4

ARTIFICIAL INTELLIGENCE IN RESEARCH AND INFORMATION SERVICES: TRANSFORMING KNOWLEDGE DISCOVERY, SCHOLARLY COMMUNICATION, AND DIGITAL INFORMATION ECOSYSTEMS

BY

***Peace U. ONONOGBU*[1]**

Main University Library, University on the Niger, Umunya[1]

peace.ononogbu@uniniger.edu.ng ; pcisprecious@gmail.com[1]

Abstract:

Purpose: *The aim of this paper is to understand the transformative impact of Artificial Intelligence (AI) on research and information services by summarizing the emerging applications, benefits, challenges, and future implications of AI in knowledge creation, organization, access and dissemination. In particular, it examines the impact of AI technologies on the current information landscapes of the scholarly communication system, digital library service, information retrieval, research information service, and knowledge management.*

Design/Methodology/Approach: *The paper uses a conceptual review method based on the critical analysis and synthesis of the latest scientific literature, institutional reports and professional literature related to Artificial Intelligence, machine learning, digital libraries, research support systems, and information services.*

Findings: *The study shows that AI tools, such as machine learning, NLP, generative AI, intelligent information retrieval systems, recommender systems, semantic search tools, automatic metadata generation and AI research assistants are dramatically improving research productivity and information service delivery. The results suggest that AI can aid in quicker literature retrieval, better information structuring, personalized knowledge retrieval, knowledge discovery automation, prediction, and more efficient digital library services. The study also highlights the key challenges of AI adoption, such as algorithmic bias, data privacy concerns, intellectual property rights, ethical concerns, lack of digital infrastructure, AI illiteracy, and potential over-reliance on AI systems.*

Implications: *The paper emphasises that the way to ensure a successful use of AI in research and information service is to adopt a balanced approach for collaboration between human and artificial intelligence instead of replacing information professionals and researchers. There is a need for universities, libraries and research institutions to create AI governance strategies, build AI digital infrastructure, create competencies in information work with AI technologies, and support ethical and responsible use of AI technologies.*

Originality/Value: *This paper's novelty lies in its holistic analysis of the intersection between the research, information and digital knowledge service worlds and the application of AI. This paper takes a comprehensive postition, combining technological, professional, ethical and institutional viewpoints to offer a more holistic perspective on the potential of AI to contribute to the strategic improvement of research and information services. The study offers insight for librarians, researchers, University administrators, policymakers as well as other professionals in the information space who are looking to responsibly embrace the use of AI in the enhancement and advancement of scholarly communication and knowledge management.*

Keywords: *Artificial Intelligence; Research Services; Information Services; Digital Libraries; Knowledge Management; Scholarly Communication*

Paper Type: *Conceptual Review Paper*

INTRODUCTION

Artificial Intelligence (AI) has been a game-changer in the evolution of knowledge production, organization, access and use in today's information environments. AI began as a field of computer science focused on building systems that could do things that humans

could not, but is now becoming a technology that has a strategic impact on a range of fields including education, scientific research, digital libraries and information management. In recent years, the capacity of information systems to interpret complex data, understand the needs of the users, automate intellectual work, and provide personalised knowledge services have been extended thanks to new developments in machine learning, natural language processing (NLP), deep learning, and generative AI. The Stanford Institute for Human-Centered Artificial Intelligence (2025) reports that there has been a significant uptick in the adoption of AI in scientific research, education, and professional fields, highlighting its growing significance as a tool for knowledge creation and decision-making.

In the context of Library and Information Science (LIS), AI is a transformative shift from the conventional ways of searching and organizing information mainly by humans to creating intelligent, adaptive, and user-centric knowledge ecosystems. Through the integration of AI capabilities in information retrieval, automated cataloguing, semantic indexing, recommendation systems, reference services, and research analytics, academic libraries and research institutions are increasingly delving into potential applications for these AI solutions. The applications of AI and machine learning have opened up new opportunities for libraries, such as enhancing information retrieval, automating routine tasks, and streamlining digital resource management, as mentioned by Das and Islam (2021). Thus the use of AI has not only transcended its role as a technological aid but has also become a growing part of research infrastructure, affecting the processes of scholarly communication and knowledge management.

