An Investigation of Artificial Intelligence as a New Frontier for Cataloguing and Classification: A Case of Selected Public Academic Libraries in Copperbelt Province

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DOI: https://dx.doi.org/10.47772/IJRISS.2025.907000248

Received: 09 July 2025; Accepted: 17 July 2025; Published: 12 August 2025

ABSTRACT

This study will investigates the integration of Artificial Intelligence (AI) as a transformative tool for cataloguing and classification in selected academic libraries in Copperbelt Province, Zambia. As academic libraries face increasing pressure to modernize their services and handle growing volumes of information, AI presents opportunities to improve accuracy, efficiency, and user experience in bibliographic processes. Drawing on both global and regional literature, the study explores the extent of AI adoption, its impact on cataloguing accuracy and consistency, and the challenges and opportunities it presents. A descriptive research design will be employed, targeting 100 librarians from public academic libraries registered by the Higher Education Authority. Data will be collected using structured questionnaires and analysed using SPSS Version 22. The findings are expected to provide practical insights for library professionals, policymakers, and educational institutions seeking to optimize library operations through AI integration, while also addressing concerns around infrastructure, ethics, and institutional readiness.

INTRODUCTION

Academic libraries play a crucial role in supporting teaching, learning, and research activities within educational institutions. With the rapid advancement of technology, artificial intelligence (AI) has emerged as a potential tool to revolutionize library services and operations. AI application offer opportunities to streamline processes, personalize user experiences, and unlock insights from vast amounts of data. However, the integration of AI in academic libraries also presents challenges related to privacy, equity, and resource allocation. This study aims to examine the Artificial Intelligence as a new frontier for cataloguing and classification in selected academic libraries in Copperbelt Province

Background Information

The integration of Artificial Intelligence (AI) into cataloguing and classification systems is transforming modern libraries, revolutionizing traditional practices, and paving the way for more efficient and sophisticated information management (Smith, 2021). As libraries increasingly adopt AI technologies, the impact on cataloguing and classification processes is becoming a critical area of study. This paper explores the significant changes AI is driving in these systems, drawing on the latest literature to highlight current trends and future directions.

Liu (2010) provided a comprehensive literature review on the utilisation of AI and robotics to enhance the quality of services in university libraries. The applications highlighted include automated indexing and abstracting, expert system reference services, cataloguing, and classification. Building on this, Kuyela et al. (2025) posited that the adoption of artificial intelligence applications has helped university libraries mitigate threats posed by other retrieval systems and deliver services that surpass those of Google Search. AI provides libraries with a competitive edge and a method to deliver superior services to users in the current information age.

Kuyela et al. (2025) also noted that AI enables libraries to reach and attract users with high reading skills, creating opportunities for enhanced service offerings and improved user experiences. Chatbots, for example, can be employed in librarian reference activities or as part of readers' advisory services, while automated AI applications can perform tasks such as cataloguing, indexing, and abstracting tasks that are traditionally carried out by trained professionals.

De Sarkar (2023) asserted that artificial intelligence is set to transform the way various information service operations are conducted. An AI-powered online assistant may seamlessly integrate with library systems to support users in their search, discovery, and retrieval processes. AI systems can retrieve valuable information from a wide range of sources, including information-rich graphical resources such as maps, and generate overviews to support learning and research.

The benefits of artificial intelligence in libraries appear to be substantial. Mogali (2014) highlighted that these benefits include assisting in the cataloguing and classification of library collections, handling stressful and complex tasks that humans may find difficult or impossible, completing tasks more rapidly than humans, reducing errors and defects, and offering virtually limitless functionality. To fully harness these benefits, Vysakh and Rajendra (2019) reported that many libraries have already deployed AI technologies and found them beneficial. While some libraries in both the developed and developing world have not yet adopted AI, many have included its deployment in their strategic plans, whereas others are yet to consider its implementation.

