SCHOOL OF LIBRARY, ARCHIVES AND DOCUMENTATION STUDIES

(SLADS) – BAGAMOYO

RESEARCH REPORT ON:

AN ASSESSMENT ON THE ROLE OF ARTIFICIAL INTELLIGENCE IN ENHANCING ACADEMIC LIBRARY SERVICES: CASE STUDY AT MARUCO UNIVERSITY

BY

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A Research Report Submitted to the School of Library, Archives and Documentation Studies (SLADS) in Partial Fulfillment of the Requirements for the Award of Ordinary Diploma in Library and Information Management.

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CERTIFICATION

The undersigned certify that he has read and here by recommend for the acceptance by the School of Library, Archives and Documentation studies a research report entitled “an assessment of the role of artificial intelligence in enhancing library services: A case study at Pwani Bagamoyo" as a partial fulfillment of requirements for the award of Ordinary Diploma in Library, Archives and Information Studies.

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(Supervisor)

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I, Anjela Elias Mahwata declare that this research report is my own original work and that it has not been presented and will not be presented to any other university or college for a similar or any other academic award.

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DEDICATION

This research is dedicated to Almighty God for His guidance, wisdom, strength, and endless blessings throughout my academic journey. I also dedicate this work to my beloved parents and family for their love, encouragement, prayers, and continuous support. Special appreciation goes to my lecturers and friends for their valuable guidance, motivation, and encouragement during the completion of this study.

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LIST OF ABBREVIATIONS AND ACRONYMS

Abbreviation	Full Form
AI	Artificial Intelligence
ICT	Information and Communication Technology
OPAC	Online Public Access Catalog
LMS	Library Management System
ILS	Integrated Library System
RFID	Radio Frequency Identification
MARUCo	Marian University College
IT	Information Technology
DL	Digital Library
NLP	Natural Language Processing
ML	Machine Learning
OCR	Optical Character Recognition
PDF	Portable Document Format
ISBN	International Standard Book Number

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ABSTRACT

This study examined the role of Artificial Intelligence (AI) in enhancing library services. The main objective of the study was to examine how AI technologies improve the efficiency, effectiveness, and quality of library services. Specifically, the study sought to identify AI technologies used in libraries, examine how AI enhances library services, assess the perceptions of librarians and library users toward AI, identify challenges affecting AI adoption, and propose strategies for improving the implementation of AI in libraries. The study employed a descriptive research design and used both primary and secondary data. Data were collected through questionnaires and interviews from librarians and library users. The collected data were analyzed using descriptive statistics and presented in tables, charts, and narrative form.

The findings indicate that AI technologies such as chatbots, library management systems, recommendation systems, automated cataloguing, and digital information retrieval significantly improve access to information, reduce service delivery time, enhance user satisfaction, and increase the efficiency of library operations. However, the study also identified challenges including inadequate funding, limited ICT infrastructure, insufficient technical skills, and resistance to technological change. The study concludes that Artificial Intelligence has great potential to transform library services by improving information access and operational efficiency. It recommends increased investment in ICT infrastructure, continuous staff training, adequate financial support, and the development of policies that promote the adoption and effective use of AI in libraries.

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CHAPTER ONE

INTRODUCTION AND BACKGROUND OF THE STUDY

1.0 Introduction

This chapter presents the background of the study, the statement of the problem, and the purpose of the study, including both the general and specific objectives. It also outlines the research questions, significance of the study, scope of the study, definition of key terms, and the organization of the study.

1.1 Background of the Study.

Artificial Intelligence (AI) has become one of the most transformative technologies in the digital age. It refers to computer systems designed to perform tasks that normally require human intelligence, such as learning, reasoning, problem solving, and decision making (Russell & Norvig, 2021). Over the past decade, AI technologies such as machine learning, natural language processing, robotics, and chatbots have been increasingly adopted in different sectors including education, healthcare, finance, and information management.

Libraries, traditionally known as centers for knowledge storage and dissemination, have also begun integrating AI technologies to improve their services. Modern libraries are no longer limited to physical collections; they now provide digital services, automated cataloging, virtual reference assistance, and intelligent search systems. AI plays a key role in enhancing these services by improving efficiency, accuracy, and accessibility of information resources (Cox et al., 2019).

For instance, AI-powered recommendation systems can suggest books and resources based on user preferences and previous searches. Chatbots and virtual assistants can answer user queries instantly without requiring human librarians. Additionally, machine learning algorithms can assist in cataloging large volumes of digital resources, thereby reducing manual work and improving information retrieval processes (Asemi & Asemi, 2018).

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Despite these benefits, the adoption of AI in libraries also presents several challenges. These include high implementation costs, lack of technical skills among librarians, concerns about data privacy, and resistance to technological change. In many developing countries, libraries still struggle with limited ICT infrastructure, which may hinder effective implementation of AI technologies.

Therefore, it is important to assess how AI is currently being used in library services and to examine its impact on service delivery, efficiency, and user satisfaction. This study aims to evaluate the role of artificial intelligence in library services, identifying both its benefits and challenges.

1.2 Statement of the Problem.

Despite the artificial intelligence is transforming the landscape of information access and knowledge creation, presenting both challenges and opportunities for libraries, libraries are yet to intergrade the use of Artificial intelligence in their library services. The study there for explored the role of Artificial intelligence technologies in enhancing library services.

1.3 Objectives of the Study

1.3.1 General Objective

To examine the role of artificial intelligence in enhancing library services at Marian University College (MARUCO).

1.3.2 Specific Objectives

i. To identify artificial intelligence technologies that can be applied in library services.

ii. To examine the ways in which artificial intelligence enhances the efficiency and effectiveness of library services.

iii. To assess the perceptions of librarians and library users toward the use of artificial intelligence in libraries.

iv. To identify the challenges facing the adoption of artificial intelligence in library services.

v. To examine strategies that can improve the adoption of artificial intelligence in libraries.

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1.4 Research Questions

i. What artificial intelligence technologies are applied or can be applied in library services?

ii. How does artificial intelligence enhance library service delivery?

iii. What are the perceptions of librarians and library users toward the use of artificial intelligence in libraries?

iv. What challenges affect the adoption of artificial intelligence in library services?

v. What strategies can be used to improve the adoption of artificial intelligence in libraries?