The volume, complexity and diversity of scholarly information have grown and further underscored the need for intelligent systems that can help researchers navigate the growing information resources. These problems are the ones modern researchers face - information overload, fragmented databases, lengthy review procedure for literature and not being able to find relevant scholarly work in the rapidly growing knowledge areas. AI technologies like intelligent search engines, intelligent assistants, citation analysis systems, and AI review platforms are giving researchers a new way to access, analyze, and combine academic content. In their study, Dwivedi et al., (2023) noted that generative AI technologies can have a transformative impact on academic writing and research by enhancing content generation,

facilitating research support and knowledge dissemination, but proper usage and use of these technologies must be considered in terms of accuracy, ethics, and academic honesty.

Additionally, generative AI has added a new layer of interaction with users in the form of natural language conversations in research and information service. While these earlier IR systems relied heavily on key word searching, modern AI-based systems are able to interpret questions, summarise lengthy content, create research topics, and help users navigate related topics within the sphere of knowledge. Kasneci et al. (2023) pointed out that the large language models have introduced novel opportunities to improve human learning, research and work productivity, but also raised concerns about their potential for misuse because of their issues with hallucination, bias and inaccurate output. It has profound implications for the role of the librarian and information professional, who are becoming more and more shifting from knowledge or information providers to facilitators of the discovery and critical evaluation of knowledge with the help of AI.

While opportunities are increasing with the advent of AI, there are also several challenges in embedding AI in research and information services. Ethical governance, transparency, data privacy, algorithmic discrimination, copyright, and disparities in technological infrastructure persist as factors impacting the use of AI. UNESCO (2023) emphasized the need for a human-centered approach to the implementation of responsible AI, which should be based on principles of fairness, accountability, inclusiveness, and respect for fundamental rights. These concerns are especially significant in developing countries where the university and library may be faced with further challenges such as low availability of digital infrastructure, low budget, instability in Internet connectivity and lack of AI skills of information professionals.

The use of AI is still in its nascent stages in the research process and information services in Africa/Nigeria higher education arena warrant more attention. While digital technologies are slowly being adopted by the universities and Libraries, there is a large number of institutions that are still in the initial stages of being AI ready because of infrustructural and capacity restrictions. As observed by Adeleke and Nwalo (2022), academic libraries in Africa continue to grapple with the challenges technological, which impacts their usage of high level digital services. Hence, the importance of comprehending the opportunities and constraints of using AI

to build the suitable strategies and shape the ways technology is embraced in the context of institutions.

Although there are previous studies focused on specific topics like Education, Digital Libraries, Information Retrieval, and Research productivity, there is a desire to have a more comprehensive concept to analyze in relation to technological developments, professional, ethical and institutional perspectives. Discussions are either about the capabilities of AI systems or about the challenges of its adoption; little discussion is given on how to strategically place AI technologies in the larger scope of information and research services. Key to that consideration is the need for institutions to robustly connect technology innovation and human effort in scholarly communication and information management, whether it be for ethical or sustainable reasons, which will play an even more prominent role in the future.

So, this paper will focus on artifical intelligence in research and information services and extend discussion to its uses, advantages and obstacles as well as its future trends. In particular, the paper explores how AI is changing information environments, key AI technologies impacting research and library services, how the technologies can be applied in academic and digital libraries, implications in terms of research efficiency and scholarly communication, ethical issues, and how to responsibly incorporate AI. This paper adds to the current debates on the effective, inclusive and sustainable use of AI for the creation of knowledge ecosystems. In this paper, author examines the evolution of AI in research and information services and also explores how the field of AI has evolved in the context of research and information services.

Evolution of Artificial Intelligence in Research and Information Services

While today's discussions about AI might be linked to generative AI tools like ChatGPT and large language models (LLMs), the roots of AI powered information services has been growing for decades since the era of computing and information retrieval, as well as automation and data science. This historical evolution offers valuable context on the evolution of AI, from the capabilities of narrowly defined tasks to the broader context of supporting complex intellectual tasks like research discovery, knowledge synthesis, scholarly communication and even personalized information delivery. Initial research and development of AI was greatly inspired by the attempt to mimic the human reasoning with the aid of computational systems. In the middle 20th Century, research in AI

was devoted to symbolism, meaning that computers were programmed to execute a set of rules and logical steps. These early systems led to the concept of an expert system, automated decision making support, knowledge representation and other developments. As a result, they were not so effective since they only worked with previously established rules and they weren't able to learn from vast amounts of information. With the growing power of a computer, one day at a time, AI gradually moved from performing the tasks based on rules to using data-driven methods to learn from, find patterns, make predictions and grow better with experience.

