confidentiality, integrity, and availability of information, reinforces user trust, and upholds the library's mission as a secure and reliable hub for knowledge in the digital age.

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Building Cybersecurity Capacity in the Age of Digital Libraries

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Abstract

In this era of digital transformation, libraries have evolved from traditional physical repositories of knowledge into dynamic online learning commons. This transformation relies on interconnected and complex computer networks, which also create vulnerabilities and opportunities for cyberattacks. Consequently, libraries have witnessed an increase in sophisticated cyber threats, raising serious concerns about the protection of users' personal data and the confidentiality of digital content. These developments underscore the need for librarians to acquire new skills to ensure secure and effective service delivery. As a result, the security of resources, data, users' personal information, and digital services has become a major concern for educational institutions and organisations globally. Evidence consistently shows that human factors play a critical role in preventing data breaches, unauthorised access, and data loss, highlighting the need to strengthen librarians' cybersecurity capacity to support resilient digital services. Guided by three research questions, this exploratory study adopted the NICE (National Initiative for Cybersecurity Education) framework developed by NIST to assess the cybersecurity competencies of librarians in Africa and identify existing skill gaps. The study targeted librarians from 201 digital libraries and repositories listed in the Registry of Open Access Repositories (ROAR). Data were collected through a structured questionnaire aligned with the NICE framework and analysed quantitatively. The findings revealed limited awareness and sensitisation on cybersecurity and a significantly high-priority skills gap among librarians. The study recommends immediate, targeted upskilling and capacity-building initiatives to enhance cybersecurity readiness and strengthen digital library services across the African continent.

***Keywords**: cybersecurity, skill, capacity building, digital libraries.*

1. Introduction

Secured digital library services are widely recognised as essential for promoting the reliability and accessibility of information. By leveraging technological platforms, libraries extend their conventional operations beyond geographical boundaries, enabling continuous access to resources. According to Jie and Bao-Zhang (2012), the main functions of a digital library include: the collection, storage, and processing of extensive volumes of information and knowledge; providing user-friendly interfaces; offering robust network connectivity; supporting conventional library functions; and enabling convenient, efficient retrieval and inquiry services. The services digital libraries render to patrons are so integral that they are increasingly regarded as part of the critical infrastructure systems whose continued operation is vital to societal functioning (CISA, 2024; Hovious & Becker, 2025).

As the world becomes more interconnected, networks are now used to conduct critical transactions, making cybersecurity more essential than ever (Ajie, 2019). Quintana et al (2024) define cybersecurity

as the prevention of damage to, protection of, and restoration of computers; electronic communications systems and services; including the information they contain, to ensure availability, integrity, authentication, confidentiality, and nonrepudiation. Digital library services operate within this interconnected environment, linking to many third-party service providers and vendors through vast, interlinked networks. While these connections enable them to serve large numbers of patrons across multiple systems, they also expose them to risks, as cybercriminals can exploit insecure systems and networks to intercept sensitive data.

Like other critical infrastructures, digital libraries face threats such as malware, ransomware, and denial-of-service attacks, which can compromise data integrity, breach confidentiality, and restrict access to resources. Safeguarding these infrastructures and, by extension, preserving users' privacy while maximising the value of library resources requires a workforce with strong cybersecurity skills. The risk of data breaches, unauthorised access, and cyberattacks on library systems is increasing. Libraries have become attractive targets for cyberattacks due to the vast amount of valuable information they hold, including personal data, politically sensitive or governmental information, research findings, and their connections to third-party service providers and vendors, which malicious actors exploit to gain access to these entities. Another reason attackers target libraries are their increasing interconnection with the greater university network and their continued use of outdated or legacy systems. Moreover, libraries often lack full-time system administrators and security specialists (Corrado, 2024). As custodians of digital collections, librarians must safeguard the confidentiality, integrity, and availability of resources through capacity-building programmes.

Capacity building can be described as retraining provided to the workforce to develop a specific skill for enhanced performance. According to Okwelle and Ebikeseye (2022), capacity building refers to efforts aimed at enhancing an individual's knowledge, skills, and attitudes to improve proficiency in a specific task or job. It focuses on strengthening individual abilities to increase efficiency and productivity. In this context, building cybersecurity capacity refers to the effort aimed at enhancing the skills of librarians to safeguard resources, data, personal information of users, and services in cyberspace. Capacity building and development of the right skills are inevitable for Librarians, particularly in Africa, whose workforce has been reported as far from its potential (Signe, 2023). Libraries in Africa can only compete and take part in the fourth industrial revolution society if their workforce possesses the right skills. This underscores the need for libraries to invest in training and retraining, thereby strengthening their capacity to deliver secure digital services. The main purpose of the paper is decomposed into four objectives: (1) examining Librarians' level of awareness of cybersecurity; (2) examining the cybersecurity skill proficiency level of Librarians; (3) ascertaining the level of importance of cybersecurity skills to their job responsibilities; and (4) identifying the gap in cybersecurity skills among librarians in Africa. Based on these, the following research questions are addressed:

- What is the Librarian's level of awareness of cybersecurity?
- What is the cybersecurity skill proficiency level of Librarians in Africa?
- What is the level of importance of cybersecurity skills to Librarians' job responsibilities?

2. Review of Related Literature

This section describes the theoretical framework and related work of this study. It presents the cybersecurity skill, Anderson's Adaptive Control of Thought (ACT), and the Trist and Bamforth Sociotechnical theory as they relate to the study. This section also introduces the National Initiative for Cybersecurity Education (NICE) workforce framework and presents works that are related to the study.

2.1 Cybersecurity Skills

Skill has been defined in different ways, and it is highly relevant to the effective management of digital libraries. According to Carlton and Levy (2015), it was described as a combination of knowledge, experience, and ability that enables effective performance. In the context of digital libraries, these include traditional library skills, digital literacy skills, and soft skills. Similarly, Pratt et al. (2014) described skill as the capacity to execute a behaviour successfully within a specific context, such as applying cybersecurity protocols in digital library operations. In their writing, Bendler and Felderer (2023) emphasise skill as the proficient application of knowledge to meet situational demands securely. Green (2021) also highlighted that skills are productive, expandable, and social: they create value, and can be enhanced through training and capacity building. Skills development in cybersecurity for digital libraries involves tailored training and practice that refines technical abilities, enables librarians to consistently protect digital assets, and ensures service continuity (Yashwant, 2017).

In the definition of cybersecurity, Quintana et al (2024) defined it as the prevention of damage to, protection of, and restoration of computers, electronic communication systems and services, and the information they contain, to ensure confidentiality, integrity, availability, and non-repudiation. Similarly, Schiliro (2023) explained that cybersecurity is the collection and coordination of resources, including personnel, infrastructure, organisational structures, and processes, to protect networks and cyber-enabled systems from incidents that compromise integrity, interfere with property rights, or cause varying degrees of loss. Therefore, in this work, cybersecurity skills are defined as the knowledge and capacity to prevent, protect, and recover systems, networks, and data to ensure integrity, confidentiality, and availability. Bendler and Felderer (2023) asserted that confidentiality is referred to as the prevention of divulgence of information to unauthorised individuals or devices. Likewise, safeguarding of information from malicious alteration is referred to as integrity, while ensuring that information and systems remain accessible to authorised users is referred to as availability.

Over the years, librarians and information professionals have witnessed a continuous evolution in their professional skills and roles. Literature has extensively explored these changes (Middleton, 2003; Gerolimos & Konsta, 2008), documenting the shift from core traditional information and knowledge management skills (Gerolimos, 2009) to systems-related skills (Middleton, 2003), contemporary professional skills (Partridge, Menzies, Lee, & Munro, 2010), and digital-era competencies (Raju, 2014). This raises an important question: are these transformations driven by the increasing integration of technology into library services, or by the critical value of the resources and data libraries manage? Regardless of the cause, the rapid pace of change underscores the need for continuous reskilling and upskilling among librarians to prevent widening skill gaps. When there is a disparity between the skills required for a task and the skills currently possessed by the workforce, a skills gap exists (Okwelle & Ebikeseye, 2022; Ayodele, Oladokun, & Shakantu, 2020).

Scholars have reported a global gap in cybersecurity-skilled professionals (Vogel, 2016; Akdur, 2022; Blackwood-Brown, Levy, & D'Arcy, 2021; Quintana et al., 2024). Particularly, African countries that ranked the poorest in terms of cybersecurity resilience (Signe, 2023), consistently scoring the lowest across all five pillars of the International Telecommunication Union's Global Cybersecurity Index (ITU-GCI): capacity building, legal, technical, organisational, and cooperation. Studies further indicate that African countries are highly vulnerable to cyberattacks due to weak network and information security systems and the widespread use of pirated software (Asongu, 2014), among other factors. Growing concern about the cybersecurity skills gap has led to initiatives such as the National Initiative for Cybersecurity Education (NICE) Workforce Framework, designed to strengthen competencies and bridge the cybersecurity skills gap (Petersen, 2020). Addressing these gaps requires targeted and intentional capacity-building efforts.

2.2 Theoretical Framework

Adaptive Control of Thought (ACT) Model

The theoretical construct underpinning skills acquisition in this study was drawn from Anderson's Adaptive Control of Thought (ACT) model, which proposed that skills development progresses in three stages: declarative knowledge, procedural knowledge, and automatisation (Anderson, 1982). At the declarative stage, information is given to an individual, who becomes aware of the skill. The transition from declarative knowledge to procedural knowledge is crucial for mastering complex skills, such as cybersecurity skills. In organisations where the security of systems, networks, resources, and sensitive personal data are taken as highly prioritised, workers' capabilities in handling and safeguarding assets should exceed the awareness stage and progress to the procedural stage where they can employ techniques and move to the automatization stage where cybersecurity knowledge, skills and ability execute automatically as routines to mitigate the continuous evolving nature of cyberattacks.

Socio-technical Theory

The integration of new technologies, including cybersecurity measures for securing systems, networks, and personal data, often introduces complex processes involving multiple interdependent subsystems. Organisational technological development must therefore account for the interactions among these subsystems and how such changes affect the broader work environment. Trist and Bamforth (1951) study of coal miners, which gave rise to socio-technical theory, demonstrated that changes in mining technology produced significant social effects that, in turn, influenced the effectiveness of the new technology. The central principle of socio-technical theory is joint optimisation, which stresses that both the technical and social subsystems of an organisation must be optimised simultaneously; otherwise, overall system performance may be compromised.

In the context of cybersecurity, this principle is particularly relevant. This is because cyber threats are continuously evolving; organisations must secure not only their technological infrastructure but also the human and organisational subsystems that support it (Aaltola, Ruoslahti, & Heinonen, 2022). According to Paulsen et al. (2012), the distributed and interconnected structure of cyberspace constantly shows that a weakness at one point often has a significant impact on the security of another point. Too often, cybersecurity responsibilities are concentrated within IT or risk management departments, which is insufficient for building robust defenses. As Brill, cited in Petrowicz (2021) observed, effective cybersecurity requires that every organisational unit understands its role in safeguarding data. Thus, successful implementation demands attention to both the technical system and the social system, including staff training and the cultivation of a strong security culture.

Research further highlights the critical role of people in cybersecurity advancement. Colabianchi (2025), Khadka and Ullah (2025) and Abzakh and Althunibat (2023) revealed that individuals lacking cybersecurity awareness are highly vulnerable to social engineering, phishing, and spoofing attacks. This underscores the need to optimise personnel's knowledge, skills, and abilities through capacity building, supported by continuous training and the acquisition of new competencies (Ruoslahti, 2020). By aligning technical defenses with human capability development, organisations can better withstand evolving threats and ensure the continuity of secure services.'

National Initiative for Cybersecurity Education (NICE) Workforce Framework

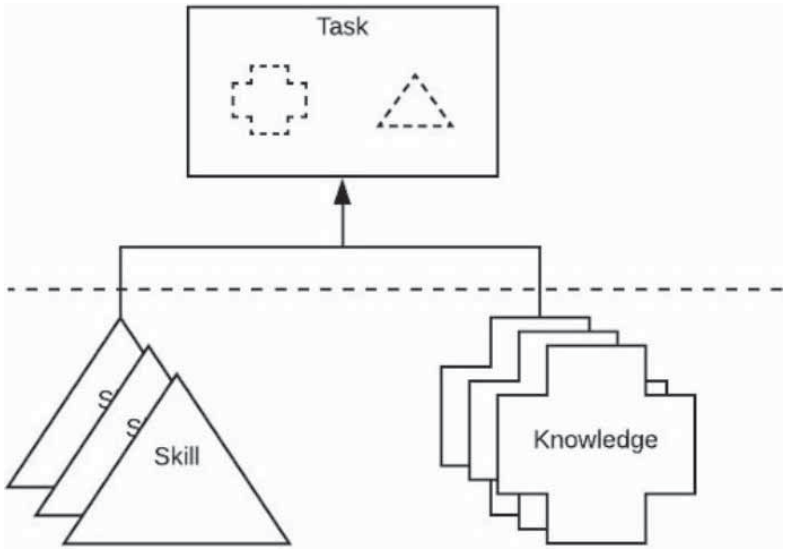
Cybersecurity encompasses a wide range of fields, and the skills required likewise span both technical and non-technical domains. Given this breadth, contributions to cybersecurity come from multiple disciplines, although its foundational roots lie in computer science, information technology, and in-

formation systems (Furnell, 2021). Because of this diversity, it is essential to identify the specific skills required for a workforce role. These skills vary in terms of scope, target groups, and methods of assessment. Effective skills assessment should be grounded in a recognised skills framework or taxonomy, aligned with appropriate proficiency levels, and directly linked to the actual tasks demanded by the job (Aaltola, Ruoslahti, & Heinonen, 2022; Nevmerzhitskaya et al., 2019). This informed the use of the NICE workforce framework in this study to assess the cybersecurity skill proficiency of librarians for effective digital library services.

According to Paulsen et al (2012), NICE seeks to establish an operational, sustainable, and continuously advancing programme for cybersecurity awareness, education, training, and workforce development to measurably improve long-term cybersecurity posture. They further explained that NICE was founded on the notion that people are a valuable asset in the battle against cyberthreats: people who can develop the technologies that safeguard data and assets, people who can identify and respond to cyberthreats, and people who know how to keep themselves and others safe online. The NICE framework consists of five categories, and eleven competency areas, which are broken down into forty-one work roles; each work role has a list of associated knowledge, skills, and tasks.

Figure 1

NICE Framework Building Blocks Approach (Petersen et al, 2020)



The NICE framework building block described the Task as work to be completed. It is defined as an activity that is directed towards the achievement of organisational objectives. A Task statement should be straightforward and aligned with the organisation's context. Figure 1 shows how the Task is related to knowledge and skill. This suggests that to complete a task, one must possess the knowledge and skills, or the individual is challenged to gain the knowledge and learn the skills to complete the task. Knowledge is described as a retrievable set of concepts within memory. It could be foundational or specific concepts. Skill statements describe what an individual can do, while a task is work to be done. An individual who cannot demonstrate the described skills cannot perform the task (Petersen et al, 2020). The skills and knowledge list associated with knowledge management and database management work roles in the implementation and operation work category were adapted to examine the cybersecurity skill proficiency of librarians for the study.,

2.3 Related Works

Aleminda (2025) employed a qualitative content analysis combined with comparative analysis to evaluate the key cybersecurity skills emphasised in ten (10) European Union-based cybersecurity frameworks, comparing their structures, scopes, and focus areas, and identifying their main strengths and limitations. The study found that the predominant skills highlighted across these frameworks focus on building and maintaining a secure digital environment. These include competencies in network and infrastructure security, risk management and governance, secured design and development, as well as security operations and incident response. The findings suggested that these frameworks serve as valuable guides for industries seeking to enhance cybersecurity readiness and for educators developing curricula aligned with job market demands. However, despite increasing interest in the human factor and secure AI skills, these areas received comparatively limited attention.

Quintana et al, (2024) adopted an exploratory design to identify cybersecurity trends impacting criminal justice professionals and articulate the cybersecurity skills, knowledge, and abilities that criminal justice professionals need to succeed upon graduation. The study used convenience sampling to select participants from law enforcement, the judicial system, corrections, the military, and social work for an interview. Eight themes emerged from their study and stressed the importance of soft skills instead of technical skills to integrate into the nature of their work and collaborate with people from different disciplines.

In a study conducted by Njoku et al (2023) on fostering Cybersecurity in Institutional Repositories: A Case of Nigerian Universities, they averred that a sizable proportion of librarians they studied believed that cyber threats exist outside the library, and lack technical oversight of their domain. Similarly, Fox, cited in Kuzma (2010), explained that the majority of users and librarians are unaware of the security threats to their networks and systems. He claims that educating staff and users about security issues is one way to improve overall library security. Consequently, awareness and training will help develop security hygiene through regular practices such as system updates, regular back-ups, software patches, and safe browsing habits, among others.

Muhammad's (2025) study on cybersecurity threats in Pakistani Academic Libraries in the Era of Artificial Intelligence revealed that, although librarians possess a certain level of awareness, more education is required, and cybersecurity topics should be included in the library training curriculum. In a related study, Aji and Sule (2023) found that library stakeholders are not adequately informed about cybersecurity relevant to the library, and this led to inadequate cybersecurity infrastructure. The study showed poor password management practices and recommended cybersecurity awareness and literacy among librarians.

In a related study by Alia (2023), the training needs of information specialists at Saudi University were revealed to include risk assessment, vulnerability management, and identifying and implementing security controls in managing libraries, among others, as areas that require training to enhance the skills and competencies of information specialists and keep pace with cybersecurity. Akor et al (2024) identified Artificial Intelligence, Machine Learning, blockchain, and biometric authentication as crucial tools for mitigating cyber threats and offer transformative capabilities and skills for securing library collections.

The literature predominantly focused on comparative analyses of cybersecurity skill frameworks, the effects of cybersecurity trends on criminal justice professionals, the cybersecurity competencies required for criminal justice practice, and levels of cybersecurity awareness among information specialists. Despite these advances, librarians' cybersecurity skills within digital library contexts, particularly in Africa, remain underexplored. To address this gap, this study contributes by: (1) adapting the Knowledge Manager and Database Administrator work roles of the NICE framework to assess librarians' cybersecurity skills for digital library services; (2) empirically examining cybersecurity skills proficiency among African

librarians; and (3) identifying critical skills gaps and priority areas for targeted capacity-building and upskilling interventions.