1.5 Significance of the Study

i. The study will helps librarians and library management to gain a deeper understanding of how artificial intelligence can enhance the efficiency and quality of library services.

ii. Library users may benefit from improved access to information and enhanced service delivery.

iii. This study is expected be helpful policymakers and educational institutions may use the findings to inform planning and decision-making regarding technological advancement in academic libraries.

1.6 Scope of the study

This study focuses on the role of artificial intelligence in enhancing library services at Marian University College in Tanzania. There are reasons for choosing such us there are have digital infrastructure ,this includes computers, servers, and reliable Internet connectivity AI-Related Technologies and the library have experimenting with AI-related technologies such as Online Public Access Catalog (OPAC)these technology allow the researcher to assess the role of artificial intelligence in enhancing library services.

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1.7 Limitation of the study

Experience; also experience is considered to be a limitation because a researcher it's the first time to conduct the research. Therefore has no experiences on a particular work where by sometimes will cause inconvenience to the study.

Inadequate of fund; a researcher will need enough amount of money for transportation, stationary, computer, photocopying and binding. As a researcher has not yet employed and expert the fund from a sponsor ,this situation is difficult because a researcher has to minimize the money given by the sponsor to avoid the family to be in bad cost.

1.8 Definition of key terms

Artificial Intelligence (AI): Refers to the ability of computer systems to perform tasks that normally require human intelligence, such as learning, reasoning, problem-solving, and decision-making.

Library Services: Refer to the services provided by a library to meet the information needs of users, including reference, circulation, cataloguing, and information retrieval services.

Academic Library: is a library that supports teaching, learning, and research activities in higher learning institutions.

Information and Communication Technology (ICT): Refers to technologies used to collect, store, process, and communicate information electronically.

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CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter reviews existing literature related to the role of artificial intelligence (AI) in enhancing library services. It examines the concept of artificial intelligence, its applications in libraries, benefits of AI in library operations, challenges associated with its implementation, and findings from previous studies. The aim is to establish the knowledge gap that the current study seeks to address.

2.2 Concept of Artificial Intelligence

Artificial Intelligence refers to the ability of machines or computer systems to perform tasks that normally require human intelligence. These tasks include learning, reasoning, problem-solving, speech recognition, and decision-making. According to Russell and Norvig (2021), AI is a branch of computer science concerned with building intelligent systems capable of performing tasks that typically require human intelligence. AI technologies include machine learning, natural language processing, robotics, and expert systems. McCarthy (2007) defines artificial intelligence as the science and engineering of making intelligent machines, particularly intelligent computer programs. In the context of libraries, AI technologies are increasingly used to automate operations, improve information retrieval, and enhance user experiences.

2.3 Concept of Library Services

Library services refer to activities and resources provided by libraries to meet the information needs of users. These services include reference services, circulation services, cataloguing, information literacy training, digital services, and access to electronic resources. According to Ranganathan (1931), libraries exist to connect readers with the information they need. Modern libraries have evolved with technology to provide faster, more efficient, and user-centered services. Rowley (2006) notes that the development of digital technologies has transformed library services from traditional book lending to

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digital information services such as online databases, digital repositories, and electronic catalogs.

2.4 Applications of Artificial Intelligence in Libraries

Artificial intelligence is increasingly being integrated into library systems to improve efficiency and service delivery. Several AI technologies are used in modern libraries.

2.4.1 Chatbots and Virtual Assistants

AI-powered chatbots are used in libraries to provide instant responses to user inquiries. They can answer frequently asked questions, guide users in searching for information, and assist with library navigation. According to Cox et al. (2019), chatbots enhance user interaction with library systems by providing 24/7 assistance without requiring human librarians to be present. Chatbots are increasingly being adopted in modern libraries to provide automated assistance to users. They can handle frequently asked questions, guide users in searching for resources, and offer 24/7 support. Chatbots significantly reduce librarians' workload while improving user satisfaction.

2.4.2 Information Retrieval and Search Systems

AI improves search systems in libraries by enabling intelligent information retrieval. Machine learning algorithms help users find relevant materials faster by analyzing search patterns and preferences. Bawden and Robinson (2012) state that AI-based retrieval systems improve the accuracy and relevance of search results in digital libraries.2.4.2 Information Retrieval and Search Systems Artificial Intelligence (AI) has significantly transformed information retrieval and search systems in modern libraries. Traditional search systems often rely on keyword matching, which may produce irrelevant or incomplete results. However, AI-powered systems use advanced techniques such as machine learning, natural language processing (NLP), and semantic search to better understand user queries and context.

Machine learning algorithms analyze users' search histories, behaviors, and preferences to deliver more personalized and relevant results. For instance, AI can interpret synonyms, user intent, and contextual meaning, allowing users to retrieve information even when

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their search terms are not exact. Additionally, AI-driven systems can rank search results based on relevance, usage frequency, and user feedback, thereby improving user satisfaction. Furthermore, intelligent search systems can support voice-based queries and multilingual searches, making library resources more accessible to diverse users. According to Bawden and Robinson (2012), AI-based retrieval systems enhance both the precision and recall of search results, thereby improving the overall efficiency of digital library services.

2.4.3 Automated Cataloguing and Classification

Artificial intelligence can automate cataloguing processes by analyzing metadata and assigning classification numbers automatically. According to Witten, Bainbridge, and Nichols (2010), AI technologies can significantly reduce the time required for cataloguing and indexing library resources.AI technologies play a critical role in automating cataloguing and classification processes in libraries. Traditionally, cataloguing requires significant human effort to assign subject headings, classification numbers, and descriptive metadata. This process can be time-consuming and prone to inconsistencies.

With AI, libraries can automate these tasks using machine learning algorithms and pattern recognition techniques. AI systems can analyze the content of documents—such as titles, abstracts, and full texts—to automatically generate metadata and assign appropriate classification codes based on established systems like Dewey Decimal Classification (DDC) or Library of Congress Classification (LCC).Moreover, AI can ensure consistency and accuracy in cataloguing by minimizing human errors and standardizing metadata formats. It also enables faster processing of large volumes of information, which is particularly useful for digital libraries with extensive collections. Witten, Bainbridge, and Nichols (2010) highlight that AI-driven cataloguing systems significantly reduce the time and labor required for indexing and organizing library materials, allowing librarians to focus on more strategic tasks.