An era of great development of artificial intelligence for information service has come with the advent of Internet and digital information environments in the 1990s and early 2000s. The proliferation of electronic information sources, online databases and digital libraries posed new problems with respect to how the information could be organized, retrieved and accessed by the user. The search engine started to come up with more advanced and complex methods to discover information: ranking and organizing a huge amount of digital content. Initially, however, these systems were primarily focused on the matching of queries from users with the documents that were available, with little attention paid to the deeper context, purpose and knowledge requirements of the users. In the 2010s, with the drastic improvement of machine learning and deep learning technology, AI has been gaining attention in information environments at a rapid pace. This shift from the more traditional approach of fixed instructions, to the use of Machine Learning algorithms that learn from data and therefore were able to gradually improve their performance. These breakthroughs enabled new methods of library automatic classification, recommender systems, predictive analytics, plagiarism detection, and better information retrieval systems in libraries and research settings. With their use of machine learning, digital libraries have gained an unprecedented new paradigm from resource discovery to better organization processes to more intelligent means of managing digital collections, as explained by Shadrova (2020). AI is now not only supporting scientific operations but also shaping the research process itself in scientific and research settings.AI has become more than just a tool for scientific operations; it's gaining traction in academic and research settings as an influence on the entire research process. The use of modern AI systems can allow researchers to find literature relevant to their research, analyse trends in academic

research, gather information from large datasets, and utilize them to create research insights. The advent of Generative AI has ushered in several transformative changes in knowledge work with AI systems adopting a natural language interaction with the user to aid content creation and information synthesis (Dwivedi et al., 2023). This is a key advance on previous information retrieval methods, in which the researcher has to search for information in a limited manner —by the use of keywords, for instance.

The adoption of the large language models and generative AI since 2022 has paved the way to creating a more transformative research and information services. The advanced language models-based tools proven to be capable of summarizing documents, answering research questions, providing explanations and helping with the academic writing process. The emergence of these developments, however, has also given rise to new discussions and debates on accuracy, the right to authorship, academic integrity and responsible usage. Despite their great potential, LLM's have inherent issues that need to be evaluated and help from humans otherwise misinformation and unreliable knowledge production will occur, as emphasized by Kasneci et al., 2023. In the academic sector, the development and evolution of AI have brought about a paradigm shift from the traditional information repository to the intelligent knowledge service platform in academic libraries.In academic libraries, the development and evolution of AI have paved the way for a shift from information repository to intelligent knowledge service platform. AI is emerging as a promising application across multiple usage areas of the reference service, cataloguing, metadata production, user support, collection evaluation and research support in contemporary academic libraries. Academic libraries are now experimenting with AI's use in reference services, cataloguing, metadata production, service to users, collection development and research support. Pachisa, Kulkanjanapiban and Lambovska (2025) conducted a recent systematic review of the major applications of AI in academic libraries, which showed that academic libraries are using AI in various ways, such as: by automating activities; leveraging NLP tools; using chatbots for information services; and implementing enhanced discovery functionalities. The review also shows that the ability to be literate in AI and to plan strategically for its implementation are now key skills for library staff in technology-rich contexts.

Core Artificial Intelligence Technologies Transforming Research and Information Services

Artificial Intelligence (AI) has been continuously undergoing changes and transformations as a result of the development of various interconnected technologies that allow machines to learn, interpret information, create knowledge, and help in complex decision-making processes. In research and information service settings, these technologies have evolved from being merely automated to intelligent, systems that can learn and understand the user, analyze massive information resources and provide user-tailored information experiences.