3. Methodology

The study adopts an exploratory survey design approach. Exploratory research is a type of research conducted where the research has not been clearly defined (Jha, 2023; Haile, 2023; Rahmon, Osademe, Ononokpono, 2023). An exploratory research design is appropriate for the study because little or no research has been done, to the best of the researchers' knowledge, on building cybersecurity capacity for digital library services. The population of the study consists of Librarians (system librarians, digital librarians, electronic resource librarians, repository managers) associated with 201 digital libraries/repositories in Africa, as recorded in the Registry of Open Access Repositories (ROAR). The study adopts the total enumeration sampling technique, which implies that all two hundred and one (201) digital repositories were included in the study.

An online survey was administered to assess the level of cybersecurity skill proficiency among library staff working in these digital libraries. Participants were recruited through library Conferences attended by the researchers, professional network platforms, and contact information obtained from staff directories on library websites. A total of 105 invitations (sent via email, including 17 WhatsApp messages) containing the survey link were distributed, and 32 complete responses were received.

Ethical approval was obtained for the study. Participants were fully informed about the purpose of the research, participation was voluntary, and their identities and data were protected. Data collected from the survey were analysed using descriptive statistics.

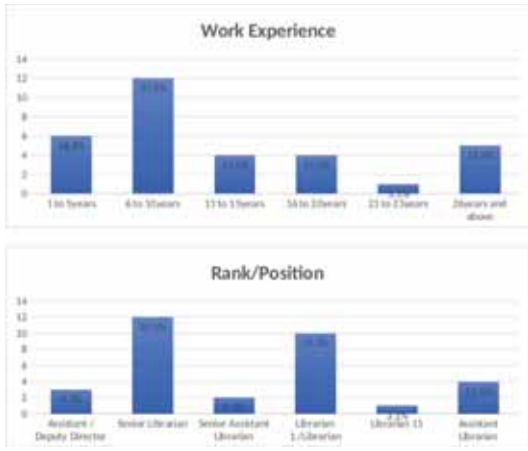
4. Results and Discussion of Findings

4.1 Demographic factors of the participants

Figure 2 and Table 1 in the appendices present the demographic characteristics of the thirty-two (32) librarians who responded to the survey. The distribution of years of working experience shows variation across participants, with the largest proportion (37.5%) representing 6–10 years of experience. In terms of rank, Senior Librarians constitute the highest proportion of respondents 12 (37.5%), followed by Librarian I/Librarian II (31.3%).2

Figure 2

Demographic Factors of the Participants.



To Research Question 1, "What is the librarian's level of awareness of cybersecurity?", Table 2 (see appendices) shows the percentage distribution of participants' responses regarding their awareness and training on securing digital resources and protecting data. A majority (56%) of the librarians reported that they are not aware of, nor have they received, any training on data protection and the security of digital library resources. In contrast, 44% indicated that they are aware and have been trained on how to protect data and digital library resources.

These findings align with Kuzma (2010) and Njoku et al (2023), who asserted that librarians are not aware of the security issues affecting their systems and networks and that cyber threats exist outside the libraries. Conversely, Muhammad (2025) and Aji and Sule (2023) noted that although librarians possess some level of awareness, they are not adequately informed; additional cybersecurity training remains necessary. The results underscore the need for increased sensitisation, training, and retraining for librarians and repository-related staff to ensure they can effectively protect and securely manage data and digital library resources. Libraries are custodians of invaluable data and are classified as critical infrastructure (CISA, 2024; Hovious & Becker, 2025). As such, their services are essential to society, making continuous professional development crucial for keeping pace with emerging innovations, evolving trends, and growing cyber threats to maintain uninterrupted service delivery.

Figure 3

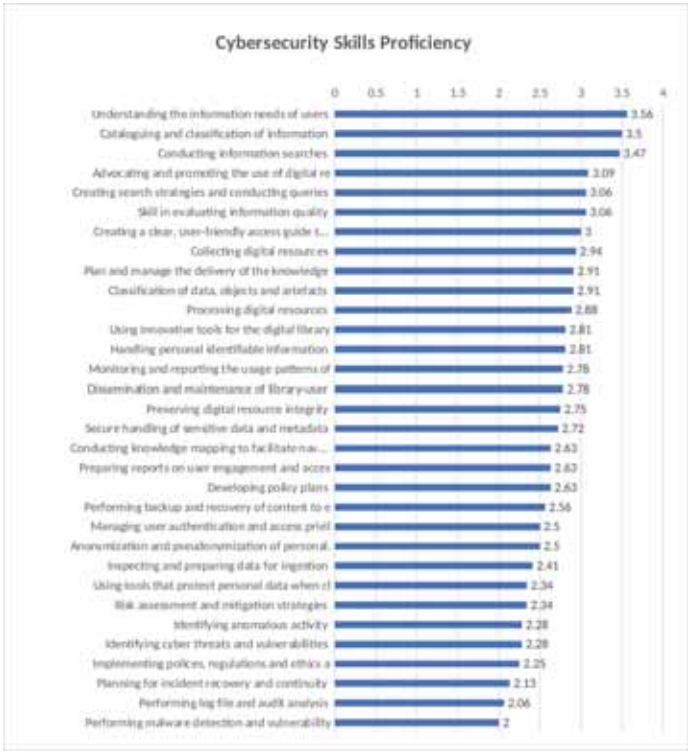
Training Methods



Of the 44% of respondents who indicated that they are aware and have received training, 14.3% received training through workshops or seminars, 21.4% through in-house training, and 28.6% through online platforms (Figure 3). While all training methods can be effective, particular emphasis should be placed on approaches that promote hands-on, practical exercises, as these foster deeper engagement and skill mastery. Mastery is essential because it enables employees to execute cybersecurity-related tasks automatically, as described by Anderson (1982). Workers' capabilities in handling and safeguarding assets should exceed awareness (declarative stage) and progress to mastery (automatisation stage). In-house training that is tailored to the organisation's specific context, regulatory requirements, and the nature of its repository content is especially recommended.

Figure 4

Level of Skills Proficiency of Librarians



A total of thirty-three (33) skills identified from the NICE framework and database managers' skill sets were grouped into three (3) categories: information and knowledge management, digital information system management, and cybersecurity, data protection, and governance, as shown in Table 3. (Appendix). The information and knowledge management category represents core traditional library skills, such as creating access guides, understanding users' information needs, cataloguing, and classification. As libraries increasingly engage in the creation, preservation, and management of digital content, particularly in making special collections accessible through digital libraries, the demand for more technical competencies has grown. These skills fall under the digital information system management category, which includes competencies related to using digital systems and tools effectively, such as monitoring and maintaining digital library systems and adopting innovative tools for enhanced digital library services. Some skills overlap across categories. For instance, managing user authentication and access privileges, performing system backups, and recovering digital content are relevant to both digital system management and cybersecurity-related functions. The third category, cybersecurity, data protection, and governance, includes skills such as identifying cyber threats, malware detection, conducting vulnerability scans, anonymising and pseudonymising personal data, and developing and implementing cybersecurity- and privacy-related policies, regulations, and ethical guidelines.

To answer Research Question 2, "What is the cybersecurity skill proficiency level of Librarians in Africa? Librarians were presented with a list of these specific skills and asked to rate their proficiency on a scale of 1 to 5, where 1 indicated no proficiency and 5 indicated expert proficiency. The results are presented in Table 3. The information and knowledge management skills achieved the highest mean ratings. The skill "understanding the information needs of users" ranked highest with a mean score of 3.56 (see Fig-

ure 4), while "processing digital resources" ranked lowest within this category with a mean score of 2.88. These scores generally fall within the intermediate (2.61–3.40) to advanced proficiency (3.41–4.20) ranges, which is unsurprising given that these are foundational skills cultivated through LIS education and practice.

Skills with mean scores ranging from 2.63 to 2.81 consisted mostly of digital information system management skills, along with some information and knowledge management and cybersecurity/governance skills. These fall within the intermediate proficiency range. The cybersecurity, data protection, and governance skills received the lowest ratings, with mean scores ranging from 2.00 to 2.56, placing them in the basic proficiency (1.81–2.60) range. Exceptions include handling personally identifiable information (2.81), secure handling of sensitive data and metadata (2.72), and developing policy plans (2.63). Notably, "planning for incident recovery and continuity strategies" received a mean score of just 2.13, which raises concerns for institutional resilience.

These results suggest that librarians generally possess basic proficiency in cybersecurity and data protection, indicating only a foundational understanding of these increasingly critical competencies. With such introductory skill levels, librarians may struggle to detect complex cyber threats, leaving libraries vulnerable to cyberattacks, data breaches, and the mishandling of sensitive information. This could undermine the trust of researchers, academics, and other library users who rely on the secure management of digital assets. Lack of required skills may lead to loss of jobs for workers who are working in organisations that are downsizing the number of workforces who lacks skills to be replaced with more skilled ones (Signe, 2023). The overall low proficiency in cybersecurity also reflects a weak cybersecurity culture, which may not be adequate to meet the demands of rapidly evolving digital environments. This underscores the urgent need to strengthen cybersecurity capacity through targeted and continuous training aimed at achieving the automatisation stage described by Anderson (1982), where essential security tasks become routine and are executed automatically. A resilient cybersecurity culture is crucial for safeguarding digital resources and ensuring uninterrupted service delivery in modern libraries.

To answer Research Question 3, "What is the level of importance of cybersecurity skills to Librarians' job responsibilities?" participants were asked to indicate the level of importance each skill holds in relation to their duties. The ratings were on a scale of 1 to 5, with 1 indicating not important and 5 indicating extremely important. The results of this set of questions are shown in Table 4 (see appendices). "Understanding the information needs of users" with a (4.16) mean score achieved the highest score, while "preparing reports on user engagement and access patterns" with a (3.65) mean score is the lowest. These are all within the range of very important (3.41 – 4.20) (see Figure 5). This suggests that all the skills are crucial to the responsibilities of a librarian. The importance of developing skills to safeguard systems, networks, data, and sensitive information in digital libraries cannot be overstated; therefore, prompt and proactive action is essential. Cybersecurity extends beyond technical measures such as firewalls, cryptography, or AI; it also depends on people's skills and their ability to detect threats, defend their environments, effectively govern digital assets, and keep themselves and others safe online. According to the principle of joint optimisation (Trist & Bamforth, 1951), both the technical and social subsystems must be developed and strengthened simultaneously. Capacity building is, therefore, crucial to ensuring that digital assets remain secure.

However, a gap analysis (see Table 5 in Appendices) was conducted to identify the most critical areas of training. In this context, a gap is defined as the mean difference between the level of importance of the specified skills and the level of skill proficiency. We adapted Ayodele, Oladokun, and Shakantu's (2020) hypothetical scale to categorise the level of the skill gap for each of the skills. The categorisation was done as follows:

mean value greater than 1.50 – very high priority;

mean value from 1.00 to 1.49 – high priority;

mean value from 0.50 to 0.99 – moderate priority;

mean value from 0.01 to 0.49 – low priority; and

mean value less than 0.01 – no skill gap.

Performing malware detection and vulnerability scans (1.84); performing log file and audit analysis (1.74); using tools that protect personal data when cleaning or archiving digital content (1.73); planning for incident recovery and continuity strategies (1.70); identifying cyber threats and vulnerabilities (1.62); implementing polices, regulations, and ethics as they relate to cybersecurity and privacy (1.56); managing user authentication and access privileges in a digital library platform (1.53); risk assessment and mitigation strategies (1.50); performing backup and recovery of content to ensure data integrity (1.50) and inspecting and preparing data for ingestion (1.50) emerged as the ten top prioritised areas for training (see Figure 6). The skill gap from 1.50 range and above indicates a very high priority skill gap, and the majority of the cybersecurity, data protection, and governance skills are within this category. This suggests that there is a skill gap in cybersecurity skills among librarians in Africa. Due to inadequate competencies, the digital library is vulnerable to cybersecurity threats. Prioritising the development of these abilities should take precedence over other strategic investments. It emphasises how important it is to improve digital security capabilities in order to guarantee efficient system, data, and digital service protection. The findings are consistent with Vogel (2016); Deniz (2022); Blackwood-Brown, Levy, and D'Arcy (2021); and Quintana et al. (2024), whose works highlighted the global cybersecurity skill gap. As libraries embrace new digital technologies to deliver services, there must be accompanying changes in the security landscape and a need to develop new skills as a result of a shift driven by new technological developments to maintain uninterrupted service delivery.

Figure 5

Level of Importance of Cybersecurity Skills on Job Responsibilities

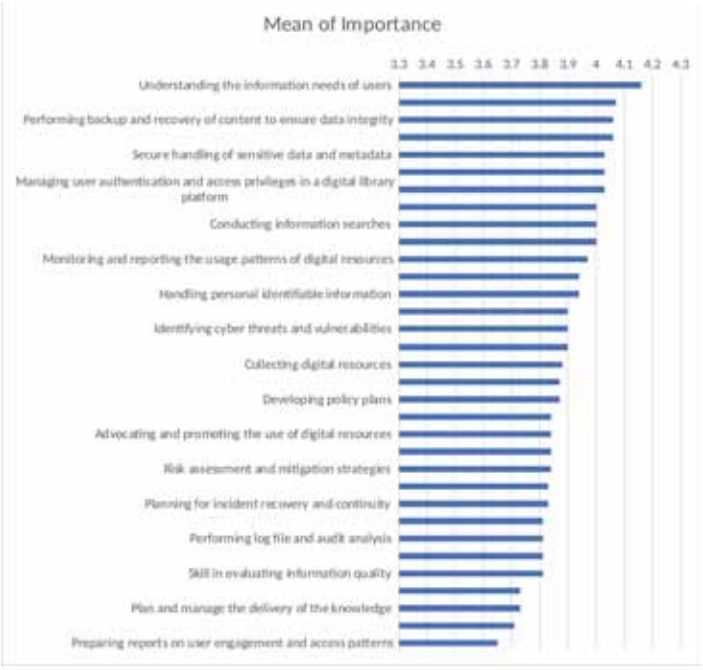
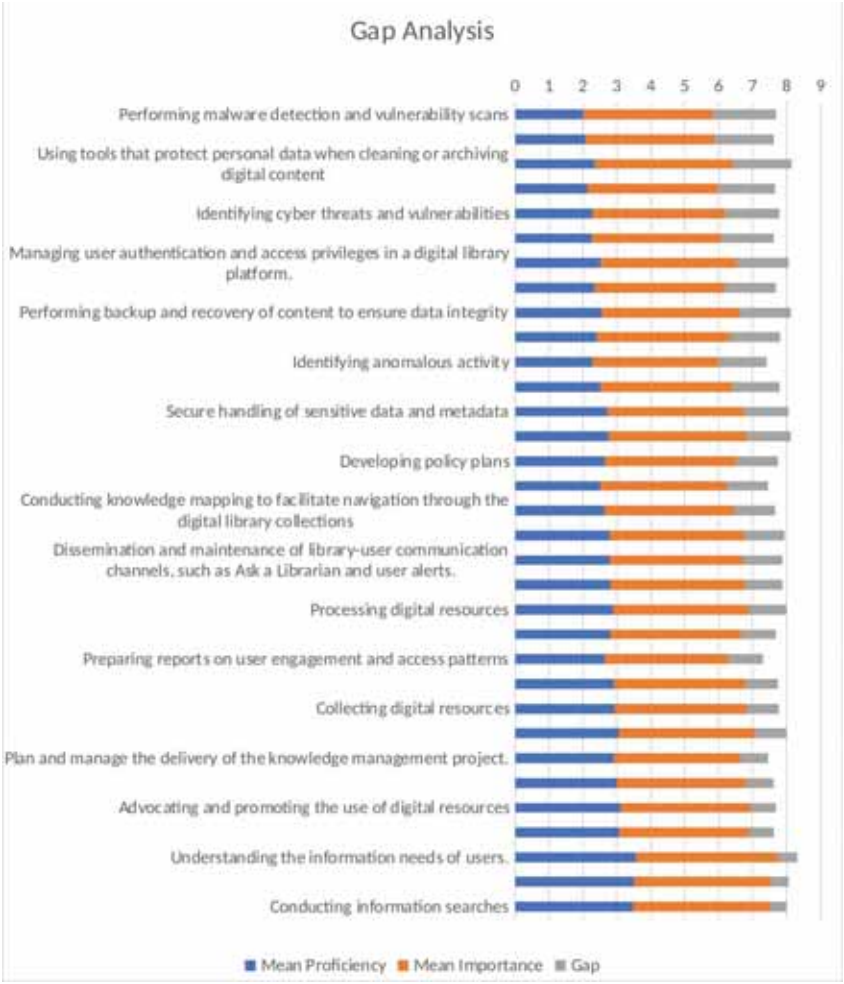


Figure 6

Gap Analysis



5. Implications of the Findings

Awareness and sensitisation are foundational components of cybersecurity readiness. Information professionals must understand the nature of emerging digital threats such as phishing, ransomware, data breaches, and identity how these threats can impact library systems and users' information. Awareness programmes will help them recognise risky behaviours, understand their responsibilities in protecting digital assets, and cultivate a security-conscious mindset. Sensitisation also creates a culture where cybersecurity is viewed not merely as a technical issue but as a shared organisational responsibility.

Capacity-building and training initiatives help workers bridge identified skill gaps, especially in areas such as data protection, access control, vulnerability and audit log assessment, and incident response. Continuous professional development is essential due to the rapidly evolving nature of cybersecurity threats. Formal training workshops, online certifications, and hands-on exercises are essentials. Capacity building also strengthens institutional resilience by ensuring that staff can maintain secure systems, protect user data, and support safe access to digital resources.

6. Recommendations

- Information professionals must understand the nature of emerging digital threats through training and attending conferences, seminars and workshops.
- There is urgent need to strengthen cybersecurity capacity through targeted and continuous training aimed at achieving the automatization stage and help workers bridge identified skill gaps.
- There is need for immediate interventions, capacity-building, upskilling, and training to build up competencies in order to fight the digital library vulnerability to cybersecurity threats.