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2.4.4 Recommendation Systems

AI-based recommendation systems suggest books, articles, or resources based on users' reading history and preferences.AI-based recommendation systems have become an essential feature in modern library services, enhancing user engagement and satisfaction. These systems use algorithms such as collaborative filtering, content-based filtering, and hybrid approaches to suggest relevant materials to users. By analyzing users' borrowing history, search behavior, and preferences, AI can recommend books, journal articles, and other resources that align with individual interests. This personalized approach helps users discover materials they might not have found through traditional search methods.

Recommendation systems in libraries function similarly to those used by platforms like Amazon and Netflix, where user data is utilized to predict preferences and suggest relevant content. In addition, these systems can highlight trending materials, newly added resources, or highly rated items within the library collection. As a result, recommendation systems not only improve user experience but also increase the utilization of library resources by promoting underused materials and supporting informed reading choices.

2.4.5 Digital Library Management

AI supports the management of digital collections by organizing and preserving digital resources. It also helps detect duplicates, manage metadata, and improve document indexing. Artificial Intelligence enhances the management of digital libraries by improving the organization, accessibility, and preservation of digital resources. AI tools can automatically organize large collections of digital content, making it easier for users to locate and access materials efficiently.

One key application of AI in digital library management is metadata generation and enhancement. AI can extract key information from documents and generate descriptive metadata, improving indexing and searchability. It also helps in detecting duplicate records, ensuring data integrity and reducing redundancy in the system.

Additionally, AI supports digital preservation by monitoring the condition of digital files and recommending appropriate storage or migration strategies to prevent data loss. It can

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also assist in document classification, tagging, and content summarization, making large datasets more manageable. AI-driven systems can further analyze usage patterns to optimize collection development and resource allocation. This enables libraries to make data-driven decisions about which materials to acquire, retain, or discard. Overall, AI contributes to more efficient, accurate, and scalable digital library management, ensuring that library services remain relevant in the digital age.

2.5 AI in enhancing efficiency and effectiveness of library services

The application of Artificial Intelligence (AI) in libraries has brought significant transformation in both the efficiency and effectiveness of service delivery. As libraries increasingly adopt digital technologies, AI plays a crucial role in optimizing operations, improving service quality, and meeting the evolving needs of users in the information age.

Firstly, AI enhances operational efficiency by automating repetitive and time-consuming tasks such as cataloguing, indexing, circulation management, and data entry. Traditionally, these activities required substantial manual effort and were prone to human error. Through machine learning and automation tools, AI systems can perform these tasks faster and with greater accuracy. For example, automated circulation systems can manage book check-ins and check-outs, track overdue materials, and send reminders to users without human intervention. This automation reduces workload pressure on library staff and allows librarians to focus on more complex, user-centered, and strategic services such as research support and information literacy training. As noted by McAfee and Brynjolfsson (2017), the integration of AI into organizational processes significantly enhances productivity and operational performance.

Secondly, AI improves the effectiveness of information retrieval systems. Traditional library systems primarily rely on keyword-based searches, which often fail to capture the true intent of users' queries. In contrast, AI-powered systems utilize technologies such as natural language processing (NLP), semantic analysis, and machine learning to understand the context and meaning behind user queries. This enables more accurate, relevant, and comprehensive search results. AI systems can also learn from user interactions, continuously refining search outcomes based on user preferences and

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behavior. According to Jiang et al. (2020), AI-driven information retrieval systems significantly improve both precision and recall, leading to more efficient access to information resources.

Thirdly, AI enhances the user experience through personalization. Modern library users expect services tailored to their individual needs and preferences. AI systems analyze user behavior, including search history, borrowing patterns, and browsing activities, to provide personalized recommendations of books, articles, and other resources. This not only saves users time but also increases their engagement with library services. Personalized services create a more user-centered library environment, where users feel understood and supported in their information needs.

In addition, AI supports strategic decision-making and management in libraries. By analyzing large volumes of data, such as user activity, resource usage, and service trends, AI systems can generate valuable insights for library management. These insights can inform decisions related to collection development, resource allocation, budgeting, and service improvement. For example, AI can identify frequently accessed materials, predict future demand, and highlight underutilized resources, enabling libraries to make data-driven and evidence-based decisions.

2.4 Perceptions of librarians and users toward AI in Libraries

The adoption and successful implementation of AI in libraries largely depend on the perceptions and attitudes of both librarians and users.From the perspective of librarians, many studies indicate a generally positive attitude toward AI due to its potential to improve efficiency and service delivery. However, some librarians express concerns about job displacement, lack of skills, and the complexity of AI technologies (Cox et al., 2019).

Training and capacity building play a significant role in shaping librarians' perceptions. According to Huang and Rust (2021), librarians who receive adequate training are more likely to embrace AI technologies and integrate them into their work.On the other hand,

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library users tend to have positive perceptions of AI due to its convenience, speed, and accessibility. Users appreciate features such as instant responses, personalized recommendations, and improved search capabilities (Jiang et al., 2020).

However, concerns related to data privacy, security, and trust remain significant barriers to adoption. Users may hesitate to rely on AI systems if they are unsure about how their personal data is being used. In developing countries such as Tanzania, perceptions of AI are influenced by factors such as limited awareness, inadequate infrastructure, and low levels of technological adoption. These factors may affect both acceptance and effective use of AI in library services.

2.7 Empirical review of previous studies

Several studies have examined the use of artificial intelligence in library services.

A study by Cox et al. (2019) found that AI technologies such as chatbots significantly improve user interaction and reduce workload for librarians.

Similarly, Bawden and Robinson (2012) reported that AI-based search systems improve information retrieval efficiency in digital libraries.

Another study by Asemi and Asemi (2018) highlighted that AI can enhance library operations such as cataloguing, reference services, and digital resource management.

However, most studies have focused on developed countries, leaving a gap in understanding the application of AI in libraries in developing regions such as Tanzania. Therefore, this study seeks to assess the role of AI in enhancing library services at MARUCo.

2.8 Research gap

Although previous studies have shown that artificial intelligence can improve library services, there is limited research focusing on its implementation and impact in Tanzanian academic libraries. Despite the growing body of literature on AI in libraries, several gaps remain. Firstly, there is a geographical gap, as most studies focus on

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developed countries, with limited research conducted in Africa and Tanzania. Secondly, there is a contextual gap, as many studies focus on specific aspects of AI rather than providing a comprehensive analysis that integrates technologies, efficiency, perceptions, challenges, and strategies. Thirdly, there is a practical gap, as existing studies often emphasize theoretical benefits without addressing real-world implementation challenges. This study aims to fill these gaps by providing a comprehensive and context-specific analysis of AI adoption in library services. This study therefore aims to fill this gap by assessing how AI can improve library services in this context.