Despite the potential benefits, the implementation of AI in cataloguing and classification in academic libraries within Copperbelt Province faces several challenges. These include lack of technical expertise, inadequate funding, and limited infrastructure to support advanced AI systems. Kuyela et al. (2025) argued that while librarians are receptive to new technologies, the absence of targeted training and institutional support hinders the effective deployment of AI tools. Additionally, ethical concerns regarding algorithmic bias and data privacy raise critical questions about the reliability and fairness of AI-generated cataloguing decisions (Cox et al., 2021). These concerns necessitate a cautious and well-regulated approach to AI adoption in library environments.

Statement of the problem

Despite the rapid advancements in Artificial Intelligence (AI) and its transformative potential in information management, many academic libraries in Copperbelt Province have been slow to adopt AI technologies in their cataloguing and classification systems (Kuyela et al, 2025). Traditional cataloguing methods, which rely heavily on manual input and human judgment, are often time-consuming, prone to inconsistencies, and unable to cope with the growing volume and complexity of information resources (Smith, 2021). This has led to inefficiencies in information retrieval and access, thereby limiting the ability of libraries to meet the dynamic needs of their users. While global trends indicate a shift toward automated metadata generation, semantic indexing, and machine learning applications in cataloguing (Jones and Anderson, 2020), a significant gap exists in the implementation of such technologies in the Zambian academic context.

Furthermore, the lack of technical expertise, limited funding, and inadequate policy frameworks have further hindered the integration of AI in cataloguing and classification processes in selected academic libraries in Copperbelt Province. According to Kuyela et al. (2025), many library professionals' express uncertainty and resistance toward AI-driven tools due to fears of redundancy and ethical concerns related to data governance. This resistance, coupled with infrastructural challenges, raises critical questions about the readiness and capacity of academic libraries to embrace AI innovations. Therefore, there is a pressing need to investigate the challenges, opportunities, and implications of adopting AI technologies for cataloguing and classification in the Zambian academic library setting.

Research Objective

1. To examine the extent to which Artificial Intelligence (AI) technologies have been adopted in cataloguing and classification processes in selected academic libraries in Copperbelt Province.

2. To assess the effect of AI tools on the accuracy and consistency of cataloguing and classification practices in academic libraries.
3. To identify the challenges and opportunities associated with the integration of AI in cataloguing and classification within the selected academic libraries.

Research Questions

1. To what extent have Artificial Intelligence (AI) technologies been adopted in cataloguing and classification processes in selected academic libraries in Copperbelt Province?
2. How do AI tools affect the accuracy and consistency of cataloguing and classification practices in academic libraries?
3. What challenges and opportunities are associated with the integration of AI in cataloguing and classification within the selected academic libraries?

Significance of the study

The significance of this study lies in its potential to provide valuable insights into how Artificial Intelligence (AI) is transforming cataloguing and classification practices in academic libraries within Copperbelt Province. As libraries increasingly embrace digital transformation, understanding the impact of AI technologies can inform policy development, capacity building, and strategic planning in library services. This study will contribute to the body of knowledge by highlighting the benefits and challenges of AI adoption, thereby guiding librarians, educators, and decision-makers in optimizing resource organization and improving access to information. Ultimately, the findings may support the development of more efficient, accurate, and user-centred cataloguing systems that enhance the overall quality of academic library services.

LITERATURE REVIEW

The extent to which Artificial Intelligence (AI) technologies have been adopted in cataloguing and classification processes in selected academic libraries in Copperbelt Province.

Globally, artificial intelligence (AI) has increasingly transformed library operations, particularly in technical services such as cataloguing and classification. AI-powered tools and systems like machine learning, natural language processing (NLP), and automated metadata generation have been integrated into library management systems (LMS) to improve accuracy and consistency (Choi, 2019). These technologies enable libraries to handle large volumes of bibliographic data efficiently and reduce human errors, especially in assigning subject headings and classification numbers. For instance, OCLC's Smart CAT system and Bibliotic AI platforms have shown significant promise in automating cataloguing tasks in academic institutions across North America and Europe (Breeding, 2020).

According to Kuyela et al. (2025), the realisation that technology will be a major determinant of the quality of education has contributed to a redefinition of the role of libraries. The evolution of information and learning environments has pushed libraries to adapt and change. This is in stark contrast to the previous few centuries when libraries were rather stagnant organisations. The rate at which technological change is accelerating, and the adoption of technology in libraries has no end in sight. This is because technology is not static; it is ever-changing. Each new generation of technology becomes outdated several times faster than the previous generation (Kuyela et al, 2025).