7. Limitations and Further Research

Although the findings indicate that librarians possess only basic proficiency in cybersecurity and data protection, there are some limitations: firstly, the study relies on self-reported data, which might not capture the actual skill level in real-world cybersecurity tasks. The study focused on librarians from a few institutions who were willing to participate in the survey, which may limit the generalisation of the results to libraries in institutions or countries with different digital maturity levels. Consequently, we suggest that further research should consider an approach such as direct skill assessments.

8. Conclusion

Strengthening cybersecurity within digital libraries requires capacity building. Awareness and sensitisation initiatives ensure that the workforce understands emerging threats and adopts a proactive security mindset. Training and capacity-building programmes address critical skill gaps, equipping staff with the competencies needed to manage digital systems securely. Together, these elements enhance the overall cybersecurity posture of digital libraries, enabling the workforce to protect sensitive data, ensure the integrity of digital services, and support resilient and trustworthy library operations in an increasingly complex digital environment. Cybersecurity is not only about technical measures, firewalls, cryptography, or AI, but also about people. In Africa, the workforce must evolve as fast as the adversaries, armed with skills and capabilities, for this is our greatest defence.

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Appendices

Table 1

Frequency Distributions of Respondents' Demographic Factors

Variable	Category	Frequency / Percentage
Working experience	1 - 5years	6 (18.8%)
	6 - 10years	12 (37.5%)
	11 - 15years	4 (12.5%)
	16 - 20years	4 (12.5%)
	21 - 25years	1 (3.1%)
	26years and above	6 (15.6%)
Rank or position	Assistant / Deputy Director	3 (9.3%)
	Senior Librarian	12 (37.5%)
	Senior Assistant Librarian	2 (6.3%)
	Librarian 1 /Librarian	10 (31.3%)
	Librarian 11	1 (3.1%)
	Assistant Librarian	4 (12.5%)

Table 2

Level of Awareness/training on Cybersecurity

Have you received any training or awareness on the security of digital resources and data?	Frequency (%)
Yes	14(44%)
No	18 (56%)

Table 3

Level of Skills Proficiency of Librarians

S/N	Skills	NP 1	BP 2	IP 3	AP 4	EP 5	Sum	Mean	SD
	Information & Knowledge Management.								
1	Creating a clear, user-friendly access guide to help find and use relevant information easily.	1	10	10	10	1	32	3.00	2.62

2	Understanding the information needs of users.	0	6	6	16	4	32	3.56	3.16
3	Cataloguing and classification of information	0	9	5	11	7	32	3.50	3.16
4	Skill in evaluating information quality.	1	10	10	8	3	32	3.06	2.72
5	Creating search strategies and conducting queries	3	8	7	12	2	32	3.06	2.75
6	Classification of data, objects, and artefacts	4	9	8	8	3	32	2.91	2.63
7	Conducting information searches	0	9	4	14	5	32	3.47	3.11
8	Conducting knowledge mapping to facilitate navigation through the digital library collections	6	10	7	8	1	32	2.63	2.36
9	Collecting digital resources	4	9	6	11	2	32	2.94	2.66
10	Advocating and promoting the use of digital resources	1	10	9	9	3	32	3.09	2.75
11	Plan and manage the delivery of knowledge management project.	1	11	10	10	0	32	2.91	2.51
12	Processing digital resources	2	13	5	11	1	32	2.88	2.55
	Digital Library Management								
13	Using innovative tools for the digital library service	3	12	6	10	1	32	2.81	2.50
14	Monitoring usage patterns of digital resources.	4	11	6	10	1	32	2.78	2.49
15	Preparing reports on user engagement and access patterns	4	14	5	8	1	32	2.63	2.33
16	Preserving digital resource integrity	4	11	7	9	1	32	2.75	2.45
17	Monitoring and maintaining digital library systems	5	15	4	7	1	32	2.50	2.22
18	Dissemination and maintenance of library-user communication channels, such as Ask a Librarian and user alerts.	3	13	6	8	2	32	2.78	2.49

19	Inspecting and preparing data for ingestion	8	13	3	6	2	32	2.41	2.21
20	Managing user authentication and access privileges in a digital library platform.	7	12	6	4	3	32	2.50	2.29
21	Performing backup and recovery of content to ensure data integrity	5	14	5	6	2	32	2.56	2.30
	Cybersecurity, Data Protection & Governance								
22	Performing log file and audit analysis	11	10	9	2	0	32	2.06	1.75
23	Identifying cyber threats and vulnerabilities	8	12	7	5	0	32	2.28	1.98
24	Performing malware detection and vulnerability scans	13	10	5	4	0	32	2.00	1.75
25	Risk assessment and mitigation strategies	8	13	4	6	1	32	2.34	2.11
26	Handling personal identifiable information	3	11	10	5	3	32	2.81	2.51
27	Anonymisation and pseudonymisation of personal data	8	9	8	5	2	32	2.50	2.28
28	Planning for incident recovery and continuity strategies	9	12	9	2	0	32	2.13	1.79
29	Secure handling of sensitive data and metadata	2	16	6	5	3	32	2.72	2.42
30	Using tools that protect personal data when cleaning or archiving digital content	8	12	6	5	1	32	2.34	2.09
31	Identifying anomalous activity	7	13	8	4	0	32	2.28	1.95
32	Developing policy plans	6	9	10	5	2	32	2.63	2.36
33	Implementing polices, regulations, and ethics as they relate to cybersecurity and privacy	7	16	4	4	1	32	2.25	1.97

Key: No Proficiency=1, Basic Proficiency=2, Intermediate Proficiency=3, Advanced Proficiency=4, Expert Proficiency=5

Table 4

Level of Importance of Cybersecurity Skills on Job Responsibilities

S/N	Skills	NI 1	SI 2	MI 3	VI 4	EI 5	Sum	Mean	SD
	Information & Knowledge Management								
1	Creating a clear, user-friendly access guide to help find and use relevant information easily.	1	2	2	23	3	31	3.81	3.07
2	Understanding the information needs of users.	0	2	1	18	10	31	4.16	2.70
3	Cataloguing and classification of information	0	4	2	14	11	31	4.03	2.46
4	Skill in evaluating information quality.	1	2	5	17	6	31	3.81	2.77
5	Creating search strategies and conducting queries	0	2	6	13	10	31	4.00	2.51
6	Classification of data, objects, and artefacts	0	4	4	15	8	31	3.87	2.62
7	Conducting information searches	0	3	4	14	10	31	4.00	2.53
8	Conducting knowledge mapping to facilitate navigation through the digital library collections	1	1	8	12	8	30	3.83	2.54
9	Collecting digital resources	1	2	5	16	8	32	3.88	2.66
10	Advocating and promoting the use of digital resources	0	5	3	15	8	31	3.84	2.59
11	Plan and manage the delivery of knowledge management project.	0	3	6	17	4	30	3.73	2.86
12	Processing digital resources	0	2	4	17	8	31	4.00	2.74
	Digital Library Management								
13	Using innovative tools for the digital library service	1	4	1	19	7	32	3.84	2.75
14	Monitoring usage patterns of digital resources.	1	2	3	15	9	30	3.97	2.59

15	Preparing reports on user engagement and access patterns	0	5	6	15	5	31	3.65	2.70
16	Preserving digital resource integrity	0	3	3	14	11	31	4.06	2.49
17	Monitoring and maintaining digital library systems	0	2	5	18	6	31	3.90	2.84
18	Dissemination and maintenance of library-user communication channels, such as Ask a Librarian and user alerts.	1	1	4	18	7	31	3.94	2.79
19	Inspecting and preparing data for ingestion	0	2	6	16	7	31	3.90	2.74
20	Managing user authentication and access privileges in a digital library platform.	0	3	3	15	10	31	4.03	2.57
21	Performing backup and recovery of content to ensure data integrity	0	2	3	17	9	31	4.06	2.70
	Cybersecurity, Data Protection & Governance								
22	Performing log file and audit analysis	0	2	7	17	5	31	3.81	2.84
23	Identifying cyber threats and vulnerabilities	0	2	5	18	6	31	3.90	2.84
24	Performing malware detection and vulnerability scans	1	3	3	17	7	31	3.84	2.71
25	Risk assessment and mitigation strategies	0	3	4	19	5	31	3.84	2.88
26	Handling personal identifiable information	0	1	7	16	7	31	3.94	2.76
27	Anonymisation and pseudonymisation of personal data	0	4	7	12	7	30	3.73	2.54
28	Planning for incident recovery and continuity strategies	0	2	6	17	5	30	3.83	2.85
29	Secure handling of sensitive data and metadata	0	4	3	12	12	31	4.03	2.34

30									
	Using tools that protect personal data when cleaning or archiving digital content	0	2	5	12	11	30	4.07	2.44
31	Identifying anomalous activity	0	4	8	12	7	31	3.71	2.54
32	Developing policy plans	0	0	8	19	4	31	3.87	2.98
33									
	Implementing polices, regulations, and ethics as they relate to cybersecurity and privacy	1	3	3	18	6	31	3.81	2.78

Key: Not Important=NI, Slightly Important=SI, Moderately Important=MI, Very Important=VI, Extremely Important=EI

Table 5

Skill Gap Analysis

S/NO	Skill	Mean Proficiency	Mean Importance	Gap
1	Performing malware detection and vulnerability scans	2.00	3.84	1.84
2	Performing log file and audit analysis	2.06	3.81	1.75
3	Using tools that protect personal data when cleaning or archiving digital content	2.34	4.07	1.73
4	Planning for incident recovery and continuity strategies	2.13	3.83	1.70
5	Identifying cyber threats and vulnerabilities	2.28	3.90	1.62
6	Implementing polices, regulations, and ethics as they relate to cybersecurity and privacy	2.25	3.81	1.56
7	Managing user authentication and access privileges in a digital library platform.	2.50	4.03	1.53
8	Risk assessment and mitigation strategies	2.34	3.84	1.50
9	Performing backup and recovery of content to ensure data integrity	2.56	4.06	1.50
10	Inspecting and preparing data for ingestion	2.41	3.90	1.50
11	Identifying anomalous activity	2.28	3.71	1.43
12	Monitoring and maintaining digital library systems	2.50	3.90	1.40
13	Secure handling of sensitive data and metadata	2.72	4.03	1.31
14	Preserving digital resource integrity	2.75	4.06	1.31
15	Developing policy plans	2.63	3.87	1.24

16	Anonymisation and pseudonymisation of personal data	2.50	3.73	1.23
17	Conducting knowledge mapping to facilitate navigation through digital library collections	2.63	3.83	1.20
18	Monitoring usage patterns of digital resources.	2.78	3.97	1.19
19	Dissemination and maintenance of library-user communication channels, such as Ask a Librarian and user alerts.	2.78	3.94	1.16
20	Handling personal identifiable information	2.81	3.94	1.13
21	Processing digital resources	2.88	4	1.12
22	Using innovative tools for the digital library service	2.81	3.84	1.03
23	Preparing reports on user engagement and access patterns	2.63	3.65	1.02
24	Classification of data, objects, and artefacts	2.91	3.87	0.96
25	Collecting digital resources	2.94	3.88	0.94
26	Creating search strategies and conducting queries	3.06	4.00	0.94
27	Plan and manage the delivery of the knowledge management project.	2.91	3.73	0.82
28	Creating a clear, user-friendly access guide to help find and use relevant information easily.	3.00	3.81	0.81
29	Advocating and promoting the use of digital resources	3.09	3.84	0.75
30	Skill in evaluating information quality.	3.06	3.81	0.75
31	Understanding the information needs of users.	3.56	4.16	0.6
32	Cataloguing and classification of information	3.50	4.03	0.53
33	Conducting information searches	3.47	4.0	0.53

Bibliometric Analysis of Publications at the Malawi Liverpool Wellcome Programme: Demonstrating Expansion and Achieving Milestones in Health Research and Science

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Abstract

African research institutions are contributing to global health knowledge production. However, systematic evidence on their research output, visibility, and impact remains limited. The Malawi Liverpool Wellcome Programme (MLW) conducted a bibliometric analysis to provide quantitative evidence of research growth, supporting institutional evaluation and funding justification. The study assessed MLW's annual academic publication output from 2000 to 2024 and benchmarked its research performance against selected UK-based research institutions. A retrospective bibliometric analysis was conducted using data from Scopus, MLW's institutional Zotero database, and investigator-submitted publication lists. The dataset included peer-reviewed publications with at least one MLW-affiliated author. Key indicators examined included annual publication volume, Field-Weighted Citation Impact (FWCI), citation percentiles, and international collaboration rates. Comparative benchmarking was conducted using SciVal data and Scopus. MLW published 1,903 peer-reviewed articles between 2000 and 2024, with output rising from fewer than 20 articles annually in the early 2000s to over 250 in recent years. The FWCI was 1.7, indicating a 70% higher citation rate than the global

average. In terms of highly cited publications, 19% of MLW's publications have citations that fall within the top 10% citation percentiles, a high performance comparable to UK Russell Group universities. MLW also demonstrated strength in international collaborations. The evidence supports institutional visibility, fosters equitable research partnerships, and reinforces the role of data-driven approaches in advancing academic excellence and contributing to sustainable development goals in Africa. The study recommends that big data and innovative information services can guide strategic planning, resource allocation, and research evaluation.

Keywords: *bibliometric analysis; research impact; Malawi Liverpool Wellcome Programme*

1. Introduction

African research institutions are making important contributions to global health knowledge, yet there is limited evidence on their research output, visibility, and impact. Bibliometric analysis, defined as the quantitative study of publications and citations, has become a key tool for assessing research performance at different levels: individual, institutional, national, and global (Aria & Cuccurullo, 2017; Corrall, Kennan, & Afzal, 2013). Bibliometrics allows stakeholders to quantify research productivity, evaluate visibility through citation impact, and explore patterns of collaboration. Universities, research institutions, and funding agencies are relying on bibliometric evidence for strategic planning, performance evaluation, and funding justification (Donthu et al., 2021; Moed, 2017). Studies show that research productivity in sub-Saharan Africa has increased in the past two decades, driven by collaborations and donor-funded programmes (Owusu-Nimo & Boshoff, 2017). However, African institutions often face some challenges, including limited indexing of local journals, underrepresentation in bibliometric databases, and scarce capacity for conducting bibliometric monitoring (Boshoff, 2010; Pouris & Ho, 2014).

The Malawi Liverpool Wellcome Programme (MLW), based in Blantyre, Malawi, is among the most prominent health research institutions in Africa. MLW was established in 1995 and has grown into a leading centre of research and training (Malawi Liverpool Wellcome Programme, 2022). It is an affiliate of the Kamuzu University of Health Sciences (KUHeS), a public university in Malawi (Kamuzu University of Health Sciences, 2024). It has a strong track record in infectious diseases, implementation science and clinical trials, among others. MLW's collaborations with KUHeS, Queen Elizabeth Central Hospital (QECH), the Liverpool School of Tropical Medicine (LSTM), University of Liverpool (UoL) and the London School of Hygiene and Tropical Medicine (LSHTM) have positioned it as a hub of research excellence in sub-Saharan Africa. The study assessed MLW's annual academic publication output from 2000 to 2024 and benchmarked its research performance against selected United Kingdom (UK)-based research institutions.

1.1 Problem Statement

In today's competitive research environment, institutions are required to provide robust and clear evidence of their output and impact. Donors and policymakers use bibliometric indicators, such as the Field-Weighted Citation Impact (FWCI), proportion of papers in top citation percentiles, and international collaboration rates, to evaluate the performance of institutions and to guide funding decisions (Bornmann & Leydesdorff, 2014; Abramo & D'Angelo, 2014). The absence of systematic bibliometric evidence poses several challenges for MLW. It limits the ability to showcase the institution's long-term research growth and visibility in global science. It also reduces competitiveness in attracting and retaining international collaborations and donor funding, particularly when peer institutions can provide such evidence. It also weakens internal capacity to monitor research outputs, identify trends, and align research agendas with strategic goals.

Despite MLW's key role in health research in sub-Saharan Africa, no bibliometric analysis has been undertaken to assess its research performance and impact over time. This gap is not unique to MLW but reflects broader limitations across many African research institutions, where bibliometric assessments remain underutilised due to constraints in expertise, access to bibliometric databases, and data curation (Boshoff, 2010; Pouris & Ho, 2014; Onyancha, 2020). For MLW, however, the lack of a comprehensive bibliometric profile covering its two-decade research trajectory represents a missed opportunity to document achievements and demonstrate institutional impact on global health research. This study was therefore conducted to support institutional evaluation and seven-year Core funding justification by demonstrating MLW's research growth through its publications. MLW received its Core funding from the Wellcome Trust. Core funding is a multimillion-pound grant, which covers the cost of running the research institute for a specific cycle, in this case seven years. MLW must reapply for this Core funding for every cycle, and must provide evidence of its strong publication track record when doing so. Furthermore, limited data exists comparing MLW's output with that of UK-based research institutions. This lack of benchmarking prevents MLW and its stakeholders from assessing growth, demonstrating impact, or positioning the institution strategically within the global research landscape. This problem necessitates a study of this nature.

1.2 Objectives

The following were the specific objectives of the study:

- To assess MLW's research output between 2000 and 2024, with a focus on annual growth patterns and publication trends.
- To benchmark MLW's performance against selected UK research institutions using internationally recognised bibliometric indicators.