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CHAPTER THREE.

RESEARCH METHODOLOGY.

3.1 Introduction

This chapter presents the research methodology used in the study. It explains the procedures and techniques that will be used to collect and analyze data in order to achieve the objectives of the study. The chapter discusses the research design, study area, target population, sampling techniques, sample size, data collection methods, research instruments, data analysis procedures, validity and reliability of research instruments, and ethical considerations.

3.2 Research design.

According to kothari (2004)Research design refers to the overall plan or structure used by a researcher to conduct a study. It provides a framework that guides the collection, measurement, and analysis of data. This study will use a descriptive research design. Descriptive research design is appropriate because it enables the researcher to describe the current situation regarding the use of artificial intelligence in enhancing library services.

The design will help the researcher to examine how artificial intelligence is applied in library services, identify the benefits of artificial intelligence in improving library services, determine challenges faced in implementing artificial intelligence in libraries. Descriptive research design is suitable for this study because it allows the researcher to collect detailed information about the experiences and opinions of library users and staff without manipulating any variables.

3.3 research approach

This is a type of research bring to the fact that these are two basic is quantitative and qualitative approach,the former involves the generation of data in quantitative from which can be subjected to rigorous quantitative analysis in formal (kromley,2006). The purpose of approach research is to form data base from which to infer characteristic or relationship of population. The researcher will use qualitative research design for both

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oral questions and written questions will ask to the informant's answer will collected through the written form.

3.4 Area of a study.

The study will be conducted at MARUCo Library. The library serves students, lecturers, researchers, and other members of the academic community by providing access to various information resources. The library offers a range of services including circulation services, reference services, digital information services, cataloguing and classification and access to electronic databases. MARUCo library was selected as the study area because it plays an important role in supporting academic activities and is gradually adopting information technologies that may include artificial intelligence tools.

3.5 Target population

A population refers to the entire group of individuals or elements that share common characteristics relevant to a research study (kothari 2010).The target population of this study will include 100 individuals who interact directly with library services. These include library staff, students and academic staff (lecturers).These groups are selected because they are the main users and providers of library services and therefore can provide relevant information about the role of artificial intelligence in improving library operations.

3.6 Sample size

A sample refers to a subset of the population selected for the study. Due to the nature of the study and financial constraints total of 10 respondents will be used which involves 7 users and 3 library staff. This sample size is considered adequate to provide reliable data for the study.

3.7 Sampling techniques.

Kothari,(2004) defines a sampling technique is a plan or process determined before any data are actually collected for obtaining a sample from a given polulation.under this study ,both purposive and simple random sampling will be used.

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3.7.1 Simple random sampling

The simple random sampling is type of probability sampling which provided equal chance to every member in the population to be included in the study (Bryman & Bell,2011).

3.7.2 Purposive sampling

This is a form of non-probability sampling in which decision concerning the individual to include in the sample that are taken by a researcher. Purposive sampling will be used to select library staff and lecturers because they possess specialized knowledge about library operations and technologies used in library services(Paul,2016)

3.8 Data collection methods

Data collection methods refer to techniques used by the researcher to gather information from respondents. But also according to (Burns&Grove,1998) data collection is a precise ,systematic gathering of information relevant to the research sub-problems ,using methods such as interviews ,focus group discussion and case histories .In this study the researcher intends to collect both primary and secondary data.

3.8.1 Primary data

According to Mugenda(1999),primary sources of data constitute the "information a researcher obtain from the field that is data collected from the subjects in the sample". Primary data for this research will be collected by using questionaire amd interviews for library staff and users.

3.8.2 Secondary data

Secondary data are data that have been already collected by and readily available from other sources (Kelly,2005). Such data are cheaper and more quickly obtainable than the primary data and also may be available when primary data cannot be obtained at all. These are data obtained from other peoples finds the researcher can collect data from documentary review, those are text books, journals, newspaper, magazines ,abstracts and those materials are found in libraries, information centers and archives.

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3.9 instruments of collecting data

3.9.1 Questionaire method.

According to Aina (2004),Questionnaire are instrument that consist a set of question to be answered by respondents .Questionnaires will be distributed to students and lecturers. The questionnaires will consist of both open-ended and closed-ended questions. In this study questionnaire will be used to correct data from library users.

The advantages of questionnaires include they allow collection of information from many respondents within a short time, It is free from bias of the interviewer, answers are in respondents ‘own words and respondents have adequate time to give well throughout answers. The researcher used open ended questionnaire. The questionnaire distributed to respondents with a request answer the question in written and returned them to the researcher with a specific period of time.

3.9.2 Interviews

According to kothari (2004) an interviews is asset of question administered through oral or verbal communication o face to face discussion between the researcher and interview respondent. Interviews will be conducted with library staff in order to obtain detailed information about the use of artificial intelligence in library services. Interviews will allow the researcher to obtain in-depth information, clarify responses from participants, and understand the experiences of library staff. In this study interview will be used to collect data from 5 library staff.

Advantages of interview methods personal information can as well be obtained easily under this method, more information and that too in greater depth can be obtained sample can controlled more effectively as there arises no difficulties of the missing returns, non-response generally remains very low.

3.9.3 Observation method.

Observation will also be used to examine how library systems operate and how artificial intelligence technologies are used in delivering services. Observation will help the researcher understand the actual situation in the library environment. Data collection

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methods refer to techniques used by the researcher to gather information from respondents. The advantage of this method are help to get fact details.

3.10 Data quality control.

This is the most critical criterion and indicates the degree to which an instruments measures what it is supposed to measure (Kothari,2004). In order to achieve data quality control, the researcher ensured the measuring instruments provides adequate coverage of the topic by containing adequate representative sample of the universe.

3.11 Data analysis plan

Data processing refers too counting of low facts into a form that is suitable for feature use (Krishnaswami&Ranganathan,2005). In order possess the collected data from questionnaires and interview, the data detailed to remove errors and incompleteness. The raw data to be collected will be organized and processed. Statistical data devices such as excel and Microsoft word will be employed for analyzing data. Both qualitative and quantitative methods of data analysis will be used where various responses from respondents will be grouped and compared for making easy analysis.