Machine Learning: The Foundation of Intelligent Information Services

Machine Learning (ML) is one of the most crucial pillars of the modern applications of AI. It allows computers to learn from data and recognize patterns, make predictions and improve their performance without all the data explicitly being programmed to them for each action. Machine Learning algorithms continuously learn from new information, unlike traditional information systems which rely on fixed rules, which is of great value in dynamic research and information environments. In the field of research and information services, machine learning has made huge improvements to many processes, including information classification, document recommendation, metadata generation, citation analysis, prediction of user behaviour, and identification of research trends. Shadrova (2020) pointed out that the use of machine learning technologies in digital libraries has broadened the scope for the automatic organization, discovery and management of digital resources and enhanced the efficiency of information access. In addition, machine learning can be used to facilitate predictive analytics in the academic and research sectors, by identifying patterns in scholarly communication data. These applications help institutions discover areas of emerging research, gauge research impact and learn about information needs of users. Newer evaluations of the application of Artificial Intelligence in academic libraries reveal that AI applications are being introduced in technological, reference and research support services with varying degrees of success, depending on the professional skills, data quality and institutional capacity of the library.

Natural Language Processing: Enabling Human-Like Interaction with Information Systems

Another key AI technology impacting research and information services is Natural Language Processing (NLP),

which enables machines to comprehend, analyze, and compose human text.Natural Language Processing (NLP) is another vital AI technology that is revolutionizing research and information services by enabling computers to understand, interpret, and create human language. By applying NLP techniques, information systems are able to interpret textual information, understand the queries of users, identify meaningful concepts within the text and respond in a way that resembles human communication. NLP has been used to enhance the process of literature search, automatic abstract generation, text mining, sentiment analysis, and knowledge extraction from large-scale collections of academic papers in research settings. With the help of NLP tools, researchers are now able to use tools that identify relevant studies, summarise the results of research, and analyse large amounts of academic documents more efficiently. While acknowledging the potential of AI in literature reviews, Bolaños et al. (2024) noted that it can be beneficial in certain aspects like information retrieval, document analysis, and knowledge organization, it's crucial to have human oversight to maintain methodological accuracy. Academic Libraries have seen NLP helping to create conversational search systems, intelligent reference services, and AI-powered chatbots, allowing users to communicate in a natural manner with library resources.

Generative Artificial Intelligence: A new paradigm in research support and knowledge production

One of the biggest recent advancements in AI is known as Generative Artificial Intelligence (GenAI). Generative AI differs from the previous generation of AI systems which primarily analyzed the information available to them; this new type of AI can generate new content such as text, summaries, explanations, computer code, and research ideas — based on patterns it has learned from a vast amount of data. Large Language Models (LLMs) like those based on systems such as GPT have broadened the scope of AI's application from information processing to an active role in knowledge generation. In the field of research services, AI tools are being more and more used for brainstorming research ideas, summarizing academic texts, enhancing the quality of academic writing, translating academic texts and for data interpretation. While some aspects of inaccuracies, biases, and fabricated information limit the use of LLMs in education and research, their ability to offer personalized support and productivity gains is enormous (Kasneci et al., 2023). One area where generative AI is evident is scholarly communication and academic libraries. With the rise of AI-

powered tools, researchers are increasingly turning to them for literature exploration, citation discovery and writing pieces of research.

Intelligent Information Retrieval Systems

A significant improvement over the traditional systems of information retrieval based on keyword search, is the intelligent information retrieval systems. While the conventional retrieval systems were largely based on the matching of user queries with terms in the index, AI-powered retrieval systems can comprehend context, user intent, and the connections among ideas. They are made up of machine learning, NLP, and semantic technologies, all of which deliver more precise and meaningful search results. In research settings, intelligent retrieval systems help researchers access the scholarly information they need more efficiently, enabling them to find the relevant articles, datasets, and academic resources more easily. Using modern AI search systems, large amounts of scholarly publications can be analysed and connections between the different themes of research can be detected, which may not be apparent through more traditional search systems. This is an ability that is becoming more and more vital in the realm of research where there is an ever-increasing amount of information available. Recently, retrieval has seen an exciting development, called Retrieval-Augmented Generation (RAG) systems. RAG is a hybrid approach that leverages information retrieval and generative AI models to create content that is based on external data retrieved from the system instead of solely on data already learned by the AI.

AI-Based Recommender Systems

The aim of an AI recommender system is to customize their information suggestions based on user behavior, preferences, interactions, and context. The use of such systems is commonplace in digital platforms and are becoming essential in the field of research and information services. Recommendation systems can be employed in academic libraries and research settings to recommend related articles, databases, books, research materials, and other scholarly resources, all based on users' interests and research activities. This aids in making customized discoveries, and decreases the time of researchers doing an extensive search of large information collections.