2. Methodology

2.1 Study Design

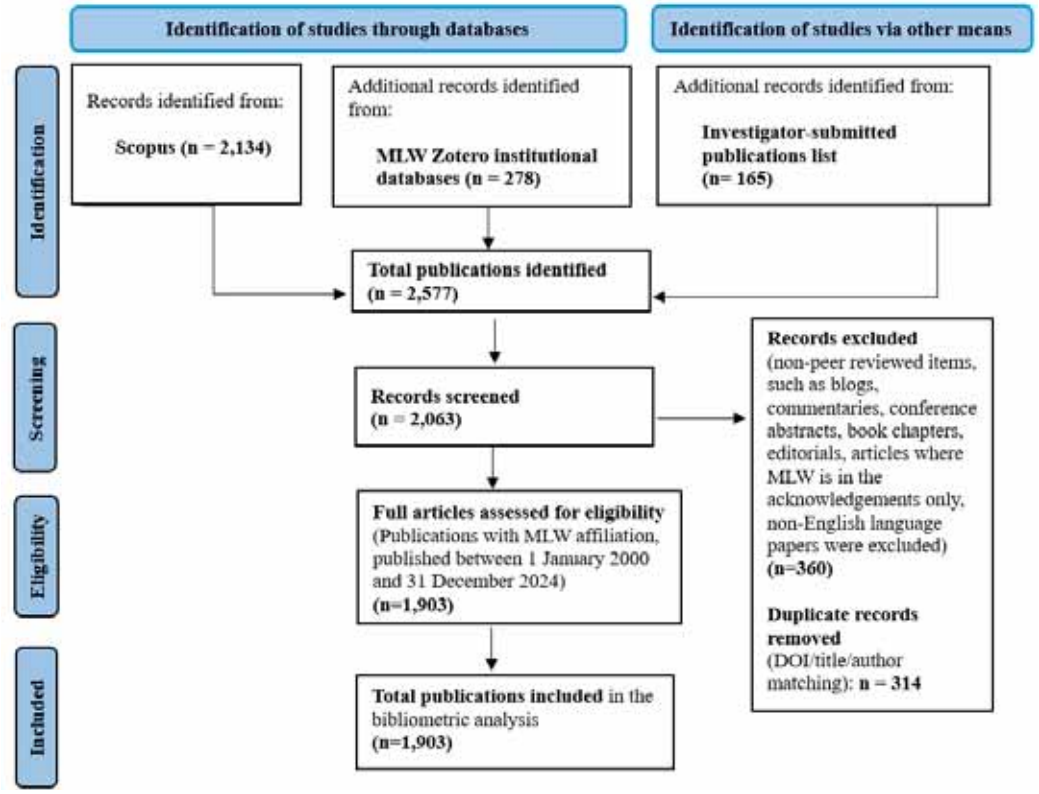
This study employed a retrospective bibliometric design, which is a commonly used approach for evaluating research productivity, impact, and collaboration over defined periods (Donthu et al., 2021; Moed, 2017).

2.2 Study Dataset

The study population consisted of all publications that included at least one author affiliated with the Malawi Liverpool Wellcome Programme (MLW) between 1 January 2000 and 31 December 2024. Publications were included if MLW was explicitly listed in the author affiliation field of indexed databases or confirmed through institutional records. Non-peer-reviewed outputs such as conference abstracts, book chapters, and editorials were excluded. The inclusion criteria were in line with international bibliometric standards (Bornmann & Leydesdorff, 2014). The process of publication identification, screening, and inclusion is illustrated in Figure 1 using an adapted Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow diagram.

Figure 1

Adapted PRISMA Flow Diagram



Note. Adapted PRISMA flow diagram illustrating the data retrieval and inclusion process for MLW publications (2000–2024).

2.3 Instruments and Data Sources

Data were retrieved from three complementary sources: Scopus, MLW's institutional Zotero database, and investigator-submitted publication lists, to maximise completeness and accuracy. Scopus is among the largest multidisciplinary citation databases and is used for institutional bibliometric analyses due to its broad coverage and standardised citation metrics (Falagas et al., 2008). The Malawi Liverpool Wellcome Programme maintains an internal Zotero repository of research outputs, updated regularly by investigators. This local source provided additional records, especially where Scopus coverage was incomplete or inconsistent for African outputs (Onyancha, 2020). To further validate the dataset, MLW investigators were requested to provide publication lists, which were cross-checked with Scopus and Zotero records. For benchmarking purposes, additional bibliometrics were obtained from SciVal, an analytics platform linked to Scopus that provides institutional-level metrics such as Field-Weighted Citation Impact (FWCI) and international collaboration rates. Benchmarked institutions included a selection of UK research institutions, specifically those within the Russell Group, an association of leading research-intensive universities in the UK. The Russell Group comparison was chosen deliberately, as it represents institutions widely recognised for research excellence and high academic impact. Given that MLW's principal funder, the Wellcome Trust, is UK-based, this benchmark provides a relevant and credible frame of reference that funders can easily identify with.

The primary data source was Scopus, which guarantees the integrity of the data included in the study. Scopus only indexes journals and other sources that meet clearly defined quality criteria set by the Content Selection and Advisory Board (CSAB). These criteria ensure that indexed titles demonstrate editorial quality, peer review integrity, and international relevance. As a result, Scopus excludes predatory or non-standard journals that fail to meet these thresholds (Elsevier, 2024). This makes it a reliable and credible source of data for institutional-level bibliometric evaluations. All publications were peer-reviewed and affiliated with MLW; the dataset excluded additional items such as blog posts and articles where MLW appeared in the acknowledgements only. The dataset was verified by the library teams at MLW and LSTM.

2.4 Data Analysis

The combined dataset was exported to Microsoft Excel and cleaned through deduplication (using DOI, title, and author matching). Affiliations were standardised to ensure consistency in recognising MLW contributions, as institutional name variants such as Malawi Liverpool Wellcome Trust, Malawi Liverpool Wellcome Clinical Research Programme, and Malawi Liverpool Wellcome Programme are common in bibliometric databases.

The following bibliometric indicators were calculated: annual publication volume, the total number of publications per year; Field-Weighted Citation Impact (FWCI), a Scopus/SciVal-derived metric that measures citation performance relative to global averages in the same field, year, and document type (Elsevier, 2023); and citation percentiles, the proportion of MLW publications in the top 1%, 5%, and 10% most cited papers globally. Analyses were conducted using Microsoft Excel for descriptive statistics. Comparative benchmarking with UK institutions was performed using SciVal exports to provide standardised cross-institutional metrics.

2.5 Ethics

This study did not involve human participants or any form of identifiable personal information. All analysed data were derived from publicly available bibliographic records in Scopus and institutional publication databases. As such, ethical approval was not required, in accordance with international norms for bibliometric research (Donthu et al., 2021; Moed, 2017).

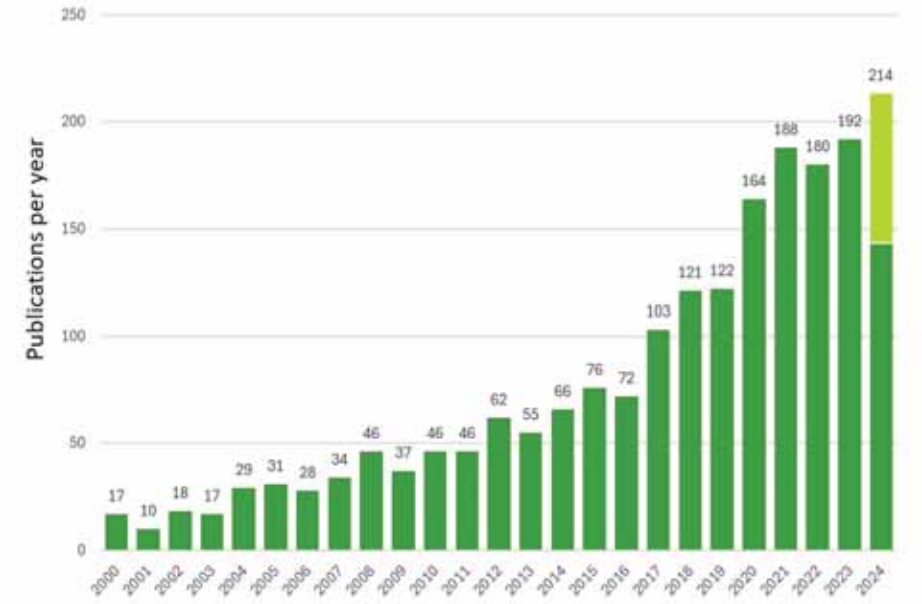
3. Findings

3.1 Publication Volume

The Malawi Liverpool Wellcome Programme has published 1,903 publications in total (Figure 2) since 2000, with the number of publications published each year steadily increasing.

Figure 2

Malawi Liverpool Wellcome Programme Total Publications Since 2000



Note. Figure 2: MLW publications published per year. (Data were extracted in late August 2024. The light green segment therefore represents a projection.)

3.2 Comparing MLW to other UK Institutions

The Malawi Liverpool Wellcome Programme's strong publication track record is also evident when compared against other institutions using the Field-Weighted Citation Impact (FWCI) and analysis of citation percentiles.

3.3 Citation Impact

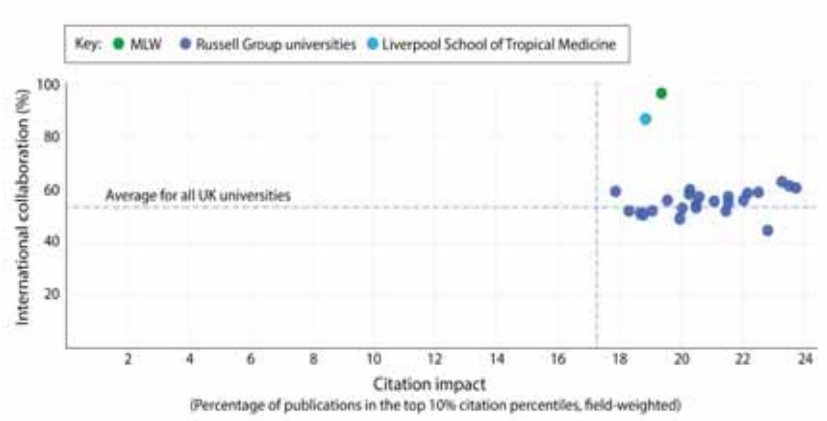
The FWCI for MLW publications during the study period was 1.7. This indicates that MLW publications were cited 70% more often than the world average for publications of the same date range and subject area.

3.4 Highly Cited Publications

Analysis of citation percentiles revealed that 19% of MLW publications were among the top 10% most cited papers globally. This proportion is comparable to the performance of UK Russell Group universities (the Russell Group is a prestigious association of top public research universities in the UK, known for their focus on research excellence, academic rigour, and close links with industry). MLW's proportion of publications with citations in the top 10% citation percentile falls within the same range as Russell Group institutions, and above the UK average. This is also true for the top 1%, 5% and top 25% citation percentiles. (Data source: Scopus and SciVal. Articles published 2000–2024. Date extracted 20 September 2024.)

Figure 3

Comparing MLW to Other UK Institutions



Note. Figure 3: Comparing MLW to other UK institutions. International collaboration is the proportion of articles that have at least one author based at an institution in another country. (Data source: Scopus and SciVal. Articles published 2000–2024. Data extracted 20 September 2024.)

3.5 International Collaboration Network

The Malawi Liverpool Wellcome Programme demonstrates an extensive network of international collaborations spanning multiple continents. Figure 4 presents the MLW collaboration map, showing the global distribution of MLW's research collaborators based on co-authored publications indexed between 2000 and 2024. The strongest partnerships are concentrated in the United Kingdom, particularly with the Liverpool School of Tropical Medicine (LSTM), the University of Liverpool, and other UK institutions. Collaborations are also evident across Europe (520 publications), Asia (320 publications), Africa (263 publications) and North America (255 publications).

Figure 4

Malawi Liverpool Wellcome Programme's Collaboration Map



Note. Figure 4: MLW's collaboration map (2000–2024). Each marker represents the number of co-authored publications with partner institutions in the respective regions. Source: SciVal data, 2024.

3.6 Thirty Most Cited Papers

The bibliometric analysis of the 30 most cited papers revealed a cumulative total of 10,045 citations, with individual citation counts ranging from 192 to 730. On average, each paper had approximately 335 citations, while the median citation count was 291. The most highly cited article, "Invasive non-typhoidal salmonella disease: An emerging and neglected tropical disease in Africa" (2012), accounted for 730 citations.

4. Discussion of the Findings

This bibliometric analysis demonstrates that MLW has experienced a substantial increase in research output since 2000, with publications rising from fewer than 20 annually to over 250 in recent years. Similar growth trends have been reported in bibliometric studies of other African research institutions, where international collaborations and external funding have significantly expanded research capacity (Boshoff, 2010; Owusu-Nimo & Boshoff, 2017). For example, Owusu-Nimo and Boshoff (2017) observed comparable growth in public health research outputs across sub-Saharan Africa, highlighting the role of global partnerships. MLW's trajectory appears steeper, suggesting a strong institutional capacity to attract research funding and collaborations.

4.1 Citation Impact and Visibility

The Malawi Liverpool Wellcome Programme's FWCI of 1.7 indicates a citation performance 70% above the global average, a level of impact comparable to that of top-ranked UK Russell Group universities. A FWCI above 1.0 is generally regarded as evidence of above-average citation performance, highlighting MLW's strong global visibility and influence. By contrast, an earlier study on African institutions reported citation rates below the world average (Pouris & Ho, 2014), reflecting challenges in visibility and dissemination. According to 2025 SciVal data, the average FWCI for African research institutions was 0.9, further demonstrating MLW's outstanding performance relative to the continental average and positioning MLW as an outlier achieving unusually high global visibility for an African research institution. This may be partly attributable to MLW's deep integration into international research networks with LSTM, UoL, LSHTM and other international institutions, as well as to strong external funding support, which brings high-quality, policy-relevant research that resonates both locally and globally. The major funder for MLW is the Wellcome Trust. Other MLW funders include the Foreign, Commonwealth and Development Office (FCDO), National Institute for Health and Care Research (NIHR), Medical Research Council (MRC), UK Research and Innovation (UKRI), Scottish Government (SCG), European and Developing Countries Clinical Trials Partnership (EDCTP), Centers for Disease Control and Prevention (CDC), National Institutes of Health (NIH), and International Vaccine Institute (IVI).

A further contributing factor is MLW's emphasis on publishing in high-impact journals indexed by Scopus and Web of Science. Publishing in open-access journals is another factor, as this increases accessibility, particularly in low- and middle-income countries where paywalls limit reach.

4.2 Highly Cited Publications

The finding that 19% of MLW's publications are in the global top 10% citation percentile reflects the institution's ability to produce influential research. Comparable bibliometric analyses in South Africa have shown a lower proportion of highly cited outputs, often ranging between 10% and 15% (Pouris & Ho, 2014). This suggests that MLW's research not only contributes to global knowledge but also achieves disproportionate influence in certain domains, particularly infectious diseases and clinical research.

4.3 Global Collaboration Network

The findings reveal that MLW maintains an extensive and diverse international collaboration network, reflecting strong integration within the global health research ecosystem. The concentration of partnerships in the United Kingdom, especially with the Liverpool School of Tropical Medicine (LSTM) and the University of Liverpool, reflects the historical and institutional foundations of MLW's collaborative model. This aligns well with earlier studies showing that sustained North–South partnerships enhance research visibility, capacity building, and funding opportunities in low- and middle-income countries (Boshoff, 2010; Onyancha, 2020). The breadth of MLW's collaborations across Europe, Asia, Africa, and North America highlights its role as a strategic hub for transcontinental research. Such partnerships increase citation impact and knowledge exchange, and promote equitable participation in global science. These results mirror regional trends in which international collaboration has been identified as a major driver of research growth and impact in sub-Saharan Africa (Owusu-Nimo & Boshoff, 2017), implying that strategic and equitable collaborations are key to sustaining MLW's research excellence and strengthening Africa's position in global health science.

4.4 The Thirty Most Cited Publications

The high citation counts observed among the top 30 publications show the global visibility and influence of MLW's research, particularly within infectious diseases and public health. A similar bibliometric study conducted in sub-Saharan Africa by Onyancha (2020) has also shown that a small set of highly cited articles often drives regional and institutional impact, especially in health-related disciplines where local disease burdens intersect with global research priorities. The present findings show a stronger concentration on infectious diseases, antimicrobial resistance, and respiratory health, reflecting both the institutional mandate and pressing health challenges in Malawi and the region.

This clustering of citations around a small number of publications suggests the importance of strategically supporting research areas with both local and international relevance. For research managers and libraries, the findings emphasise the need to sustain investment in bibliometric monitoring, open access support, and targeted research capacity building, so that MLW can amplify the reach of its most impactful outputs. The results reaffirm the strategic value of bibliometrics in guiding institutional research policy, strengthening international collaborations, and positioning African research institutions within the global knowledge economy.

4.5 Role of Libraries in Bibliometrics and Research Evaluation

An important implication of this study is the increasingly central role of academic and research libraries in facilitating bibliometric evaluations. Libraries have been perceived primarily as custodians of scholarly literature and providers of information resources. However, in the contemporary knowledge economy, their role has expanded to encompass data stewardship, research analytics, contributing to knowledge synthesis through systematic reviews, research impact assessment, promoting research visibility, managing institutional repositories, and evidence generation for institutional strategy (Corrall, Kennan, & Afzal, 2013; Onyancha, 2020). Libraries are repositioning themselves as active partners in the research lifecycle.

In the case of MLW, the institutional Zotero repository was critical in validating and supplementing publication records that were not fully indexed in commercial databases such as Scopus. This highlights a fundamental equity issue: global indexing systems tend to underrepresent African research outputs, particularly those published in local or regional journals (Boshoff, 2010; Pouris & Ho, 2014). Libraries act not only as curators of institutional bibliographic records but also as corrective agents, ensuring that contributions are visible and accurately represented in global research evaluations.

Libraries play a strategic role in building bibliometric literacy for researchers and administrators. They provide training on citation databases, impact metrics, and research visibility, helping scholars, especially early-career researchers, to track their impact and choose reputable journals for publishing (Auckland, 2012). In developing countries such as Malawi, where research evaluation capacity is still emerging, the library can serve as a hub for capacity building, reducing reliance on external consultants and commercial providers.

Libraries are expected to provide research intelligence that informs institutional decision-making. Through bibliometric evaluations, libraries can supply evidence on research productivity, visibility, and impact, which becomes valuable in several areas. For example, bibliometric insights strengthened MLW's Core funding application by demonstrating institutional growth, impact and relevance.