3.12 Ethical considerations

Ethics is mostly associated with morality and deals with issues of right and wrong among group, society or communities. It is therefore important that everyone who is dealing or involved in research should be aware of the respondents will only be used for research purpose and not subject to leakage into other objectives. This will help the researcher to get sufficient information from the respondent

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CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND DISCUSSION OF FINDINGS

4.0 Introduction

This chapter presents the findings of the study on the role of artificial intelligence in enhancing library services, using MARUCo University Library, Bagamoyo, as a case study. Data were collected through questionnaires and interviews administered to library user and library staff, in line with the study's specific objectives. The chapter begins with the response rate and demographic characteristics of respondents, followed by findings on the types of artificial intelligence technologies used in library services, the role of artificial intelligence in enhancing library service delivery, the challenges facing its adoption, and the possible solutions to those challenges.Data collected through questionnaires and interviews are presented in this chapter using a combination of narrative descriptions, statistical tables, and graphical illustrations such as pie charts and bar charts. This mixed approach was adopted to provide a clear, comprehensive, and easily interpretable presentation of the findings for each objective of the study.

4.1 Response Rate

A total of 30 questionnaires were administered to the targeted respondents, out of which all 30 were correctly filled in and returned, giving a response rate of 100%. This high response rate was attributed to the researcher's close follow-up and the willingness of library staff and management to participate in the study. Such a response rate is considered sufficient to guarantee the reliability and validity of the findings presented in this chapter. Respondent rate is the percentage of people who complete and return the research questionnaire or participate in the study out of the total number selected. Formula: Response Rate = (Number of completed responses ÷ Total number of questionnaires distributed) × 100%

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Table 4.1 Summary of Questionnaire Response Rate

Category	Number	Percentage
Questionnaires distributed	30	100%
Questionnaires returned and correctly filled	30	100%

Source: Field Data (2026)

4.2 Demographic Characteristics of Respondents

The demographic characteristics of respondents, namely age, gender, and education level, were examined in order to understand the composition of individuals who participated in the study. This information is important because it helps to contextualize the findings in relation to the respondents' experience and exposure to library and information technologies.

4.2.1 Age of Respondents

The age of respondents was analyzed to establish the age composition of individuals involved in library service delivery. Table 4.1 presents the findings.

Table 4.1: Age of Respondents (N=30)

category	Library user (N=25)Frequency	Percentage	Library Staff (N=5) Frequency	Percentage
18-25	2	8%	-	-
26-35	8	32%	-	-
36-45	12	48%	1	20%
Above 45	3	12%	4	80%
Total	25	100%	5	100%

Source: Field Data (2026)

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The findings in Table 4.1 show that among library user, 2 (8%) were aged between 18-25 years, 8 (32%) were aged between 26-35 years, 12 (48%) were aged between 36-45 years, and 3 (12%) were above 45 years. Among library stuff, 1 (20%) was aged between 36-45 years while 4 (80%) were above 45 years. This distribution indicates that the majority of respondents were mature and experienced staff, who are likely to give informed opinions on the adoption and use of artificial intelligence in library services.

4.2.2 Gender of Respondents

The gender of respondents was assessed in order to determine the representation of male and female respondents in the study. Table 4.2 presents the findings.

Table 4.2: Gender of Respondents (N=30)

Category	Library user (N=25) Frequency	Percentage	Library staff (N=5) Frequency	Percentage
Male	13	52%	3	60%
Female	12	48%	2	40%
Total	25	100%	5	100%

Source: Field Data (2026)

The findings show that 13 (52%) of library users were male and 12 (48%) were female, while among library staff, 3 (60%) were male and 2 (40%) were female. This distribution shows a fairly balanced representation of both genders, which enhances the credibility of the findings since the views of both male and female respondents regarding the role of artificial intelligence in library services were captured.

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4.2.3 Education Level of Respondents

The educational background of respondents was assessed to understand their level of academic qualification, since this influences their understanding and appreciation of artificial intelligence technologies in library services. Table 4.3 presents the findings.

Table 4.3: Education Level of Respondents (N=30)

Source: Field Data (2026)

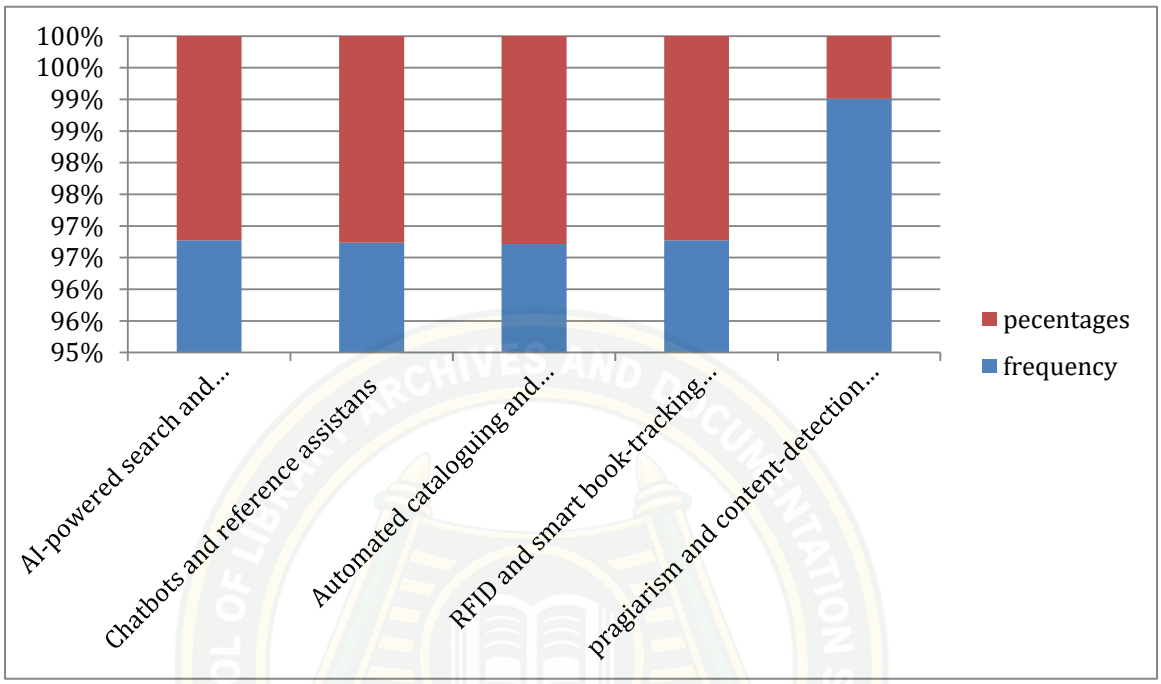
The findings indicate that among library staff, 4 (16%) had certificate-level education, 9 (36%) held diplomas, and 12 (48%) held bachelor's degrees. Among library management, 2 (40%) held bachelor's degrees, 2 (40%) held master's degrees, and 1 (20%) held a PhD. This suggests that most respondents had adequate academic qualifications to understand and evaluate the role of artificial intelligence in enhancing library services, while the higher qualifications among management point to a capacity for strategic decision-making on technology adoption.