In Africa, the adoption of AI in academic libraries remains in its infancy, often limited by infrastructural and financial constraints. However, some universities in South Africa and Kenya have started exploring AI technologies to support metadata management and classification. According to Ocholla (2021), institutions such as the University of Johannesburg and Kenyatta University are piloting AI-enhanced systems to assist with bibliographic control, albeit at a slow pace. Challenges include lack of skilled personnel, unreliable internet connectivity, and inadequate funding for technological upgrades (Onyanchaand, 2020). These constraints hinder the full realization of AI's potential in enhancing cataloguing accuracy and efficiency, leaving many academic libraries in Africa reliant on traditional manual methods.

In Zambia, there is limited empirical research on the adoption of AI in academic libraries, though anecdotal evidence suggests that most institutions are still in the early stages of technological integration. Academic libraries in Lusaka Province, such as those at the University of Zambia and the Zambia Institute of Business Studies and Industrial Practice (ZIBSIP), have begun upgrading their integrated library systems, but AI functionality is often lacking or underutilized. According to Mwale and Chita (2022), cataloguing practices in Zambian academic libraries still rely heavily on manual input, with limited use of automation beyond basic MARC record management. The awareness of AI tools among cataloguers is generally low, and institutional support for AI training and infrastructure development remains minimal.

The effect of AI tools on the accuracy and consistency of cataloguing and classification practices in academic libraries.

The integration of Artificial Intelligence (AI) tools in cataloguing and classification has significantly enhanced the accuracy of bibliographic records in academic libraries. Traditional manual cataloguing processes, though thorough, are susceptible to human error, inconsistency, and subjectivity (Taylor and Joudrey, 2009). AI-driven systems such as machine learning algorithms and Natural Language Processing (NLP) tools are increasingly being deployed to automate metadata extraction and subject classification, thereby reducing errors and standardizing data entries. For instance, bibliographic tools like OCLC's World Share Metadata Services and Google's BERT model have demonstrated improved precision in subject term suggestions and classification (Garibay et al., 2021). These tools not only interpret bibliographic data with greater accuracy but also continuously learn and improve over time, ensuring consistent record generation across diverse materials.

Moreover, the use of AI enhances consistency in cataloguing practices by enabling the application of uniform rules and controlled vocabularies across large volumes of library resources. Consistency is essential for resource discoverability and retrieval, and AI tools can help enforce metadata standards such as Resource Description and Access (RDA) and Library of Congress Subject Headings (LCSH) with minimal variation (Smith and Mitchell, 2020). AI-based cataloguing assistants can be programmed to follow specific classification schemes, ensuring that similar materials are categorized uniformly. This reduces discrepancies that typically arise when multiple cataloguers handle records manually. The automation also supports batch processing of records, which helps maintain a high level of consistency even under heavy workloads.

A study done by Kuyela et al. (2025), revealed that AI holds immense potential for revolutionising library services. Libraries are leveraging artificial intelligence technologies such as powilld chatbots for virtual reference services, enhancing user interactions, and providing real-time assistance. Moreover, AI algorithms are employed for data mining and analysis, enabling libraries to extract valuable insights from vast collections and optimise resource allocation (Kuyela, 2025). In this context, Vysakh and Rajendra [2019] conducted a study on the integration of artificial intelligence in libraries, and their study revealed that libraries can integrate robotics with other artificial intelligence technologies like a drone being controlled by a robot that can make sure that the libraries are always under surveillance, by just placing robots in various sections of the library as a user aid and guide.

The challenges and opportunities associated with the integration of AI in cataloguing and classification within the selected academic libraries.