Libraries can also play a strategic role in guiding recruitment and talent management strategies within research institutions. By analysing publication and citation patterns, libraries can help identify disciplinary or thematic expertise gaps and inform decisions about where new appointments or collaborations would add the greatest value. For instance, a bibliometric profile might reveal that an institution such as MLW produces a high volume of clinical research but fewer outputs in mental health, implementation science, data analytics and climate change. This insight could guide MLW leadership to recruit researchers with expertise in underrepresented or emerging areas, strengthening institutional balance and capacity.

Bibliometric data provided by libraries can help institutions attract and retain high-performing researchers who contribute to institutional visibility and impact. Bibliometric indicators can supplement peer review and assessment in performance evaluations, offering evidence-based measures of scholarly influence, collaboration networks, and citation visibility (Corrall, Kennan, & Afzal, 2013; Donthu et al., 2021). For example, citation trends, field-weighted impact scores, or co-authorship patterns can highlight researchers who contribute substantially to institutional impact, informing promotion or recognition processes.

Libraries have a unique opportunity to champion open science through their involvement in bibliometrics. By advocating for open-access publishing, promoting institutional repositories, and leveraging open bibliometric tools such as OpenAlex and Dimensions, libraries can help promote access to metrics and reduce dependency on commercial infrastructures. In doing so, they contribute to the broader global movement towards equity, transparency, and inclusivity in scholarly communication.

5. Conclusion

This study provides the first bibliometric analysis of MLW, covering data for over two decades of scholarly output. The findings highlight research trajectory and impact as key contributions of the current study. MLW has experienced significant growth in publications, and its research impact is comparable to leading UK institutions of higher learning and research. The study shows how bibliometric evidence can support strategic planning, resource allocation, and institutional positioning, particularly in competitive funding environments. A further contribution lies in illustrating the role of libraries as custodians of institutional research visibility and enablers of bibliometric intelligence: libraries become central to institutional research evaluation and the advancement of open science by curating publication data and providing training. It is clear from the study that African institutions can strengthen their global visibility, foster equitable collaborations, and contribute more effectively to the Sustainable Development Goals.

6. Recommendations

Drawing on the findings of this study, the following recommendations are proposed:

i) Institutionalise bibliometric monitoring in strategic planning. Incorporate bibliometric tracking into organisational strategies, performance reviews, and funding proposals to strengthen evidence-based decision-making and demonstrate research impact.

ii) Encourage researchers to publish in reputable, peer-reviewed journals indexed in Scopus and Web of Science, while also embracing open-access outlets to maximise research visibility and accessibility.

iii) Complement bibliometric indicators with qualitative assessments to capture broader dimensions of research influence, including contributions to policy formulation, health outcomes, and societal benefit.

7. Limitations

This bibliometric analysis provides important insights into MLW's research productivity and impact; however, it is important to acknowledge some limitations.

Uneven disciplinary coverage within bibliometric databases such as Scopus is a limitation worth noting. Scopus provides strong representation of medical and natural sciences, which is the core focus of MLW, but limited coverage of social sciences, humanities, and locally published journals. As a result, output in these underrepresented domains may not be fully captured, which may lead to a potential underestimation of interdisciplinary or community-focused research.

Sample size and representativeness also influence the robustness of bibliometric indicators. MLW's large publication base strengthens the validity of the analysis; however, smaller datasets or specialised subfields may exhibit greater statistical fluctuation in citation impact and percentile rankings. Bibliometric data users in smaller contexts should apply caution when interpreting such metrics.

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DIGITAL TECHNOLOGIES AND READING CULTURE

Academic Libraries as Enablers of Open Science in Public Universities in Zambia: A Survey-Based Analysis

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Abstract

Open Science is reshaping the global research landscape by promoting transparency, accessibility, equity, and collaboration. In Zambia, public universities are beginning to embrace these principles, with academic libraries playing a pivotal role in this transition. By providing critical infrastructure, expert support, and inclusive spaces, they empower researchers and the wider community to access, share, and engage with scientific knowledge. This study explores the role of academic libraries in promoting Open Science within public universities in Zambia. Drawing on survey data from librarians and faculty members, the paper examines institutional practices, technological integration, and policy frameworks that support open access and data sharing. Using a mixed-methods survey of librarians, ICT staff, and faculty across five institutions, the study identifies key successes and challenges. Findings reveal that while awareness of Open Science is growing, infrastructural and policy limitations hinder full participation. Recommendations include capacity building, policy development, and inter-university collaboration to strengthen Open Science ecosystems.

Keywords: *open science, academic libraries, institutional repositories, Zambia.*

1. Introduction

Open Science is reshaping scholarly communication by promoting transparency, accessibility, and collaboration across disciplines and borders (UNESCO, 2021). It seeks to democratise access to knowledge and foster global collaboration. In Zambia, the adoption of Open Science is still in its early stages, but public universities are beginning to recognise its potential to enhance research visibility and impact (EIFL, 2023).

Academic libraries, as central hubs of information management and dissemination, are uniquely positioned to lead this transformation. They provide the infrastructure for institutional repositories, advocate for open access policies, and support researchers in navigating digital scholarship (Chan et al., 2015).

Zambia's public universities, including the University of Zambia (UNZA), Copperbelt University (CBU), and Mulungushi University, face challenges such as limited funding, low research visibility, and uneven access to digital tools (Chitumbo & Mulenga, 2021). However, the global push for Open Science has spurred local efforts to enhance scholarly communication and knowledge equity.

This paper investigates the extent to which libraries in Zambia's public universities are enabling Open Science, drawing on survey data and institutional case studies to highlight both progress and persistent challenges.

1.1 Objectives of the study

- To assess the current state of Open Science initiatives in public university libraries in Zambia.
- To evaluate infrastructure, staffing, and policy frameworks supporting Open Science.
- To identify challenges and opportunities for academic libraries in promoting Open Science.
- To recommend strategies for enhancing library-led Open Science initiatives.

2. Literature Review

The concept of Open Science has gained global traction as a transformative approach to scholarly communication. It encompasses open access publishing, open data, transparent peer review, and citizen science, all aimed at making research more accessible, reproducible, and inclusive (UNESCO, 2021). Libraries, as institutional knowledge hubs, have emerged as key facilitators of this movement, particularly in higher education settings.

Globally, academic libraries have played a pivotal role in advancing Open Science through the development of institutional repositories, advocacy for open access policies, and training in research data management. Tenopir et al. (2012) found that libraries in North America and Europe were increasingly offering research data services, including data curation, metadata support, and guidance on funder mandates. Similarly, Pinfield et al. (2014) emphasised the strategic role of libraries in supporting researchers through the entire data lifecycle, from creation to preservation and sharing.

In the African context, the adoption of Open Science has been uneven but steadily growing. Initiatives such as Electronic Information for Libraries (EIFL) have supported national campaigns, capacity building, and repository development across several countries (EIFL, 2022). For example, in Ethiopia and Uganda, EIFL-supported projects have led to the creation of institutional repositories and the formulation of open access policies at major universities (C. Mwelwa, 2020). However, challenges such as limited funding, inadequate infrastructure, and low awareness among researchers persist.

In Zambia, the Zambia Library Consortium (ZALICO) has been instrumental in promoting Open Science principles. Through workshops, advocacy campaigns, and technical support, ZALICO has raised awareness among librarians and academic staff about the benefits of open access and data sharing (EIFL, 2023). The University of Zambia (UNZA) stands out as a national leader, having implemented a repository policy and upgraded its digital infrastructure to DSpace 7.6. These efforts have significantly increased the visibility of Zambian research outputs and positioned UNZA as a model for other institutions (Phiri, 2018).

Even with this increase in awareness, recent studies still show that only a few lecturers and researchers publish their papers in open access journals (Bwalya et al., 2019). By contrast, Onaolapo et al. (2025) found that a significant proportion of lecturers and researchers do publish in open access journals, suggesting that awareness is slowly turning into action.

Although policy development is crucial to the successful implementation of Open Science (League of European Research Universities, 2018), most public universities in Zambia still lack formal policies governing open access publishing and data management. For instance, M'Kulama et al. (2022) [reference not found in the manuscript's reference list – see Editorial Report §2.5] reported that the University of Zambia did not have a research data management policy, although it had a robust ICT infrastructure supported by qualified IT staff. The University of Zambia has since established an ICT department within the library.

Despite the various benefits associated with Open Science and open access, academic libraries in developing countries' path to open access has not been smooth. Open access confronts these countries with a variety of challenges and barriers, such as inadequate access to the internet and information and communication technologies (ICTs), caused by the high cost of ICTs and connectivity, and poor telecommunications infrastructure (Ogungbeni et al., 2018; Onaolapo et al., 2025).

A study by Chitumbo and Mulenga (2021) revealed that while librarians were generally aware of Open Science principles, institutional support and researcher engagement were limited, and support for policy development was found to be a hindrance. Technical challenges such as unreliable internet connectivity, lack of repository staff, and insufficient metadata standards further hindered progress. Musa (2016) adds that a lack of ICT skills and inadequate advocacy for open access in academic and research institutions were key limiting factors to usage.

The literature also highlights the importance of collaboration between libraries, ICT departments, and research offices. Successful Open Science implementation requires cross-functional partnerships and institutional commitment (Chan et al., 2015).

Librarians must also collaborate and establish partnerships with several stakeholders to provide Open Science services and resources, including university leadership, national partners, specifically government agencies, and other campus and local libraries (Giustini et al., 2021). Libraries must not only provide infrastructure but also advocate for policy change and cultural shifts within academia.

In summary, while libraries in Zambia and across Africa are making strides toward enabling Open Science, systemic barriers remain. The literature underscores the need for coordinated national strategies, sustainable funding, and capacity building to fully realise the potential of libraries as enablers of Open Science.

3. Methodology

This study employed a mixed-methods research design to explore the role of academic libraries in enabling Open Science across Zambia's public universities. The approach combined quantitative and qualitative techniques to ensure a comprehensive understanding of institutional practices, librarian perspectives, and infrastructural readiness.

3.1 Research Design

A convergent parallel mixed-methods design was adopted, allowing for simultaneous collection and analysis of both quantitative and qualitative data (Creswell & Creswell, 2018). This design was chosen to triangulate findings and provide richer insights into the multifaceted nature of Open Science implementation.

3.2 Study Sites and Participants

The study was conducted across five public universities in Zambia:

- University of Zambia (UNZA)
- Copperbelt University (CBU)
- Mulungushi University (MU)
- Chalimbana University (CU)
- Kwame Nkrumah University (KNU)

Participants included academic librarians, ICT officers, faculty members, and research administrators. A total of 45 respondents were purposively selected based on their roles in scholarly communication, repository management, or research support services.

3.3 Data Collection Methods

Data collection involved structured questionnaires to assess awareness, infrastructure, and policy frameworks; semi-structured interviews to explore institutional practices; repository audits to evaluate technical capacity; and document analysis of existing policies.

Structured questionnaires were distributed electronically to librarians and ICT staff to assess awareness of Open Science principles, repository usage, and training needs. The questionnaire included Likert-scale items and open-ended questions.

Semi-structured interviews were conducted with key informants, such as library directors and research managers, to explore institutional strategies, policy frameworks, and perceived barriers to Open Science adoption. Interviews were recorded and transcribed for thematic analysis.

Repository audits assessed each university's institutional repository (where available) for functionality, metadata quality, frequency of updates, and integration with global indexing platforms, using a standardised checklist adapted from EIFL's repository evaluation toolkit.

Document analysis of institutional policies, strategic plans, and repository guidelines was undertaken to determine the presence and scope of open access and data management provisions.

The triangulation of methods ensured a comprehensive understanding of library-led Open Science initiatives (Creswell & Creswell, 2018).

3.4 Data Analysis

Quantitative data from questionnaires were analysed using descriptive statistics (frequencies, percentages) to identify patterns in awareness, infrastructure, and training. Qualitative data from interviews and open-ended responses were coded thematically using NVivo software, focusing on recurring themes such as policy gaps, technical challenges, and advocacy efforts.

Repository audit results were synthesised into comparative profiles, highlighting strengths and weaknesses across institutions. Document analysis was used to corroborate interview findings and assess policy alignment with Open Science principles.

4. Findings and Discussion

4.1 Awareness and Engagement with Open Science

Survey results revealed that 78% of respondents were familiar with the concept of Open Science. However, only 22% reported actively publishing in open access journals. This gap between awareness and practice suggests that while the theoretical understanding of Open Science is present, practical engagement remains limited. Faculty members expressed concerns about the perceived quality and credibility of open access journals, fearing that publishing in such outlets might undermine their academic reputation or promotion prospects (Bwalya et al., 2019). By contrast, a study by Onaolapo et al. (2025) found that the majority of respondents had actually published in open access journals.

Librarians highlighted a lack of institutional mandates or incentives to encourage Open Science practices. Without formal policies or performance metrics tied to open access publishing, researchers often default to traditional, subscription-based journals. This finding aligns with broader regional trends in sub-Saharan Africa, where Open Science is often viewed as optional rather than integral to scholarly communication (Ocholla & Ocholla, 2020).

Qualitative responses also indicated that misconceptions about copyright, licensing, and data ownership further discourage participation. Some faculty members were unsure whether depositing their work

in institutional repositories constituted a breach of publisher agreements, underscoring the need for targeted education and advocacy. Librarians should therefore take this opportunity to expand training programmes to build capacity among researchers and students in open access publishing, copyright, and journal selection guidelines, so as to avoid predatory journals.

4.2 Technological Infrastructure and Repository Use

Digital infrastructure emerged as both a critical enabler and a barrier to Open Science. While all surveyed universities had some form of digital repository (e.g., DSpace), only two of the five institutions maintained regularly updated and fully functional platforms. The remaining three libraries reported issues such as infrequent uploads, outdated interfaces, and limited technical support (Zulu, 2025).

Bandwidth limitations and unreliable internet connectivity were cited as major obstacles, particularly on rural campuses. This aligns with the findings of Ogungbeni et al. (2018), who argued that academic libraries face ICT-related challenges owing to the high cost of ICTs and connectivity, and poor telecommunications infrastructure. These constraints not only hinder access to global research but also limit the ability of local scholars to share their work widely. Librarians noted that repository usage was largely confined to theses and dissertations, with minimal integration of faculty publications, datasets, or conference proceedings.

Some libraries had begun experimenting with cloud-based solutions and mobile-friendly interfaces, but these initiatives were often donor-driven and lacked long-term sustainability plans. The absence of dedicated IT personnel within library departments further exacerbated maintenance challenges.

However, the University of Zambia has established an ICT department within the library to help mitigate some of these challenges (M'kulama et al., 2022).

4.3 Policy Frameworks and Institutional Support

Policy support for Open Science was found to be fragmented and inconsistent across institutions. Only one of the five universities assessed had a formal open access policy, and even that was described by respondents as "symbolic" rather than enforceable. Chiware and Skelly (2022) agree with this assertion as they indicated that one of the major challenges African institutions faced was redundant polices which were often times incompatible with other policies. Most libraries operated without clear guidelines on data sharing, repository management, or licensing standards.

Librarians expressed frustration at the lack of strategic alignment between university leadership and library services. While some vice-chancellors publicly endorsed Open Science principles, this rhetoric rarely translated into budget allocations, staffing, or infrastructure development. Faculty members echoed this sentiment, noting that open access publishing was not recognised in promotion criteria or research assessments.

The survey also revealed a disconnect between library staff and academic departments, with limited collaboration on research data management, metadata standards, or publication workflows. This siloed approach undermines the potential of libraries to serve as integrated partners in the research lifecycle.

4.4 Cultural and Behavioural Factors

Beyond infrastructure and policy, cultural attitudes toward knowledge sharing play a significant role. Several respondents described a "protective" stance toward research outputs, driven by fears of plagiarism, misappropriation, or loss of competitive advantage. These concerns are particularly acute in con-

texts where intellectual property laws are poorly enforced or misunderstood.

Additionally, the hierarchical nature of academic institutions in Zambia may discourage junior researchers from challenging traditional publishing norms. Without mentorship or institutional encouragement, early-career academics are less likely to explore Open Science pathways.

4.5 Comparative Insights and Regional Context

Compared to neighbouring countries such as South Africa and Kenya, Zambia's Open Science ecosystem is still in its formative stages. In South Africa, national mandates and funding agency requirements have accelerated repository development and open access adoption (J. Mwelwa et al., 2020). Zambia lacks such centralised coordination, resulting in uneven progress across institutions.

However, the survey also uncovered pockets of innovation, such as librarian-led workshops, student-driven repository projects, and informal faculty networks that could serve as models for broader reform. These grassroots efforts demonstrate that change is possible even in resource-constrained environments, provided there is vision and commitment.

5. Conclusion and Recommendations

Academic libraries in Zambia's public universities are pivotal to the advancement of Open Science. While awareness is growing, systemic challenges must be addressed to unlock their full potential. This study has shown that foundational efforts, particularly at UNZA, have laid important groundwork, but broader systemic reforms are needed to ensure equitable and sustainable adoption across institutions. Strategic investment in infrastructure, policy, and human capital will be essential to foster a sustainable Open Science culture. By empowering libraries to lead this transformation, Zambia can enhance its research visibility, foster collaboration, and contribute meaningfully to the global knowledge commons.

6. Recommendations/Practical Implications

- Capacity building: Regular training for librarians and researchers on Open Science tools and practices.
- Policy development: Universities should adopt clear policies mandating open access publishing and data sharing.
- Collaborative networks: Establish inter-university consortia to share digital infrastructure and expertise.
- Recognition and incentives: Integrate Open Science contributions into academic promotion and performance reviews.
- Sustainable infrastructure: Invest in scalable, locally managed digital platforms with dedicated technical support.