4.3 Types of Artificial Intelligence Technologies Used in Library Services

This section presents findings on the first objective of the study, which sought to identify the types of artificial intelligence technologies used in library services at MARUCo University Library. Respondents were asked to identify the AI-based tools and systems they were familiar with or used in their day-to-day library operations. Table 4.4 summarizes the findings.

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Table 4.4: Types of Artificial Intelligence Technologies Used in Library Services (N=30)



Source: Field Data (2026)

The findings in Table 4.4 show that 12 (40%) of respondents identified AI-powered search and recommendation systems as the most commonly used technology, followed by chatbots and virtual reference assistants at 8 (27%). Automated cataloguing and classification tools were mentioned by 5 (17%) of respondents, while RFID and smart book-tracking systems and plagiarism/content-detection tools were mentioned by 3 (10%) and 2 (6%) of respondents respectively.

These findings suggest that the library has begun to integrate artificial intelligence mainly in areas that directly support information search and user interaction, while more advanced applications such as automated cataloguing and smart tracking remain comparatively limited. This is consistent with literature indicating that libraries in developing countries tend to adopt AI technologies gradually, starting with user-facing services before extending to back-office and infrastructural applications.

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During the interview, one member of library management noted that "the library currently relies mostly on AI-assisted search tools within the online catalogue and a few automated notification systems, since more advanced tools require infrastructure and funding that are not yet fully available."

4.4 The Role of Artificial Intelligence in Enhancing Library Services

This section presents findings on the second objective, which examined the role of artificial intelligence in enhancing library service delivery at MARUCo University Library. Table 4.5 presents the findings.

Table 4.5: Role of Artificial Intelligence in Enhancing Library Services (N=30)

Response / Category	Frequency (F)	Percentage (%)
Improves speed and accuracy of information retrieval	13	43%
Enhances personalized user services and recommendations	8	27%
Reduces staff workload through automation	6	20%
Improves 24/7 accessibility of library services	3	10%
Total	30	100%

Source: Field Data (2026)

The findings in Table 4.5 reveal that 13 (43%) of respondents indicated that artificial intelligence improves the speed and accuracy of information retrieval, making this the most widely recognized role. In addition, 8 (27%) of respondents reported that AI enhances personalized user services and recommendations, while 6 (20%) noted that it reduces staff workload through automation of routine tasks such as cataloguing and circulation. A further 3 (10%) of respondents indicated that AI improves the accessibility

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of library services beyond normal working hours through tools such as chatbots and online catalogues.

These findings imply that artificial intelligence contributes significantly to the efficiency and quality of library service delivery, particularly by reducing the time users spend searching for information and by freeing staff from repetitive tasks so that they can focus on more specialized, user-centered services. This is in line with existing literature, which emphasizes that AI-driven systems in libraries enhance user satisfaction, expand access to information resources, and improve overall institutional efficiency.

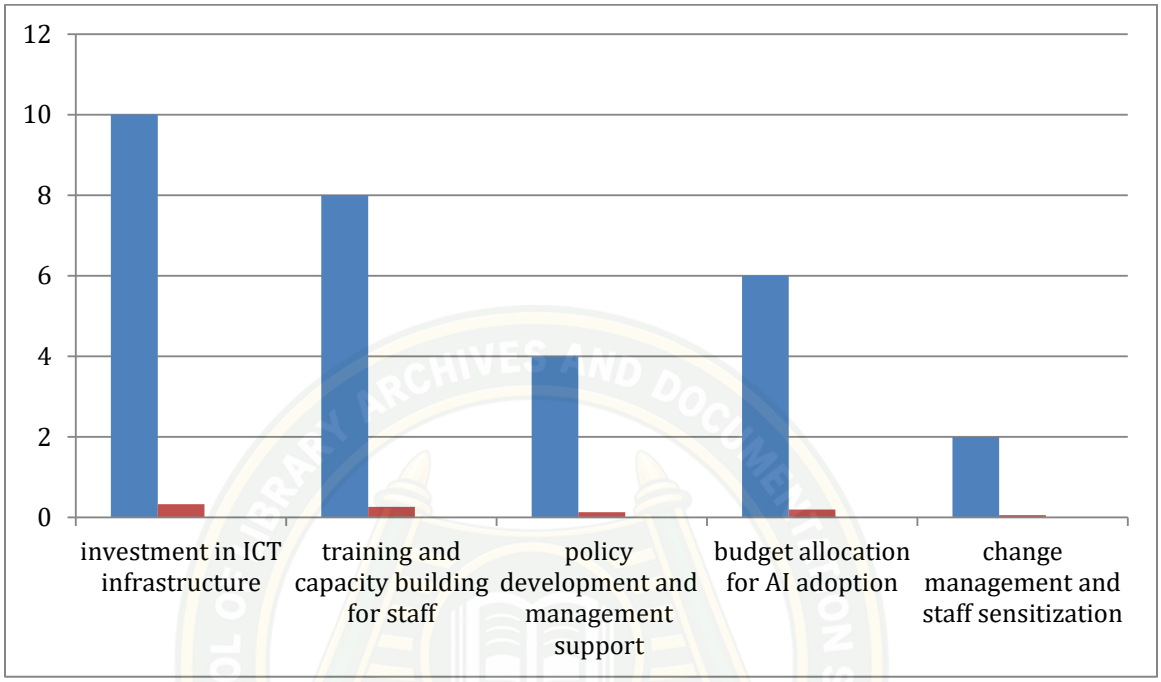
During the interview, library management respondents stated that "artificial intelligence has made it easier for students to locate materials quickly and has reduced the pressure on the reference desk, which allows staff to attend to more complex user needs."