Semantic Search and Knowledge Representation Technologies

Semantic search is a new approach to search, where the search process is not

only based on words but on the meaning and relationships between information. Its ability to understand concepts, not just keywords, opens the door to new possibilities for semantic search systems, which use AI-powered techniques like knowledge graphs, ontology development, and natural language understanding. Semantic technologies boost the capabilities of information retrieval in research and digital library settings by uncovering existing relationships among authors, concepts, publications, institutions and research areas.

AI Agents and Autonomous Research Assistants

This new milestone in AI technologies is the appearance of AI agents that can perform several tasks without the need for human involvement. AI agents can perform workflows, analyze information, take decisions and plan activities with pre-defined goals, whereas conventional AI assistants only respond to specific requests. For research and information services, AI agents can help with various complex tasks like tracking new publications, initial literature searches, reference management, creating research summaries, and knowledge management.

Applications of Artificial Intelligence in Academic and Digital Libraries

The application of Artificial Intelligence (AI) to academic and digital libraries is a radical shift from information repositories to intelligent and interactive knowledge environment, which is user-oriented. The previous sections focused on the potential of these emerging technologies in the library sector, particularly how they can enhance research support and library operations. The recent developments in machine learning, natural language processing, generative AI, intelligent retrieval systems and autonomous agents have opened up new opportunities for the improvement of library operations and research support services. As a result, AI is becoming an increasingly popular tool for academic libraries, not just for automating mundane tasks, but for improving the discovery, customization, decision-making and user engagement aspects of their operations. In the academic library, a systematic review conducted by Ayinde, Ebiefung and Oladokun (2025) revealed that there are areas of academic library where the use of AI is found, including Technical Services, Reference Services, Administration, Collection Development, Information Literacy, and Professional Development. AI's impact on library services is also highlighting the need for

librarians to acquire new skills in technology and evolve their professional roles in the new digital landscape, the study noted.

AI Applications in Cataloguing and Classification

One of the traditional library functions that have undergone significant transformation with the use of AI is cataloguing and classification.AI has revolutionised some traditional library functions such as cataloguing and classification. Traditionally these tasks required a lot of manual time in order for the librarians to make bibliographic records, label the headings of the information resources and organize them. With the increasing number of digital publications and electronic resources, however, manual processing is not sufficient to address the challenges. The use of AI technologies such as machine learning and natural language processing for aspects of cataloguing, classification and resource description is now being automated. These systems are capable of content analysis, important metadata elements recognition, subject concepts recognition and classification category recommendation. This leads to better processing speed, fewer repetitive tasks, and more time for librarians to focus on more complex tasks in handling information.

AI-Driven Metadata Creation and Digital Resource Organization

AI is also transforming digital library operations in the area of metadata creation. Another way that AI is transforming digital library operations is by creating metadata. Metadata is a collection of the data that represents the value of a digital source and consequently enables the discovery, evaluation and access of scholarly information. But with the ever expanding number of institutional repositories, research datasets and multimedia resources, manual metadata creation is becoming more challenging. With automated text extraction, entity recognition, semantic analysis, machine-learning algorithms underpinning them, AI-driven metadata systems produce a suite of descriptive information about digital objects. These technologies can extract important concepts from documents, suggest keywords, provide meta information about the authors, and improve the discovery of resources. AI's impact on metadata generation is especially useful in the context of institutional repositories, which host thousands of research publications from institutions, such as journal articles, theses, conference papers, and datasets.

AI in Reference and Information Services

One of the most visible and noticeable fields of AI's application in academic libraries is the reference service. In the past the role of the reference librarian was to answer the user's question, direct information searches, and help researchers locate resources. Today, AI is helping to augment these services by delivering real-time, speedy, and personalized assistance. With the help of Artificial Intelligence, Reference Systems can provide answers to common questions, direct visitors through the information resources of the library, recommend databases, and help with basic research questions. Natural language processing algorithms can facilitate these systems to comprehend users' inquiries that aren't given in complex search instructions but rather in normal language. Based on a systematic review of AI use in academic library reference services, Tella (2023) found that AI-based reference services are being introduced via conversational approaches, intelligent searching, and automated tools for user support. The study did reveal though that there were challenges of accuracy, privacy, cost, infrastructure and professional expertise. AI in reference services does not replace the role of librarians, but rather transforms the way they work.