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Access to Digital Literacy Technologies Among Marginalised Learners in Namibia

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Abstract

This study investigated the accessibility of digital literacy technology among marginalised learners in Namibia. A mixed-methods approach was employed, and data were collected using questionnaires, interviews, and group interviews to explore learners' access to, and use of, digital technologies. The population comprised 255 Grade 11 and 12 learners from marginalised communities in Namibia. The study ensured voluntary participation, informed consent, protection of participants' rights, anonymity, and confidentiality. Quantitative data were analysed using SPSS, while qualitative data were analysed thematically. The study was limited to eighteen (18) selected secondary schools in Namibia; therefore, its findings may not be generalised to all schools in the country. The findings revealed that 50% of learners had access to digital technology at home, mainly smartphones, whereas 50% had no access to digital technologies at home. At school, 67% of learners reported having access to digital tools such as computers, laptops, and smartboards; however, their accessibility and use were restricted by unavailability in some schools, learners' limited skills in using them, and school-imposed access restrictions. Moreover, Wi-Fi accessibility at schools was limited to teaching staff, excluding learners. Beyond home and school, 37.5% had no access to digital tools, while 29.4% accessed digital technology at public libraries. These findings are crucial to the government of the Republic of Namibia and various relevant non-governmental organisations, as they highlight a persistent digital divide among learners, where access to, and use of, digital tools and internet connectivity remain unequal at home and school.

Keywords: *digital access, digital divide, marginalised learners, Namibia.*

1. Introduction

Digital literacy is a worldwide concern for researchers (Nawaz & Kundi, 2010). National and international communities have made commitments to tackle digital literacy, particularly in terms of infrastructure development (Chetty et al., 2018). Namibia, like many countries, is striving to remain relevant in the digital era by continuously positioning itself to fully leverage the technological innovations brought about by the Fourth Industrial Revolution and by developments in artificial intelligence, in order to achieve its national agenda (UNESCO, 2023). Despite these efforts, there is limited information regarding the inclusiveness of access to digital infrastructure, particularly among marginalised communities in Namibia.

Digital technology accessibility is essential in digital literacy development, as access to digital technology tools and the necessary support contribute to the development of digital skills (Gottschalk & Weise, 2023). However, a significant digital divide, between and within countries, regions, and education systems, has been observed, especially in developing countries (Gottschalk & Weise, 2023; Heena & Nidhi, 2022; Kronke, 2020; OECD, 2018). Ideally, providing learners with access to digital tools can help

minimise the achievement gap, especially for learners from disadvantaged backgrounds (Gottschalk & Weise, 2023, p. 22). In the Namibian context, there is limited empirical evidence on how marginalised learners access digital literacy technology. Hence, this research examined the extent to which marginalised learners in selected senior secondary schools in Namibia accessed digital literacy technology by seeking to answer the following research questions:

- To what extent are learners aware of digital technology?
- What are learners' perceptions of, and attitudes toward, digital technology?
- What is the level of availability and accessibility of digital technologies to learners?
- How do learners use digital technologies?

2. Conceptual Framework

The study is informed by a conceptual framework that integrates concepts from two frameworks, namely the PISA 2021 ICT framework and UTAUT. The PISA 2021 ICT framework consists of five main dimensions, namely access to ICT, use of ICT, and students' ICT competencies, student cognitive performance, and student well-being. These dimensions are influenced by contextual factors such as country and system level, school level, teacher level, and learner level (Lorenceau et al., 2019; OECD, 2018). For this study, only the dimensions of access to ICT, use of ICT, and students' ICT competencies, with all associated contextual factors, are utilised, as they are closely aligned to the study's objectives. Contextual factors, together with policies and procedures, have an indirect effect on both the accessibility and utilisation of digital technologies, as they are likely to influence and limit the extent to which ICT resources are accessed and used.

UTAUT incorporates four main variables, which are performance expectancy, effort expectancy, social influence, and facilitating conditions. These variables are based on four moderators that are crucial to behaviour: gender, age, experience, and voluntariness (Bradley, 2009, p. 283; Marikyan & Papagiannidis, 2023). The current study incorporated the constructs of performance expectancy, effort expectancy, social influence, and facilitating conditions, along with the four moderators — gender, age, experience, and voluntariness of use. UTAUT effectively supports the investigation of technology acceptance and usage (Guillén-Gámez et al., 2023).

3. Methods

This study employed a mixed-methods research approach and adopted a convergent research design, which combined quantitative and qualitative data, to provide a thorough analysis of the research problem (Creswell, 2003; Creswell, 2015; Creswell & Creswell, 2018; Hafsa, 2019). A convergent research design is a type of research design whereby a researcher collects qualitative and quantitative data simultaneously, and analyses them separately, to compare the results, then determine whether they confirm or disconfirm each other (Creswell, 2003; Creswell, 2015; Creswell & Creswell, 2018; Hafsa, 2019; Sharma et al., 2023).

The population comprised Grade 11 and 12 marginalised learners, namely learners from marginalised communities in Namibia, i.e., the San, Ovahimba, Ovazemba, Ovatjimba, and Ovatue. Purposive and cluster sampling was used to select participants, while questionnaires, interviews, and group interviews were used to collect data from Grade 11 and 12 marginalised learners in Namibia. Research ethics defined by voluntary participation, informed consent, respect for participants, transparency and openness, privacy, anonymity, and confidentiality were applied. Quantitative data were analysed using SPSS, and qualitative data were analysed thematically.

4. Results

This section presents the findings of the study based on the study's four research questions, which sought to explore learners' awareness and perceptions of digital technologies, the availability and accessibility of digital technology for the learners, as well as the extent to which learners use digital tools. Since a convergent research design was employed for this study, quantitative and qualitative results are combined.

4.1 Demographic Information

The characteristics of the study's participants are presented in Table 1.

Table 1

Participants' Biographic Information

Learners' ethnic group	%	Learners' grade	%	Learners' gender	%	Learners' age	%
San	42%	Grade 11	88%	Female	52%	16 years	2%
Ovahimba	38%	Grade 12	12%	Male	48%	17 years	3%
Ovazemba	15%					18 years	22%
Ovatue	1%					19 years	25%
Ovatjimba	4%					20 years or older	48%

A total of 255 learners from marginalised communities participated in the study, with the majority being San, followed by learners from the Ovahimba, with the smallest representation from the Ovatue. Most of the participants were Grade 11 learners, and the gender distribution was 52% female and 48% male. Participants' ages ranged from 16 years to 20 years and older, with most being 20 years and older.

A total of 18 learners participated in the interviews and group interviews. Of these, 14 were from the San, one from the Ovahimba, and three from the Ovazemba communities. The sample consisted of thirteen Grade 11 learners and five Grade 12 learners. Gender representation was balanced, with nine males and nine females.

4.2 Learners' parents/guardians' employment status

Learners were asked to indicate their parents'/guardians' employment status. Table 2 shows the results.

Table 2

Learners' Parents' Employment Status

Type of employment	Parent 1	Parent 2
Full-time employment (e.g. government or private sector)	12.6%	0.8%
Informal/casual employment (e.g. domestic worker, farm worker)	9.4%	0.4%
Self-employment (e.g. street vendor or running a small business)	6%	1.2%
Small-scale/subsistence farming employment (own a family farm or garden)	4.3%	0.4%
Pensioner	5.1%	0.8%
Unemployed	62.6%	12.2%
Not applicable	-	84.2%

The findings indicate that most parents/guardians, notably 62.6% of those identified as 'Parent 1', are unemployed, and 12.6% are in full-time employment.

Interview and group interview findings also revealed that the majority of learners indicated that their parents are unemployed. A smaller number reported that their parents are in formal employment, namely as a day-care teacher, teacher, tour guide, health assistant, and mining engineer, while others are in informal employment, own small businesses, or are pensioners who rely on an old-age social grant.

4.3 Digital Technology Awareness and Interest

Learners were asked whether they are aware of digital technologies available in their surroundings and whether they have an interest in using digital technologies. The responses are shown in Figures 1 and 2.

Figure 1

Learners' Digital Technology Awareness

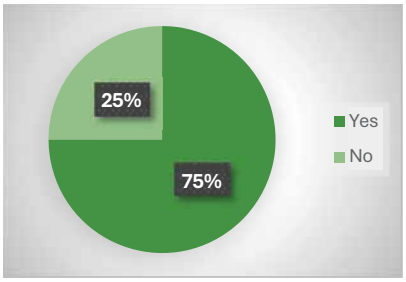
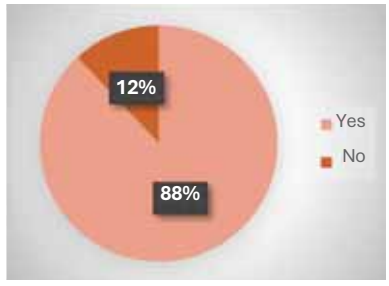


Figure 2

Learners' Interest in Digital Technology



As indicated in the figures above, the majority are aware of the digital technologies available and have an interest in utilising them.

4.4 Learners' Perceptions towards Digital Literacy Technology

Learners were also asked about the importance and usefulness of being digitally literate; the responses are shown in Figures 3 and 4.

Figure 3

Digital Literacy Importance

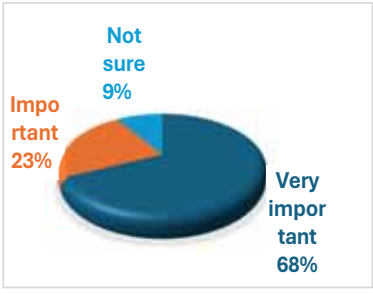
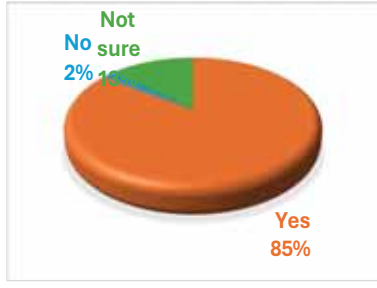


Figure 4

Digital Literacy Benefits



The finding presented in Figures 3 and 4 show that most participants (68%) considered digital literacy important, and 85% indicated that digital literacy technology is useful.

Interview and group interview findings also revealed that the majority of learners described digital tools as beneficial for research, homework, and examination preparation, particularly when using the internet to access additional information. For example, one learner said, "It is beneficial, we use them to research

for Agriculture and Otjiherero." Another shared that, "It is important, I usually use a smart phone to search for information when there are difficult old examination question papers." On the other hand, a few learners who did not perceive digital tools as beneficial explained why; for example, one stated: "We do not see their benefits because we do not use them."

4.5 Availability and Accessibility of Digital Tools at Home

Participants were asked whether they have access to digital tools and internet at home; Figures 5 and 6 present the results.

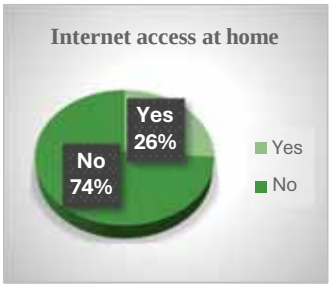
Figure 5

Access to Digital Tools at Home



Figure 6

Internet Access at Home



The findings indicate that access to digital tools is balanced, as 50% had access and 50% did not have access to digital tools at home. Most participants (74%) did not have access to internet at home.

From the qualitative findings, the majority indicated that they have access to a smartphone at home, either their own or belonging to their parents and guardians. A smaller number have access to laptops, TVs, and/or radios. For instance, one learner explained, "I use my parents' smartphone." Nevertheless, quite a few learners indicated they do not have access to digital tools at home.

4.6 Internet Connectivity at Home

Participants were asked about the type of internet connectivity they had at home; Table 3 displays the results.

Table 3

Type of Internet Connectivity at Home

Type	%
Mobile data	17.5%
Wi-Fi	7.9%
Neighbours' Wi-Fi	15.8%
Broadband	0%
None	65%
Others	0.8%

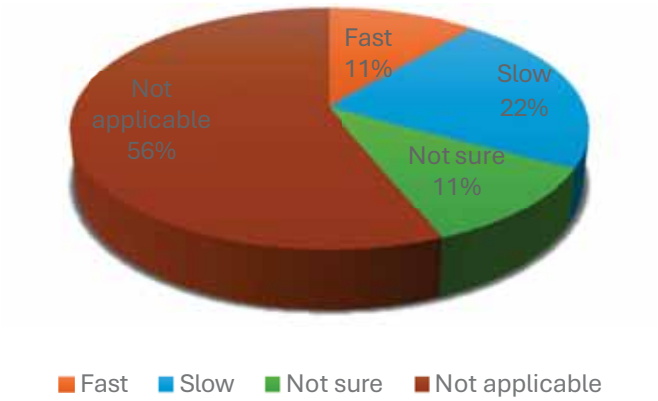
From the findings, most participants (65%) do not have internet access at home. Those who access the internet do so by means of mobile data (17.5%), followed by the use of neighbours' Wi-Fi (15.8%), while only 7.9% had Wi-Fi connectivity at home.

4.7 Internet Connectivity Speed at Home

Participants were asked to indicate the internet speed; Figure 7 presents the findings.

Figure 7

Internet Connectivity Speed



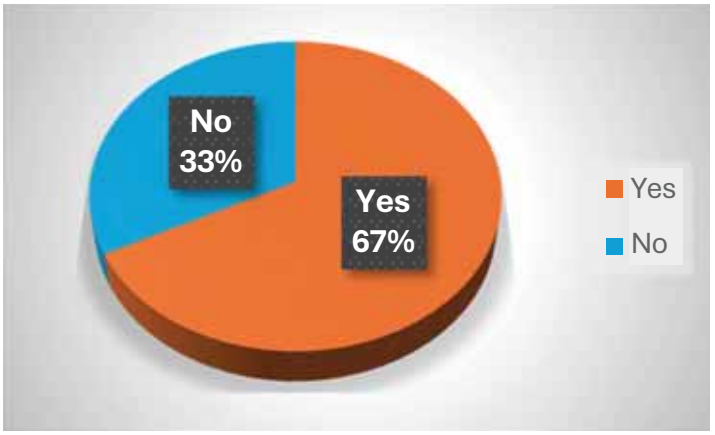
As shown in Figure 7, the majority of participants (56%) indicated that internet speed was not applicable, suggesting they do not have internet connectivity at home. Of those who indicated that they have internet access at home, most (22%) indicated that it was slow, while a smaller number (11%) indicated that their internet speed was fast.

4.8 Availability and Accessibility of Digital Technology at School

Participants were asked to indicate whether they have access to digital tools at school; Figure 8 displays the responses from quantitative data.

Figure 8

Access to Digital Tools at School



The findings show that the majority (67%) have access to digital technology at school, while 33% have no access.

The qualitative findings show that the digital tools available in schools include computers, laptops, and printers. One learner remarked, "There are computers in the lab but no computers in the school library because it is used as a class." Another learner reported that, "We have computers and smartboards at our school." However, some learners reported that there are no digital tools available at school, as noted by one who said, "There are no digital tools, no computers, no laptops and smart boards." Other participants were uncertain about the availability of digital tools at school.

The qualitative findings reveal that learners' accessibility to digital tools at school is limited. Learners reported that the tools are accessible occasionally, or when permission is sought and granted. For example, one learner stated, "The computer lab is only accessible when you ask for permission." Accessibility is limited due to learners' inability to use the tools, insufficient tools at some schools, and unavailability of tools at other schools. For instance, one learner said, "Their accessibility is limited. There are computers in the school library, and they have internet, but they are used per schedule, e.g. grade 8s use them on Mondays only, grade 9s use them on Tuesdays only etc." Another said, "Our school does not have digital tools, but we sometimes use teachers' laptops." However, a few learners reported that they have digital tools. One learner remarked, "I have access to these tools, especially the smartboards."

4.9 Internet Connectivity and Access at School

From the findings, learners indicated that all schools have internet connectivity by means of Wi-Fi; however, access is limited to teaching staff, excluding learners. One learner explained that, "The school has Wi-Fi, but learners do not have access to this Wi-Fi because the school does not allow learners to bring their devices to school, much less connect it to Wi-Fi." Others explained that, "There is Wi-Fi, but it is not accessible to learners, us learners are not allowed to use the Wi-Fi. The school changes the Wi-Fi password every month. When we are given schoolwork that requires research, we go get help from the public library, but the library only has one computer which learners make use of." The findings also revealed that inaccessibility to the internet is also due to lack of device ownership, as well as unavailability of internet on school computers with slow and weak connectivity. For example, one learner explained that, "There is Wi-Fi at school, I access the Wi-Fi using a friend's phone because I do not have a phone." Another learner reported that, "There is Wi-Fi at school, but the computers in the lab do not have internet," while another noted that, "...the internet is slow because we use it a lot; we are many."

4.10 Access to Digital Tools and Internet Elsewhere

Participants were asked where else, apart from home and school, they accessed digital tools and internet; the responses are shown in Table 4.

Table 4

Access to Digital Technology Elsewhere

Location	%
Public library/community centres	29.4%
Internet café	2%
Neighbours	17.9%
Friends and family	24.6%
I do not access digital tools and internet elsewhere	37.5%
Others	6.3%

The findings indicate that 37.5% of participants do not have access to digital devices and the internet anywhere else, followed by 29.4% who have access at public libraries/community centres, and 24% who have access through friends and family. 17.9% have access through their neighbours, 6.3% have access through other means, and 2% have access through internet cafés.

4.11 Use of Digital Technology at School

Participants were asked to indicate the digital tools they regularly used; the responses are displayed in Table 5.

Table 5

Digital Tools Regularly Accessed at School

Tool	%
Laptops	25.7%
Computers	57.3%
Tablets/iPad	6.7%
Smart boards	19.4%
Digital TVs	13%
Others	2%
None	21.7%

Table 5 shows that participants mostly use computers (57%), followed by laptops (25%); however, 21% indicated that they do not have access to digital tools at school.

4.10 Frequently used digital tools across different settings

Participants were asked which digital tools they regularly use across different settings, including at home, school, and elsewhere. Table 6 presents the findings.