4.5 Challenges Facing the Adoption of Artificial Intelligence in Enhancing Library Services

This section presents findings on the third objective, which sought to identify the challenges facing the adoption of artificial intelligence in enhancing library services. Table 4.6 presents the findings.

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Table 4.6: Challenges Facing the Adoption of Artificial Intelligence in Library Services (N=30)



Source: Field Data (2026)

The findings show that inadequate ICT infrastructure was the most cited challenge, reported by 10 (33.3%) of respondents. This was followed by insufficient skilled and trained personnel at 8 (26.7%), and the high cost of acquiring and maintaining AI systems and software at 6 (20%). Limited technical and Internet support was cited by 4 (13.3%) of respondents, while resistance to change among staff was mentioned by 2 (6.7%).

These findings suggest that the adoption of artificial intelligence in library services at MARUCo University is constrained mainly by structural and capacity-related factors rather than by a lack of awareness of AI's potential benefits. Weak infrastructure and inadequate technical skills limit the extent to which existing AI tools can be fully utilized, while the high cost of AI systems discourages investment, particularly within resource-constrained academic institutions.

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During the interview, one library management respondent explained that "the biggest obstacle is the cost of reliable Internet and modern equipment; even where staff are willing to learn, the library lacks the infrastructure to support advanced AI applications on a full scale."

4.6 Solutions to the Challenges Facing the Adoption of Artificial Intelligence in Library Services

Respondents were further asked to suggest possible solutions to the challenges hindering the adoption of artificial intelligence in enhancing library services. Table 4.7 summarizes the findings.

Table 4.7: Solutions to the Challenges Facing AI Adoption in Library Services (N=30)

Response / Category	Frequency (F)	Percentage (%)
Investment in ICT infrastructure	10	33.3%
Training and capacity building for staff	8	26.7%
Budget allocation for AI adoption	6	20%
Policy development and management support	4	13.3%
Change management and staff sensitization	2	6.7%
Total	30	100%

Source: Field Data (2026)

The findings show that 10 (33.3%) of respondents recommended investment in ICT infrastructure as the most important solution, followed by training and capacity building for staff at 8 (26.7%). Budget allocation specifically for AI adoption was suggested by 6 (20%) of respondents, while policy development and management support, and change

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management with staff sensitization, were recommended by 4 (13.3%) and 2 (6.7%) of respondents respectively.

These findings suggest that addressing the challenges facing AI adoption requires a combination of infrastructural investment, human capacity development, and supportive institutional policies. Respondents emphasized that isolated interventions, such as acquiring AI software without corresponding investment in infrastructure and staff training, are unlikely to yield meaningful improvements in library service delivery.

During the interview, library management respondents noted that "if the university can prioritize funding for internet connectivity, computers, and staff training, the library will be able to adopt more artificial intelligence tools and better serve students and researchers."

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CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.0 Introduction

This chapter presents the summary of the major findings of the study, draws conclusions based on the research objectives, and offers practical recommendations for enhancing the role of artificial intelligence in library services. The chapter also suggests areas for further research that were not fully addressed by the current study.

5.1 Summary of the Study

The study assessed the role of artificial intelligence in enhancing library services, using MARUCo University Library, Bagamoyo, as a case study. The study was guided by three specific objectives: to identify the types of artificial intelligence technologies used in library services, to examine the role of artificial intelligence in enhancing library service delivery, and to identify the challenges facing the adoption of artificial intelligence in library services. Data were collected from 30 respondents comprising library staff and library management through questionnaires and interviews.

5.1.1 Types of Artificial Intelligence Technologies Used in Library Services

The study found that AI-powered search and recommendation systems (40%) and chatbots or virtual reference assistants (27%) were the most commonly used artificial intelligence technologies in library services, while automated cataloguing tools (17%), RFID and smart tracking systems (10%), and plagiarism/content-detection tools (6%) were comparatively less utilized. These findings indicate that the adoption of artificial intelligence in the library is still at an early and uneven stage, concentrated mainly on user-facing search and interaction tools.

5.1.2 Role of Artificial Intelligence in Enhancing Library Services

The study established that artificial intelligence plays a significant role in enhancing library services. The majority of respondents (43%) indicated that AI improves the speed and accuracy of information retrieval, while 27% noted that it enhances personalized user

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services and recommendations. Additionally, 20% of respondents reported that AI reduces staff workload through automation, and 10% indicated that it improves the accessibility of library services beyond normal working hours. These findings confirm that artificial intelligence contributes meaningfully to efficiency, accessibility, and user satisfaction in library service delivery.

5.1.3 Challenges Facing the Adoption of Artificial Intelligence in Library Services

The study identified several challenges facing the adoption of artificial intelligence in library services, with inadequate ICT infrastructure (33.3%) being the most significant, followed by insufficient skilled and trained personnel (26.7%), the high cost of AI systems and software (20%), limited technical and internet support (13.3%), and resistance to change among staff (6.7%). These challenges limit the extent to which the library can fully harness the benefits of artificial intelligence.

5.1.4 Solutions to the Challenges Facing the Adoption of Artificial Intelligence in Library Services

The study identified investment in ICT infrastructure (33.3%), training and capacity building for staff (26.7%), budget allocation for AI adoption (20%), policy development and management support (13.3%), and change management with staff sensitization (6.7%) as the key solutions proposed by respondents to address the challenges facing AI adoption in library services.

5.2 Conclusion

The study concludes that artificial intelligence plays a significant role in enhancing library services at MARUCo University Library by improving the speed and accuracy of information retrieval, enabling personalized user services, reducing staff workload through automation, and improving accessibility of library services. However, the full realization of these benefits is constrained by challenges such as inadequate ICT infrastructure, insufficient skilled personnel, high costs of AI systems, limited technical support, and resistance to change among staff. Addressing these challenges through infrastructural investment, staff training, adequate budgeting, and supportive policies

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would enable the library to more fully harness the potential of artificial intelligence in enhancing service delivery to students, researchers, and the wider university community.

5.3 Recommendations

Based on the findings of the study, the following recommendations are proposed:

- The university management should invest in modern ICT infrastructure, including reliable Internet connectivity, computers, and servers, to support the effective adoption and use of artificial intelligence technologies in the library.
- The library management should organize continuous training and capacity-building programs for library staff to equip them with the skills needed to operate and maintain artificial intelligence systems effectively.
- The university should allocate a specific budget and develop clear policies to guide the acquisition, implementation, and management of artificial intelligence technologies within the library, ensuring sustainability and consistency in service delivery.