AI-Powered Chatbots and Virtual Library Assistants

User interaction in academic libraries has increased using AI Chatbots.AI Chatbots have gained recognition for their ability to enhance user engagement in academic libraries. Such systems deliver automated conversational services via the library website, mobile apps and institutional communication platforms. Users are able to ask their chatbots questions concerning the library hours, borrowing rules, access to databases, research assistance, and simple information literacy questions. Library Chatbots are becoming one of the popular options to meet the ever-increasing demand for instant and convenient access to information services. The systematic review of Chatbot application in libraries by Yan, Zhao and Mazumdar (2023) found that the primary applications of chatbots in libraries are mainly for user support, information access, service automation, and enhancing communication between libraries and their users.

AI Applications in Digital Repositories and Knowledge Management

Digital repositories are a vital and integral part of the modern academic library, and are used to collect and make available knowledge resources created within it. AI

tools are enhancing the repository functionality by helping to organise and categorise content, search, preserve and make user discovery easier. With the new capabilities of AI technologies, digital repositories can be used to provide high-end capabilities like advanced indexing, similarity search, document clustering, related resources recommendations, and intelligent search. Semantic analysis, enabled by AI, can uncover connections among research outputs and enhance the capacity of the user to find suitable academic content.

AI for Research Support Services

Information librarianship is a goal that has been embraced by academic libraries, which have evolved from information resource-provider to research supporter. This new shift has been bolstered by the power of AI, which can offer libraries cutting-edge research support services such as literature discovery, citation analysis, research impact assessment, systematic review support, and scholarly communication assistance. A tool for scholars to help them find relevant publications, analyze large amounts of literature, track trends in research and organize references using AI. These are very useful in the current research landscape, where researchers are confronted with growing complexity of information and the demand for quick "evidence synthesis.

Personalized Library Services through Artificial Intelligence

Personalized information services is one of the major areas of academic library services being improved by the use of AI. While traditional library services typically offered the same experience to all users, AI can help libraries offer a more personalized experience, based on the individual's information needs, research interests, and behaviors. Data from user interactions, search history, research interests, and information preferences are collected then analysed by an AI system, which gives personalized book, article, database and learning resource recommendations. In conclusion, Owusu-Ansah et al. (2025) remarked that AI applications have the potential to enhance library user experiences by offering tailored services, however, there is a need to remain attentive to privacy, transparency, and the ethical handling of user data.

Artificial Intelligence Applications in Scholarly Research and Knowledge Creation

With scholarly research growing increasingly complex and the number of academic publications and research data growing exponentially, the need for

intelligent technologies to help researchers during the entire research lifecycle is a strong demand. Artificial Intelligence (AI) has propelled itself to great importance as a catalyst for change, equipped with tools and technologies that are transforming the landscape of literature search, knowledge synthesis, data analysis, research communication and scholarly decision making. AI research support technologies aim to do more than just provide access to information resources; they actively help researchers discover patterns, draw insights, and enhance the efficiency of their knowledge production process. Whereas traditional research support systems offer access to information primarily, AI-powered systems can actively support researchers in uncovering patterns, deriving insights, and optimizing knowledge production processes. Van Noorden, Van Perkel (2023) point out that researchers' fast uptake of generative AI tools shows a massive reconfiguration of scholars' workflows, including when searching the literature, writing papers, translating, coding, and communicating the research.

AI in Literature Discovery and Systematic Literature Reviews

Literature review is one of the most challenging stages in academic research as researchers need to find and identify numerous scholarly publications, analyze them, organize them and synthesize them. The growing size of academic data bases has made it difficult to rely on traditional approaches to searching, especially when searching for data in a systematic review or an interdisciplinary subject. Accountability issues are being driven by AI, making information easier to find, screen documents, and synthesize all the evidence. Today, machine learning (ML) algorithms and natural language processing (NLP) techniques are integrated into research platforms for identification of relevant publications, extraction of key concepts from publications, classification of documents and recommendation of related research studies. These functions will help researchers simplify the time used to search and screen literature and enhance the breadth of the search. AI Literature Review Systems are now commonly used in various applications, including Article Retrieval, Article Screening and Article Classification, Article Summarization and Article Synthesis, as described by Bolaños et al. (2024). The study indicated that AI tools can contribute greatly to efficiency in systematic reviews, but should be used as an aid, rather than a supplement to, the methodological task done by researchers.