The integration of Artificial Intelligence (AI) in cataloguing and classification within academic libraries presents numerous opportunities for enhancing efficiency and accuracy. AI technologies, such as machine learning and natural language processing, can automate repetitive cataloguing tasks, improve metadata generation, and enhance subject classification through pattern recognition and semantic analysis (Wang and Li, 2021). Tools like automated subject indexing and metadata enrichment not only reduce the workload on human cataloguers but also increase consistency and speed in processing materials (Mitchell and Chen, 2020). Furthermore, AI can help libraries manage the growing volume of digital resources by facilitating more intelligent and scalable cataloguing systems (Borgman, 2022).

Despite these benefits, several challenges hinder the effective adoption of AI in academic library cataloguing. One major issue is the lack of technical expertise among library staff to implement and maintain AI tools

(Ifijehand Yusuf, 2020). Additionally, concerns about data bias and the transparency of AI algorithms raise ethical questions, particularly when automated systems misclassify or exclude culturally diverse materials (Ocholla, 2021). Financial constraints also limit the capacity of many institutions to invest in AI infrastructure and continuous system upgrades. Moreover, legacy library systems may not be compatible with newer AI-based technologies, creating integration barriers (Kumar and Paul, 2019).

One of the biggest barriers to libraries adopting 4IR technology is the financial burden associated with procuring and deploying these advanced technologies (Kuyela et al. 2025). Many academic institutions find it prohibitively expensive to purchase and operate cutting-edge technologies such as artificial intelligence (AI) systems, virtual reality (VR) tools, and data analytics platforms (Kuyela et al. 2025). Some author also agree that, while in some countries such as South Africa are renowned as one of Africa's top countries for embracing modern technology and innovation, they are hampered by a lack of funds, which may hinder the implementation of 4IR in teaching and learning. Similarly, Mohideen (2022), who researched Malaysian librarians' perspectives of the 4IR, discovered that the COVID-19 pandemic would worsen financial conditions and impede libraries' ability to deploy 4IR technologies. It was also predicted that theCOVID-19 pandemic had a significant negative influence on higher education, as revenue was reduced and academic libraries' dreams of embracing Lib 4.0 technologies was not realised (Kuyela et al. 2025).

Technologies like IoT devices and cloud computing solutions capture massive volumes of user data, prompting concerns about data security, confidentiality, and General Data Protection Regulation (GDPR) compliance (Kuyela et al. 2025). Limited financial resources, a lack of technological experience among library staff, and concerns about data privacy and security are key impediments to the widespread adoption of these technologies (Kuyela et al. 2025).

METHODOLOGY

Research Design

The study will adopt a descriptive design to investigate the Artificial Intelligence as a new frontier for cataloguing and classification in selected academic libraries in Copperbelt Province. This approach will enable the identification of patterns, relationships, and trends across large sample populations.

Study Sites

The study will be conducted in Copperbelt Province in selected public academic libraries that are registered by higher education authority.

Study Population and Sample Size

The study population refers to the specific group of individuals or entities that a researcher is interested in studying and from whom data is collected to address the research questions (Neuman, (2014). The selection of a study population is critical, as it directly impacts the generalizability and validity of the research findings. In this case, the study population will consist of librarians from selected public academic libraries that are registered by higher education authority. The sample size will be 100 librarians from selected public academic libraries that are registered by higher education authority.

Sampling Techniques

Bryman and Bell (2015) stated that “sampling is the process of selecting a subset of cases from a larger population” (p. 187). The choice of sampling technique depended on various factors, such as the nature of the study, the characteristics of the population, and the specific research objectives. Therefore, the study will employ a stratified random sampling technique to determine both the sample size and the respondents who would represent the entire population.

Data collection Instruments

The study will collect data using a standard questionnaire with closed-ended questions. Babbie and Mouton (2001) stated that closed-ended questions helped respondents better understand the meaning of the questions. These questions will be answered within the same framework, allowing responses to be compared more effectively

Data Analysis

The collected data, which is quantitative will be analysed using both descriptive and inferential statistics. Initially, the data will be checked for gaps and inconsistencies. Next, the questions will be coded, and responses will be assigned numbers in preparation for data entry. During the coding process, the responses to closed-ended questions will be grouped into categories, and numbers will be assigned to these categories. Once coding is completed, the data will be entered into SPSS Version 22 and analysed, with descriptive statistics generated for various questions.

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