Table 6

Most Used Digital Tools

Tool	%
Laptops	24%
Smartphone	60%
Computer	25%
Tablets/iPad	4%
None	25%

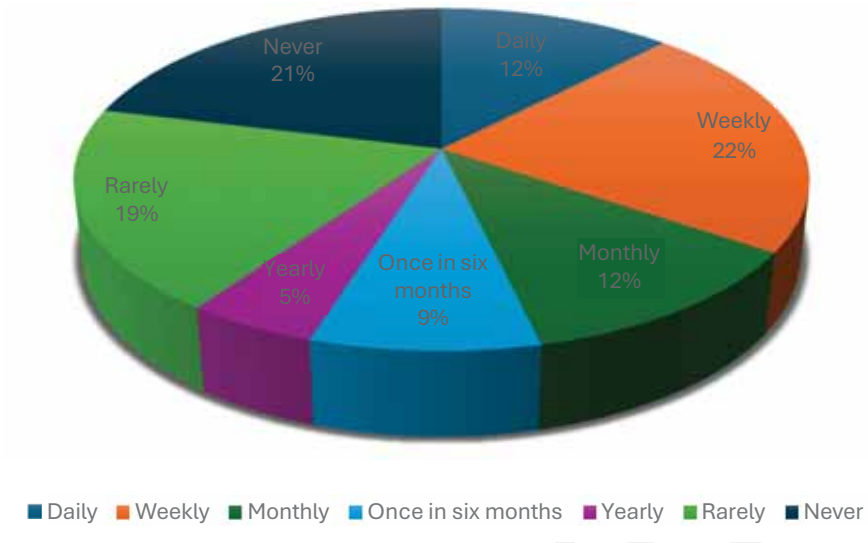
Participants indicated that they mostly use smartphones (60%), followed by computers (25%) and laptops (24%). A significant number (25%) of participants also indicated that they do not use digital tools.

4.11 Frequency of access and use of digital tools and internet

Participants were asked how often they access and make use of digital tools and internet. Figure 9 presents the responses.

Figure 9

Frequent Access and Use of Digital Technology



The findings indicate that most participants access and use digital tools weekly (22%); however, a larger number also indicated that they never (21%) or rarely (19%) access and use digital tools.

5. Discussion

The majority of respondents are aware of digital technologies available and have an interest in utilising them. Related studies also found that high school students are fully aware of the existence of digital technology (Mudra, 2020; Mnisi et al., 2024; Delima et al., 2022). Most learners perceive digital literacy as important and useful, particularly for research, homework, and examination preparation. Quantitative results complemented these findings, with 68% perceiving digital literacy as important, and 85% viewing digital literacy technology as useful. These findings resonate with related studies (Gamede, 2021; Hall et al., 2013; Jan, 2018; Ketanci, 2023; Ogunbodede et al., 2022; Son et al., 2017), which revealed that learners recognise the importance and usefulness of digital technology for academic, research, and personal purposes.

A few learners who do not perceive digital tools as beneficial do not make use of them because of a lack of know-how, unavailability of digital tools, and restricted accessibility. A report by Mudra (2020) ascribed learners' reluctance to the cost of devices. Among the factors identified by Heena and Nidhi (2022), only 'perceived low usefulness of digital technology' aligns with this study's findings, whereas reasons such as 'fear of making mistakes', 'lack of trust', lack of self-esteem, and 'technophobia' do not align with this study's findings.

Learners' access to digital tools at home was balanced, with 50% having access and 50% without access. Most learners who have access to digital tools at home have access to smartphones, either their own or belonging to their parents and guardians, while fewer have access to laptops, TVs, and radios. Nevertheless, a notable number of learners have no access to digital tools at home, evidence of underlying socio-economic disparities. The majority (74%) of learners do not have access to internet at home; where internet access is available, mobile data is the main means of connectivity, followed by access via neighbours' Wi-Fi. Lack of internet access can be linked to the unemployment of learners' parents or

guardians (62.6%), indicating limited household income and a subsequent inability to provide internet and digital tool access at home. Kronke's (2020) study concurs that 72% of the poorest households lack internet access, as opposed to 31% of more affluent households. According to Gottschalk and Weise (2023), a household with higher socio-economic status tends to have various digital devices, making digital technology easier to access for learners. The OECD (2018) report notes that those with internet access at home often experience slow speeds, with only a few reporting fast connections, suggesting that limited technology quality affects usage.

The findings of this study revealed that 67% of participants have digital tools available at school, including computers, laptops, and printers, with computers and laptops being the most accessed. However, 21% of learners reported no access to digital tools at school. It is, therefore, likely that this 21% are attending schools where no digital tools are available, or are uncertain about tool availability, have insufficient tools, lack the skills to use these tools, or face restrictions on their usage, as revealed by the qualitative data. This reflects unequal digital resources across schools. Similar findings have also been reported by Gamede (2021) at Centocow High School in South Africa, where the school did not possess any computers, laptops, tablets, or projectors.

All schools under study have internet connectivity by means of Wi-Fi; however, access is restricted to teaching staff, excluding learners. The OECD (2018) report concurs that, while school principals, teachers, and administrators have access to ICT in education, learners are often excluded from access. Notably, learners are unable to access schools' internet due to lack of device ownership, unavailability of internet on schools' computers, and slow and weak connectivity caused by many users accessing the network simultaneously. The weak Wi-Fi signal in schools has also been observed in a related study (Mudra, 2020).

Apart from home and school, 37.5% of participants do not have access to digital devices and the internet anywhere else. However, 29.4% have access at public libraries/community centres, reflecting these facilities' role in narrowing the digital divide. Moreover, 24% have access through friends and family, 6.3% have access through other means, and 2% have access through internet cafés. In a related study, Gamede (2021) found that 28% of learners access digital tools at the library, 49% access digital tools at home, 21% access digital tools at internet cafés, while only 2% access digital tools elsewhere. This highlights the limitation of learners' access to digital technology beyond home and school, while also recognising the role of public facilities in narrowing the digital-technology access gap.

Learners use smartphones the most, either their own or those owned by their parents and guardians, followed by computers and laptops. This corroborates the findings of Mardiah et al. (2021), who found that the majority of students use cell phones, and only a small proportion use computers. A significant number of participants also indicated that they do not use digital tools. In terms of frequency of usage, 22% of participants access and use digital tools weekly; however, a concerning number never (21%) or rarely (19%) access and use them. This is due to several factors, such as uncertainty about digital tool availability, actual unavailability of digital tools at school, and limited accessibility. In the present study, daily usage is low at only 12%, in contrast, Zulkifli et al. (2023) reported that daily usage of computers was quite high, meaning that context plays an important role in determining the use and non-use of a technology.

6. Study Implications

The findings highlight a persistent digital divide, which can serve to guide education policymakers in formulating targeted strategies for equitable resource allocation and improved digital inclusion.

7. Study Limitations

The study was limited to selected secondary schools in Namibia, and therefore the findings may not be generalised to other schools in the country. Due to time constraints, the vast geographical spread of schools, and financial resource constraints, the researchers were unable to collect data from every school attended by marginalised learners in Namibia. The study only gathered data from eighteen (18) secondary schools, where a majority of marginalised learners are enrolled.

8. Conclusion

We note that, although most learners are aware of digital technologies and recognise their importance for academic and personal purposes, access to and use of these technologies remain unequal and contextual. Most learners have access to digital tools at home, mainly smartphones. However, they lack internet access, which is driven by low household incomes and parents' unemployment. Contextually, there are schools that do not have digital tools, while others restrict accessibility because of an insufficient number of digital devices. Although schools have Wi-Fi connectivity, access is mostly restricted to staff members only, excluding learners.

We recommend that the Ministry of Education, Innovation, Youth, Sports, and Arts and Culture prioritise investment in digital infrastructure across all schools, particularly those with no, or insufficient, digital tools. Also, to foster equitable access to the internet, schools should implement strategies to expand Wi-Fi connectivity to learners. Notably, beyond home and school, public libraries provide learners with access to digital devices and the internet as a means of narrowing the digital divide; therefore, public libraries should be recognised and supported as key community spaces for digital inclusion. We further recognise ongoing investment by government, businesses, and civil society in addressing inequality - a major obstacle to development in general, and to equitable access to and use of technology in particular - and recommend that it remain a key development priority for society.

9. Future Work

The following research areas are recommended for future exploration:

- Explore accessibility to digital literacy technology across a broader range of learners for a more comprehensive national perspective.
- Comparative research between marginalised and non-marginalised learners.
- A study of the relationship between parents' employment status and learners' accessibility to digital tools.

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ARTIFICIAL INTELLIGENCE AND LIBRARIES

Bridging the AI Gap: Perceptions and Readiness for Integrating Artificial Intelligence into Digital Reference Services in Zambian Academic Libraries

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Abstract

Advances in technology, particularly artificial intelligence (AI), are transforming the information services landscape. In Zambia, digital transformation is guided by the National Information and Communication Technology Policy (2023), which prioritises the use of e-services across sectors, including higher education. At the same time, academic library users increasingly interact with AI-enabled tools in their daily lives and expect similar innovations from their information providers. While academic libraries in resource-rich contexts have begun integrating AI technologies into Digital Reference Services (DRS), libraries in resource-constrained settings have been slower to adopt such technologies. Although academic libraries in Zambia provide digital reference services, these services remain largely basic and underutilised. Furthermore, there is limited empirical evidence on the extent to which Zambian academic libraries are adopting or planning to adopt AI to enhance DRS. This study examined the current state of digital reference services in selected academic libraries in Zambia and investigated librarians' knowledge of AI technologies, their perceptions of AI in reference work, and the preparedness of their institutions to support AI-enabled services. Using an exploratory qualitative design, data were collected through semi-structured interviews with librarians and analysed thematically. The findings reveal significant variation in the development of DRS, levels of AI awareness, and institutional readiness for adoption of AI. Key factors influencing AI integration include limitations in ICT infrastructure, lack of targeted training, uneven management support, and the absence of library-specific policies. The study proposes a phased framework to guide the adoption of AI in digital reference services and contributes empirical evidence from an under-researched context to the literature on AI adoption in African academic libraries. It also provides a foundation for future research on emerging technologies in library services.

Keywords: *artificial intelligence, digital reference services, emerging technologies.*

1. Introduction

Digital technologies have become central to national development agendas; they are transforming how institutions deliver services and how citizens access information. In Zambia, this digital transformation is guided by the National Information and Communication Technology (ICT) Policy of 2023, which indicates that digital technologies, including artificial intelligence (AI), are key enablers of efficiency, innovation, and improved service delivery across sectors (Republic of Zambia, 2023). The policy prioritises the use of e-services, the development of digital skills, and the strengthening of ICT infrastructure as part of the country's transition towards a digital economy. As knowledge institutions within higher education, academic libraries are expected to align with these national priorities by adopting digital and technology-enabled services that enhance access to information and learning resources.

In addition to national ICT policy priorities, academic libraries face increasing pressure to adopt modern technologies that align with evolving user expectations and technology practices (Fabunmi & Akinyemi, 2024). In this regard, the question should not be whether academic libraries should embrace new technologies, but how quickly they can adapt to remain relevant and efficient. Consequently, many libraries worldwide have integrated digital reference services (DRS) into their offerings. DRS provides personalised support to meet users' information needs through electronic platforms such as email, chat, and video, making it a vital component of academic library services in today's digital world (Ramos & Abrigo, 2011; Reference and User Services Association [RUSA], 2017). As DRS continues to evolve, it increasingly incorporates modern technologies such as AI.

Artificial intelligence refers to computer systems designed to perform tasks that typically require human intelligence, such as learning, reasoning, problem-solving, and decision-making (Fabunmi & Akinyemi, 2024; Zondi et al., 2024). In the context of DRS, AI introduces a new service model that enables libraries to provide faster, more scalable, and more personalised user support. Common AI applications in DRS include chatbots, virtual assistants, and AI-enhanced search and recommendation systems. These tools support 24/7 service delivery, reduce response times, and assist users in locating relevant information efficiently (Ali, 2025; Zondi et al., 2024).

Research from well-resourced contexts shows that academic libraries have successfully integrated AI technologies into digital reference services. Studies report the use of chatbots, virtual assistants, and AI-enhanced discovery systems to improve service efficiency, personalise user interactions, and extend reference support beyond staffed hours (Cox et al., 2019; Welker et al., 2020; Yoon, 2021; Ali, 2025; Kaushal & Yadav, 2022). These studies establish that AI can significantly enhance the quality and reach of digital reference services where adequate infrastructure, funding, and skills are available.

In contrast, evidence from resource-constrained contexts shows that AI adoption in academic libraries remains limited and uneven. A scoping review by Chipembele et al. (2025) found that although awareness of AI among African librarians is increasing, most academic libraries remain at exploratory stages of adoption. Where libraries use AI, it is applied in modest ways, such as basic chatbots, AI-assisted searching, or automated cataloguing. Adoption remains constrained by limited funding, unreliable connectivity, power outages, inadequate staff capacity, and the absence of institutional AI policies.

Across Africa, the adoption of artificial intelligence in academic libraries varies significantly by country and institution. Libraries in countries such as South Africa, Nigeria, and Kenya report slightly higher levels of AI integration, largely due to stronger digital infrastructure, institutional support, and national investments in digital transformation. However, most African academic libraries continue to face foundational digital challenges. Studies consistently show that although librarians recognise the potential benefits of AI, institutions often fail to translate this awareness into system-wide implementation because of financial constraints, limited technical capacity, inadequate infrastructure, and the absence

of clear policy frameworks to guide AI (Chipembele et al., 2025; Bangani, 2025; Zondi et al., 2024).

In Zambia, existing evidence shows that academic libraries have introduced digital reference services, but these services remain largely basic, unevenly developed, and underutilised. Mwiinga et al. (2020) examined the use of DRS in Zambian academic libraries and found that most libraries relied on asynchronous tools such as email and telephone. The study reported limited use of synchronous tools such as live chat, and no use of advanced AI technologies was reported. These findings establish what is currently known about DRS in Zambia.

What remains unknown is whether academic libraries in Zambia have begun integrating, or are preparing to integrate, AI tools into DRS. While Mwiinga et al. (2020) established that Zambian academic libraries operate basic, non-intelligent DRS, no subsequent research has examined whether these libraries have progressed toward AI integration or are preparing to do so. This creates a knowledge gap regarding the evolution of DRS in Zambia since 2020, particularly in light of the rapid global advancement of AI technologies during this period. This study addresses this gap by examining the state of digital reference services, librarians' knowledge and perceptions of AI, and institutional readiness for AI adoption in selected Zambian academic libraries. It also proposes a framework to guide the adoption of AI to support DRS for academic libraries in Zambia.

1.1 Statement of the Problem

Academic libraries worldwide are increasingly adopting AI to enhance DRS, improve efficiency, expand access, and offer more personalised user support. While research from well-resourced contexts shows the integration of AI tools such as chatbots, virtual assistants, and advanced search systems, literature from resource-constrained regions shows that AI adoption remains low and uneven due to challenges including inadequate funding, unreliable internet connectivity, power disruptions, limited staff expertise, and weak policy frameworks (Cox et al., 2019; Welker et al., 2020; Yoon, 2021; Ali, 2025; Kaushal & Yadav, 2022; Chipembele et al., 2025; Zondi et al., 2024). In Zambia, literature confirms that academic libraries offer DRS, but these remain basic and underutilised, and there is no empirical evidence on whether libraries have begun integrating or are preparing to integrate AI into reference services (Mwiinga et al., 2020). There is also a lack of evidence on librarians' knowledge of AI, their perceptions of its use in reference work, and the extent to which institutional conditions support AI adoption. Without such evidence, academic libraries risk pursuing AI initiatives in a fragmented manner that may undermine their service quality and ethical practice. Addressing these gaps, this study examines the state of digital reference services in selected Zambian academic libraries, explores librarians' knowledge and perceptions of AI, and assesses institutional readiness for adopting AI-enabled reference services.

1.2 Objectives of the Study

The study aimed to explore the readiness and perceptions of academic librarians in Zambia toward integrating AI tools into DRS. The following were the specific objectives:

- To explore the state of DRS in selected academic libraries in Zambia.
- To assess academic librarians' knowledge of AI technologies relevant to libraries.
- To investigate academic librarians' perceptions of incorporating AI into DRS.
- To determine academic libraries' preparedness to adopt AI to support DRS.

2. Methods

This section outlines the methodology used in this study, including research design, participants, instruments, data analysis, ethical considerations, and limitations.

2.1 Research design

This study adopted a qualitative multiple-case study approach. A qualitative design was selected because the study was exploratory, as no previous research has examined AI adoption in DRS within Zambian academic libraries. A multiple case study design was selected because it allowed the researchers to examine the same phenomenon across several bounded settings and make comparisons (Creswell & Poth, 2018).

2.2 Sampling of Study Participants

Participants were purposefully selected, consistent with qualitative research principles. Purposive sampling was considered well-suited because it enabled the researchers to select participants who could provide relevant data for the study objectives. Although there is no universally accepted number of cases in a multiple case study design, Creswell and Poth (2018) recommend a range of three to 15 cases. Therefore, from Zambia's 60+ higher learning institutions, six academic libraries were purposively selected and recruited. Further, one librarian with direct experience in reference services was selected from each institution to provide context-rich data on AI in support of DRS.

2.3 Data Collection and Analysis

Data were collected through semi-structured interviews, conducted either face-to-face or online, depending on the participants' preferences. Semi-structured interviews were chosen because they allowed participants to provide detailed information without being limited to a set of options.

Data were analysed thematically following Braun and Clarke's (2006) six-phase approach: familiarisation with the data, generating initial codes, searching for themes, reviewing themes, defining and naming themes, and producing the report. All interviews were audio-recorded and transcribed verbatim by the researchers. During the familiarisation and initial coding phases, the transcripts were uploaded into ChatGPT to assist with data organisation and the generation of preliminary codes and potential themes. The researchers then conducted a manual, iterative review of the AI-generated outputs by repeatedly returning to the original transcripts to verify accuracy, refine codes, merge or discard themes, and ensure that interpretations were grounded in participants' statements. Final themes were therefore determined by the researchers, while ChatGPT was used as a supportive tool.

2.4 Ethical considerations

Participants were informed about the purpose of the study; their participation was voluntary, and their confidentiality was protected by removing all personal and institutional identifiers.

2.5 Limitations of the Study

The findings of this study cannot be generalised because it is a qualitative study with a small number of participants, which is not representative of all academic libraries in Zambia. However, the results provide valuable insights and lay the groundwork for future research on AI use in DRS in Zambian academic libraries.

3. Results Presentation

The findings are organised into themes that reflect the study objectives: the state of DRS, librarians' knowledge of AI technologies in the context of libraries, librarians' perceptions of integrating AI into DRS, and the preparedness of academic libraries to adopt AI in support of DRS.