AI-Assisted Research Writing and Scholarly Communication

AI is also making a considerable impact in the world of academic writing and research dissemination. Large language models can be used to help researchers with text generation, text clarity, summarizing, text translation, and idea organization. AI tools for language support can enhance communication and contribute to expanding participation in global scholarship for research in multilingual academic settings. In multi-lingual academic settings, AI language support tools offer opportunities for improving communication and increasing the participation in the global scholarship. Since the release of the tools that leverage large language models has sparked up a lot of discussion about their proper use in academic writing.Generative AI can augment human productivity, help with writing and knowledge exploration, said Kasneci et al. (2023) but the researchers are still held accountable for the accuracy they have created, the originality of their output, and adherence to ethics.

AI in Citation Analysis and Research Impact Assessment

Traditional research evaluation has been based on the facilitation of scholarly communication, bibliometric analysis and citation indicators. AI is also revolutionizing this field by providing more in-depth research analysis methods, making use of collaboration networks and new trends in science. Advanced data analysis technology, powered by AI, can sift through vast amounts of publications and citations data to gaze into the future of publications and draw insights from the past, such as identifying influential research fields, forecasting future trends, visualizing collaborations, and assessing knowledge dissemination. These applications will assist decision makers across the research community, academia and government in decision making based on sound evidence around research agendas and institutional performance. According to Donthu et al. (2021) there has been great progress in bibliometric techniques and analytical technologies which have enhanced the capacity to work on structure of scientific knowledge and research trends.

AI in Data Analysis and Research Methodology

Increasingly, it is now possible to have large data sets available to facilitate research in various fields. However, when faced with complex datasets, some researchers may not have the capacity to analyse the data in such detail. AI offers new opportunities through automating data

processing, uncovering hidden patterns, making predictions, and aiding decision-making. In various fields from the social to health sciences, from education to information sciences, machine learning is used for analyzing large data and modelling prediction. AI tools are suitable for research for classification, clustering, forecasting, sentiment analysis, and anomaly detection. Organizations and research institutions are increasingly turning to AI capabilities as a key enabler to have more value-added decisions made through analysis and draw value from complex data environments, according to Mikalef et al. (2023).

AI-Based Predictive Analytics in Research Planning

The other main application area of AI in research is predictive analytics. By analysing historical data, AI systems can identify patterns and forecast possible future developments. Predictive analytics has a valuable role in the academic world —namely, within research planning, funding reactions, publication policy and highlighting new fields of knowledge. The academic and research institutions are seeing a growing popularity for AI-powered analysis tools to help them gain insights into research activity, analyse their institutional abilities, and find collaborative opportunities.

AI in Scholarly Communication and Open Knowledge Development

AI-powered publishing platforms are revolutionizing scholarly communication, enhancing publishing, peer review, knowledge sharing, and visibility of research. There are many potential applications of artificial intelligence (AI) tools in the field of manuscript screening, plagiarism detection, matching reviewers, language editing, and even the recommendation of research articles. AI will upscale the accessibility of scholarly resources, such as better search, multilingual discovery and connecting researchers to the relevant knowledge networks in open knowledge environments. These developments are in keeping with the international movement towards promoting equal access to scientific information. But the use of AI in academic communication also presents challenges and questions about transparency and accountability, as well as the questions of intellectual ownership.

Implications for Researchers and Information Professionals

With the growing emergence of AI in academic research, there are implications for researchers and information professionals. We must build AI literacy to both be able to utilize AI tools and

critically assess their results. Likewise, the role of librarians, from being only information users, is evolving towards being information partners and helping the users in determining which AI tools to choose, when to use them, and how to conduct responsible research. Academic libraries' functions are therefore evolving their positions to become more strategic. The successful integration of the skills required for AI in the information literacy program of libraries can address students and researchers' understanding of the opportunities and limitations of AI-enabled research. AI is revolutionizing scholarly research, facilitating better literature discovery, better research writing, data analysis, citation analysis, prediction, and better scholarly communication. The applications enable more quick, efficient and data-driven research processes.

Ethics, legality and governance concerns on the adoption of AI tools in scholarly research and Academic Library information services.