5.4 Areas for Further Study

The following areas are recommended for further research:

- The impact of artificial intelligence adoption on user satisfaction in university libraries in Tanzania.
- A comparative study of artificial intelligence adoption between public and private university libraries in Tanzania.
- The relationship between staff digital literacy and the effective utilization of artificial intelligence tools in academic libraries.
- Challenges and opportunities of integrating artificial intelligence into records and archival management in higher learning institutions in Tanzania.

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APPENDIX I

REAEARCH WORK PLAN/ SCHEDULE TIME FRAME

ACTIVITIES PROGRAM	**1ST WEEK**	**2ND WEEK**	**3RD WEEK**	**4TH WEEK**	**5TH WEEK**	**6TH WEEK**
Reporting at the working place						
Familiarization and distribution of questionnaire						
Interview schedules						
Collection of data and compilation						
Data analysis and presentation						
First draft proof reading and final report submission						

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APPENDIX II

RESEARCH BUDGET.

This study requiring money in order to archive the goal, it includes stationary, computer ,photocopying and transport, expenses as well daily expense fir the researcher survival. There expenditure as follows

NO.	ACTIVITIES	COAST ANALYSIS	COST TOTAL
1.	Transport	Ukuni-maruko 1@2000×30	60,000/=Tsh
2.	Secretarial service	30 pages@100×30×5	150,000/=Tsh
3.	Stationary	2 reams of paper A4	18,000/=Tsh
4.	Binding	5 copies@3000×5	15,000/=Tsh
	TOTAL.		243,000/=Tsh

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APPENDIX III

INTERVIEW QUESTIONS FOR LIBRARY STAFF

Section 1: Introduction

My name is Anjela Elias Mahwata a student from the School of Library, Archives and Documentation Studies (SLADS) pursuing a Diploma in Library and Information Studies. I am currently conducting research on the "The role of artificial intelligence in enhancing library service: A Case Study of MARUCo, Bagamoyo-Pwani.

The purpose of this study is to examine how artificial intelligence contributes to the provision of academic libraries services, particularly at MARUCo–Bagamoyo.

Your responses will be used strictly for academic purposes and will be treated with confidentiality. Kindly answer the questions honestly by ticking (✓) the appropriate option.

Thank you for your cooperation.

Researcher:

Anjela Elias Mahwata.

Section 2: questions

These questions are used during interviews with library staff to obtain detailed information about the use of artificial intelligence in library services.

1. What is your position in the library?

a) Librarian

b) Assistant Librarian

c) Library Technician

d) Library ICT Officer

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2. How long have you worked in the library?

a) Less than 1 year

b) 1–3 years

c) 4–6 years

d) More than 6 years

3. Are you familiar with the concept of Artificial Intelligence (AI)?

a) Yes

b) No

4. Does your library use any AI-related technologies?

a) Yes

b) No

c) Not sure

5. Which AI technologies are used in your library?

a) Chatbots

b) Automated cataloguing systems

c) Digital search systems

d) Recommendation systems

e) None

6. In your opinion, how does AI improve library services?

a) Faster information retrieval

b) Improved user assistance

c) Automation of routine tasks

d) Improved resource management

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7. Which library services are enhanced by AI technologies?

a) Reference services

b) Cataloguing and classification

c) Circulation services

d) Digital library services

8. Has AI reduced the workload of library staff?

a) Yes

b) No

c) Not sure

What challenges does your library face in implementing AI technologies?

a) Lack of funds

b) Lack of technical skills

c) Lack of infrastructure

d) Resistance to change

10. Do library staff receive training on AI technologies?

a) Yes

b) No

c) Sometimes

11. What should be done to improve the use of AI in the library?

a) Provide more training for staff

b) Increase funding for technology

c) Improve ICT infrastructure

d) Increase awareness among users

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APPENDIX IV

QUESTIONNAIRE FOR LIBRARY USERS (STUDENTS / LECTURERS)

Please tick (✓) the correct answer.

1. Gender

a) Male

b) Female

2. Your position in the institution

a) Student

b) Lecturer

c) Researcher

3. How often do you use the library?

a) Daily

b) Weekly

c) Monthly

d) Rarely

4. Have you heard about Artificial Intelligence (AI)?

a) Yes

b) No

5. Are you aware that AI technologies can be used in libraries?

a) Yes

b) No

c) Not sure

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6. Which library systems do you use to search for information?

a) Online catalogue (OPAC)

b) Digital databases

c) Search engines

d) Library staff assistance

7. Do you think AI technologies can improve library services?

a) Yes

b) No

c) Not sure

8. Which services can AI improve in libraries?

a) Book searching

b) Reference services

c) Digital resource access

d) Recommendation of books

9. AI enhances user satisfaction in library services.

a) yes

b) No

9. What benefits can AI bring to library users?

a) Faster access to information

b) Better search results

c) 24-hour assistance

d) Personalized recommendations

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10. Would you prefer AI-based library services (such as chatbots)?

a) Yes

b) No

c) Not sure

11. What challenges may affect the use of AI in libraries?

a) Lack of awareness

b) Poor internet connection

c) Lack of technology

d) Lack of user skills

12. What should libraries do to improve AI services?

a) Provide user training

b) Improve internet access

c) Introduce modern technology

d) Increase digital resources

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APPENDIX IV

APPROVAL LETTER

MARIAN UNIVERSITY COLLEGE
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Mango Street
P.O. BOX 47
BAGAMOYO

Kumb. Na. MAR.DC/VOL.1 20 July 2026

The Acting Academic Officer,
School of Library, Archives and Documentation Studies (SLADS),
P.O. Box 227
BAGAMOYO

RE: STUDENTS INTRODUCTION FOR RESEARCH WORK

Reference is made to your letter with Ref. No. DA.201/457/VOL.1/20 dated 06.03.2026 on the above subject.

I am pleased to inform you that permission is herewith granted to your student **Ms. Anjela Elias Mahwata** to collect data from our University College.

Upon arriving at our University College for the said data collection exercise, Ms. Mahwata should report directly to the Head of our Library Unit for further direction.

Prof. Ralph Peter Masenge
Human Resource Management Officer

c.c: DPAF - On file
c.c: Head, Library Unit - On file
c.c: Ms. Angela Elias Mahwata

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