3.1 Participants

To preserve their anonymity, the academic libraries involved in the study were labelled as Libraries A, B, C, D, and E. Although six libraries were initially identified, only five participants were interviewed because the librarian from the sixth library was consistently unavailable.

3.2 State of DRS in Selected Academic Libraries

The first objective was to establish the state of DRS in the selected academic libraries. When asked to describe their library's DRS, participants revealed significant variation in the development and use of DRS.

Although all the surveyed libraries had some form of digital reference service, only Library C had a DRS that was relatively fully functional. Libraries A, B, and E relied primarily on basic communication tools: WhatsApp, email, and telephone. In addition to these basic tools, Library D had a chat platform through the institutional website's "Ask the Reference Librarian" feature. Library C was using more advanced tools such as chat tools, virtual assistants, and AI-enhanced databases.

Participants were asked whether these tools were successful in meeting users' needs. Only the participant from Library C reported that the DRS tools were satisfying user needs, stating: "We use chat tools, virtual assistants, and AI-enhanced databases... These tools meet the needs of our learners very well." In contrast, one librarian expressed frustration about their basic tools: "We seem to be sticking to something that is not working... We need better tools," highlighting awareness of inadequate digital infrastructure.

The study found that, except for Library C, all participating libraries had low DRS usage. Library D's participant noted, "DRS is not very active; we rarely receive requests from users," indicating low service usage. A participant from Library B described a similar circumstance, saying that "the usage of DRS is low... the problem is that we are reactive, not proactive."

The study links low usage of DRS to multiple factors: limited user awareness, outdated tools, lack of staff expertise, financial constraints, obsolete computers, poor internet connectivity, and power disruptions. Even Library C, despite reporting high use of DRS, still faced usage challenges, with the participant explaining that "the challenges we face are poor ICT skills for some learners and power outages."

A notable finding was the relationship between institutional pedagogical approaches and DRS maturity. Library C's participant explained that "our learning programmes are offered fully online; because of this, our DRS is fully developed and operational." This suggests that a digital learning environment translates into well-developed DRS, as online education creates both necessity and opportunity for advanced digital library services.

3.3 Academic Librarians' Knowledge of AI Technologies in the Context of Libraries

The second objective was to assess academic librarians' understanding of AI in the context of libraries. The findings suggest that AI knowledge was primarily gained through hands-on institutional experience rather than formal education. Librarians in institutions with somewhat developed digital systems showed stronger conceptual and practical knowledge of AI. Conversely, librarians in institutions that were less digitally mature showed limited familiarity.

Librarians' knowledge and comprehension of AI in the context of libraries varied widely; this was shown when participants were asked to briefly explain what AI is and identify AI tools employed in DRS.

The participant from Library A demonstrated low conceptual understanding of AI, although they were aware of virtual assistants. The participant struggled to articulate what AI is or how it functions.

The participant from Library B showed a fair understanding of AI and mentioned that, although they had never received any formal training, they had taken time to read around the subject and what other libraries were doing. They described AI as "advanced technology enabling proactive services." The respondent gave examples of chatbots and virtual assistant technology but did not know the technical application of AI tools in DRS.

The participant from Library C demonstrated a strong understanding of AI, explaining that AI in the context of libraries "involves the application of technology that processes information in a way that mimics human reasoning." Familiarity with tools such as chatbots, virtual assistants, and intelligent search algorithms and their uses was also reported. The participant could articulate technical concepts and practical applications.

The participant from Library D showed a satisfactory understanding of AI by identifying AI-enabled applications used in libraries, such as chatbots and AI-supported OPAC search tools. The participant, however, did not have technical expertise in the use of AI to support DRS.

The participant from Library E reported limited familiarity with AI tools and indicated that they had not engaged with AI applications in digital reference services at all.

Further, most participants acknowledged a lack of formal training in AI. The respondent from Library B noted that coworkers were "lacking skills." Library A's participant stated there was "no training" available for AI use in their institution. This training deficit was consistently mentioned as a barrier to AI adoption. Participants also consistently mentioned that they had never received any formal training in AI through the Library and Information Science (LIS) education programme.

3.4 Librarians' Perceptions of Integrating AI into DRS

The third objective was to establish librarians' perceptions of integrating AI into DRS. Participants were asked to explain the benefits of using AI in DRS, as well as any concerns or dangers related to the integration of AI into reference services.

Across the five libraries, participants identified several potential benefits that AI could bring to DRS:

- Faster access to information
- Reduced response time
- Greater efficiency in service delivery
- Expanded access to electronic resources
- Improved visibility of library collections
- Enhanced usage statistics
- Reduced human effort in routine tasks
- 24/7 availability for users
- Personalised service delivery

Participants believed that AI could strengthen user support, especially in online and blended learning environments. For instance, the participant from Library D explained that "AI is a game changer; it can allow users to access vast amounts of library resources quickly, and this information is personalised." This statement reflects strong recognition of AI's potential value.

At the same time, participants reported several concerns and challenges related to the adoption of AI in DRS. These concerns were grouped into technology-related, organisational, and employment and professional concerns.

The following were the technology-related concerns of using AI in DRS that participants identified:

- Overreliance on AI by users
- Reduced critical thinking among users
- Risks to data privacy and security
- Academic integrity concerns
- Misinformation and accuracy issues

The following were the organisational concerns of using AI in DRS that participants identified:

- Resistance to technological change among staff
- Limitations in ICT infrastructure
- Frequent power outages
- Unstable internet connectivity
- Low user ICT competence

Under employment and professional identity, the most profound concern was job displacement, but this concern had a unique dimension in the Zambian context. For instance, the participant from Library C articulated this explicitly: "AI can easily replace us; in fact, some of us were only employed because of the regulations by the Higher Education Authority that require libraries to have manpower... otherwise we would not have been around here." This statement reveals that job security concerns are not solely about AI's technical capabilities but are embedded in regulatory-structural factors.

3.5 Preparedness of Academic Libraries in Adopting AI to Support DRS

The last objective was to assess the preparedness of the selected academic libraries in adopting AI to support DRS. Key readiness for AI adoption in digital reference services was primarily influenced by management commitment, ICT infrastructure, funding, policy frameworks, and staff capacity. However, across the five libraries, levels of preparedness for AI adoption varied significantly, indicating differing degrees of readiness and implementation challenges.

Library A showed low preparedness, with the participant noting that the library had "no AI policy... no training... and no infrastructure for AI." The participant also mentioned that management had not shown willingness to embrace AI adoption in the library, indicating that "we are dealing with leaders who are afraid of trying new technologies." This represents absent preparedness across all dimensions: no strategic planning, no resource allocation, and no capacity building.

Library B was unprepared for the implementation of AI in DRS because of a lack of policy guidelines, staff inexperience, and budgetary limitations. According to the respondent, coworkers were still "lacking skills," and it was challenging to "convince management about budgetary issues." This indicates capacity deficits, financial challenges, and weak management support.

Library C showed notable readiness, backed by management dedication and an online institutional learning model. The participant reported that "management is very supportive..." and "leadership strongly advocates digital innovation." Although the participant acknowledged the absence of a "formal AI policy specific to library services," the institution had invested in digital infrastructure, provided hands-on learning opportunities, and created an organisational culture that expects technological innovation.

Library D's readiness was low due to outdated computers, a lack of policy guidelines, and inadequate training. However, the participant stated that AI had been incorporated into institutional planning, stating that "we are rolling out AI in DRS once our ICT development plan is in place." This represents behavioural intentions without current capacity; plans exist, but facilitating conditions are deficient.

Library E was comparatively unprepared. The participant mentioned that general institutional AI training was "not specific to library services... lack of policies... poor internet and frequent power failures," which restricted the library's ability to prepare for AI adoption. This indicates that even when institutions make AI efforts, library-specific readiness requires targeted support.

4. Discussion of the Findings

The findings of this study are largely consistent with existing literature on digital reference services and AI adoption in academic libraries, particularly in developing contexts. The results confirm that DRS exists but remains mostly basic, with limited adoption and use of AI tools. The findings also align with literature that highlights both the potential benefits of AI in reference services and concerns related to training, ethics, and employment. However, this study's findings offer new perspectives from Zambia, an under-researched setting in the field of AI and DRS in libraries. It thus adds to the body of existing knowledge in the field and proposes a framework for the phased adoption of AI to support DRS for Zambian academic libraries.

Importantly, the study reveals that librarians' fears of job insecurity arise from the tension between regulatory staffing requirements enforced by the Higher Education Authority of Zambia, which mandate the employment of qualified librarians, and the growing push to adopt AI for improved service delivery. While regulations provide professional assurance, AI adoption under resource constraints generates anxiety about possible role reduction or replacement. Thus, resistance appears to stem less from the technology itself and more from uncertainty about how institutional and regulatory frameworks may evolve.

The research findings are discussed based on the objectives of the study: the state of DRS, librarians' knowledge of AI technologies in the context of libraries, the extent to which AI tools were being used or planned for use in DRS, librarians' perceived benefits and challenges of integrating AI into DRS, and the preparedness of academic libraries to adopt AI in support of DRS.

4.1 State of DRS in Selected Academic Libraries

The study found that while all the surveyed libraries offer some form of digital reference service, most have not yet incorporated AI into DRS. They rely on basic tools such as email, WhatsApp, and telephone. Only one library has a relatively developed DRS supported by AI tools such as chat tools, virtual assistants, and AI-enhanced databases. The low use of DRS due to low user awareness, outdated technology, insufficient staff skills, poor internet connectivity, and frequent power outages is also reported in earlier studies, where basic DRS exists but sees low uptake (Mwiinga et al., 2020; Okoli et al., 2021; Chipembele et al., 2025).

Consistent with prior work (Bangani, 2025; Mariano, 2024), the study found that an institution's digital strategy influences the adoption of AI for DRS. Findings from a library at a fully-fledged online university showed higher DRS usage, suggesting that online learning environments catalyse digital innovation in library services.

It can, however, be noted that little has changed since Mwiinga et al. (2020) found that the implementation of DRS in Zambian academic libraries was hampered by a lack of awareness of the services, limited usage, and internet disruptions. As such, academic libraries continue to lag behind in translating the country's National ICT Policy 2023 goals for digital innovation in service delivery.

4.2 Academic Librarians' Knowledge of AI Technologies in the Context of Libraries

The study showed that librarians' AI knowledge varied across institutions, influenced more by their institution's digital maturity than by formal training. Those in digitally advanced settings showed stronger conceptual and practical AI knowledge than those in less digitally advanced settings. This further reflects trends across Africa, where librarians are strongly influenced by their institution's digital environment (Emiri, 2023; Zondi et al., 2024; Chipembele et al., 2025). Further, most of their AI knowledge is acquired through self-taught methods, including hands-on experience, personal reading, and observation of practice in other libraries. Without appropriate intervention, a lack of formal training – both at institutional level and within Library and Information Science (LIS) education – will continue to produce limited and uneven growth in AI understanding among librarians.

Furthermore, although Zambia's National ICT Policy 2023 emphasises digital skills development and the adoption of emerging technologies such as AI, the findings show that structured capacity building for librarians remains limited. As a result, librarians' knowledge of AI develops unevenly and depends largely on individual initiative and institutional exposure rather than systematic training.

4.3 Librarians' Perceptions of Integrating AI into DRS

Librarians expressed a mix of positive and negative perceptions of AI use in support of DRS. The positive views related to AI's ability to improve efficiency and response time, expand access to electronic and digital resources, and enhance service delivery, especially strengthening personalised support in online and blended learning environments. These perceived benefits are in line with earlier studies conducted elsewhere. A noteworthy negative perception relates to fear of job displacement owing to AI adoption. Other concerns related to data privacy and security, overreliance on AI, academic integrity, misinformation, and declining user critical thinking. These findings are similar to findings from other developing countries, where AI is viewed both as an opportunity for library service innovation and a threat to professional practice (Bangani, 2025; Zondi et al., 2024; Ali, 2025; Pawar, 2024).

Although these concerns about the integration of AI into DRS are well documented in the library and information science literature, this study reveals a new perspective by linking fears of job displacement to structural and regulatory factors rather than to AI technology alone. The study finds that librarians' hesitation to adopt AI may stem not only from technology-related bias but also from AI's perceived potential to undermine the institutional justification for their jobs, which some retain to meet the country's Higher Education Authority requirements.

These concerns highlight the need for clear policies and communication that position AI as a support tool, freeing librarians to focus on more complex needs, research support, and information literacy.

4.4 Preparedness of Academic Libraries in Adopting AI to Support DRS

The study established that readiness for AI adoption was shaped mainly by management commitment, availability of ICT infrastructure, funding, policy frameworks, and staff capacity. The findings reveal considerable variation in the preparedness of academic libraries in Zambia to adopt AI in support of DRS. This uneven preparedness reflects patterns reported in other low- and middle-income contexts, where institutional readiness for AI adoption differs significantly across libraries despite shared national policy environments (Chipembele et al., 2025; Zondi et al., 2024). Zambian academic libraries thus need to implement localised interventions that appropriately address the specific institutional factors driving variations in preparedness. This may prove more effective than a 'copy-and-paste' approach.

Libraries A and B demonstrated very low levels of preparedness. The absence of AI policies, limited infrastructure, lack of staff training, and weak management support noted in some academic libraries signal that AI adoption is a low strategic priority in these institutions (Emiri, 2023; Serwaa et al., 2022). These findings suggest that positive staff attitudes towards AI alone are insufficient without organisational support and resource allocation.

In contrast, Library C showed relatively high preparedness for AI adoption through its strong management commitment, investment in digital infrastructure, and an innovation-oriented culture, even in the absence of a formal AI policy. This confirms that leadership support and alignment with institutional teaching models, particularly online learning, are critical enablers of advanced digital library services (Bangani, 2025; Mariano, 2024). A key implication is that practical readiness can precede policy development – strategic investment and hands-on experience can occur even before formal policies are established. This is certainly a model that resource-constrained academic libraries can emulate.

Library D occupied an intermediate position, where intentions to adopt AI existed but were not supported by adequate infrastructure or staff capacity. This situation reflects what the literature describes as an intention–capacity gap, where institutions plan for AI adoption but lack the facilitating conditions required for implementation (Pawar, 2024; Chipembele et al., 2025). Similarly, Library E highlights how general institutional AI initiatives are insufficient if they do not address library-specific needs, such as reliable connectivity, power supply, and tailored training.

5. Proposed Framework for AI Adoption in Zambian Academic Libraries

Based on the study findings, a phased approach to AI adoption is proposed for academic libraries in Zambia to support the gradual and sustainable integration of AI into digital reference services. Strong management and leadership commitment are essential across all phases, enabling resource mobilisation, capacity building, policy implementation, and service innovation.

Table 1

Phased approach to AI adoption

Phase	**Focus area**	**Key actions**	**Role of management and leadership**
Phase 1: Strengthening the Digital Foundation	Basic DRS capacity	Stabilise existing DRS; improve internet connectivity and system reliability; increase visibility of DRS platforms	Prioritise DRS in institutional strategies; allocate basic funding; support infrastructure improvement
Phase 2: Building Human Capacity and Organisational Readiness	Librarian skills and readiness	Provide targeted AI training; support continuous professional development; encourage peer learning and partnerships	Approve training initiatives; allocate time and resources for staff development
Phase 3: Policy and Governance Development	Ethical and strategic alignment	Develop library-specific AI and DRS policies; address data privacy, academic integrity, and professional roles	Endorse policies; align library practice with institutional and national ICT frameworks
Phase 4: Pilot AI Implementation	Initial AI use	Introduce low-risk pilot projects (e.g., basic chatbots, AI-enhanced databases); monitor and evaluate performance	Support experimentation; manage risk; provide oversight and evaluation support
Phase 5: Scaling and Continuous Improvement	Sustainable adoption	Gradually scale successful AI tools; continuously evaluate impact; refine services and policies	Sustain funding; embed AI-supported DRS into routine library operations

6. Conclusion

This study examined the state of digital reference services, librarians' AI knowledge and perceptions, and institutional preparedness for AI adoption in selected academic libraries in Zambia. The findings show that although all libraries offer some form of digital reference service, most rely on basic tools and have not yet integrated AI. Librarians' AI knowledge varies, influenced more by institutional digital maturity than formal training. While librarians recognise AI's potential to improve efficiency, access, and service delivery, ethical concerns, job security fears, infrastructure gaps, and skill shortages remain significant.

The study further established that AI readiness in the participating institutions remains uneven, shaped mainly by institutional conditions such as ICT infrastructure, training opportunities, management support, and clear policies. These results highlight a gap between the country's National ICT Policy (2023) and library-level practice. The proposed phased AI adoption framework therefore offers practical guidance for academic libraries seeking to adopt AI in a sustainable and context-appropriate manner.

Finally, the study contributes empirical evidence from an under-researched context, providing a basis for future research on AI in library services.

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African libraries and information services stand at a defining moment, shaped by rapid technological and societal change. The COVID-19 pandemic exposed deep gaps in technical infrastructure, resources and capacity to deliver services remotely, while artificial intelligence, digital exclusion, shrinking library budgets, and growing pressure to justify investment continue to shape the LIS sector. At the same time, libraries face a pressing need to align their work with global, regional, and national development agendas, and to extend digital equity and knowledge access to communities still excluded from them. African libraries and information services are, in short, at a new crossroads.

It was against this backdrop that the XXVII SCECSAL Conference was convened from 27 April to 1 May 2026 in Livingstone, Zambia, under the theme "African Libraries and Information Services at the New Crossroads."

This publication brings together selected papers presented at the Conference. It offers a record of the scholarly and professional contributions shared during the conference, presenting research findings and practical approaches, organised under the following sections:

- Libraries, Information Services and Sustainable Development
- Innovation in Library and Information Services
- Partnerships, Advocacy and Strategic Positioning for Sustainable Libraries
- Strategic Marketing of Library and Information Services
- Empowering Libraries, Information Professionals and Users for Transformative Change
- Data, Analytics and Cybersecurity in Libraries and Information Services
- Digital Technologies and Reading Culture
- Policy and Legal Issues in Libraries and Information Services
- Knowledge Management in Organisational and Development Contexts
- Artificial Intelligence and Libraries

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