Nevertheless, the use of Artificial Intelligence (AI) in academic libraries presents multifaceted ethical, legal and governance concerns, while simultaneously opening up new possibilities for enhancing research productivity, access to information and other aspects of library operations. There are a number of issues that have been raised regarding transparency, accountability, privacy, IP, fairness, and human control as AI becomes more prevalent in the domain of knowledge discovery, information organization, analysis of research and scholarly communication. The implementation of AI in research and information services needs not only to be technically capable but also to have ethical guidelines and institutional governance structures which can enhance the responsible and sustainable utilization of AI. UNESCO (2022) reiterated the importance of ethical AI development taking into account human dignity, fairness, transparency, accountability, privacy protection and human oversight throughout the whole AI lifecycle.

Algorithmic Bias, Fairness & Inclusion

Algorithmic bias is one of the critical ethical issues with AI utilization. Patterns identified from past data sets are used to make decisions by AI systems, so they can inadvertently be reflecting the limitations and inequalities found in the data sets. Biased AI in research settings can impact literature recommendations, research analytics, evaluation of citations, or processes of knowledge discovery, all of which can have an impact on the visibility of certain authors, disciplines, languages, or regions. In the academic library среда,

algorithmic bias can pose library challenges, which have, up to now, been an institution dedicated to equal access to information.

Data Privacy and Protection of User Information

Large datasets are crucial for the operation of AI systems. Academic libraries may generate these data from patrons' search patterns, borrowing logs, the use of databases, patrons' research topics, user profiles, and sessions with AI tools. Such information can increase the level of personalization and service delivered, but also raise important privacy issues. When consenting to the use of user data for services that depend on artificial intelligence, some essential issues come to the fore: consent, who owns the data, how it is stored, its security, and correct usage. While a recommendation system developed with artificial intelligence can enhance research discovery through analysis of user behaviour, the risks of user privacy violation that can arise from excessive collection and/or inappropriate processing of individual data must not diminish library users' sense of privacy and confidentiality. At UNESCO, privacy and data protection are recognized as key pillars in the ethics framework for responsible AI governance, where people need to be protected from the point of AI research and creation to its deployment. A recent survey of AI technologies being adopted in academic libraries in Nigeria has proved that privacy, security, infrastructure and policy development are crucial points for the responsible use of AI.

Transparency, Explainability, and Accountability of AI Systems

One of the significant governance issues is the transparency and explainability of AI systems. Many state of the art AI models work by mathematical-based processes which are not easy to explain to the common man. This is what is known as the "Black Box" issue, of end users might not be aware of how such decisions/recs are created. Transparency is one of the most important values in research and in academic libraries as it affects the decision on knowledge can be accessed, the direction of research, and academic evaluation. In situations where an AI system suggests specific research contents, prioritizes literature, or summarizes research, it is essential that they can trust and interpret the system's recommendations to ensure the authenticity, equity, and transparency of research. In order to be responsible to human values and societal goals, the systems must be transparent, accountable and fair while providing human oversight of AI according to Floridi and Cowls (2021).

Intellectual Property, Copyright, and Academic Integrity Concerns

With the emergence of generative AI and its fast development, there arise novel legal and academic questions about intellectual property rights, copyright, authorship, and academic honesty. Large amounts of text, images and other digital resources are used to train generative AI systems, leading to concerns about the proper use of copyrighted works and potential copyright infringement of the results by AI. When utilizing generative AI in academic work, one has to consider the new problems presented in terms of accountability for authorship. AI tools can help in writing tasks, summarization, translation or data interpretation, but what level of usage and who's responsible for the work done by the AI remains a question to be addressed.

Misinformation, Reliability, and Accuracy of AI-Generated Knowledge

Generative AI systems have been able to generate coherent, believable answers has raised questions of misinformation and false knowledge-generation. Confidently conveying information, AI systems can offer inaccurate statements, invented references, or even interrogate information. In a research context where accuracy and knowledge based on evidence are paramount, this challenge is an important one. With AI generated information, there is then a need for researchers to employ some critical evaluation skills and validate information with authoritative sources. Likewise, academic libraries need to do more for content users in information literacy programmes to decipher the content created by AI. The difficulty is that the work produced is not necessarily adequate for research, it needs to be evaluated and subjected to scholarly judgment by human researchers.

Infrastructure, Digital Inequality, and AI Readiness Challenges

In addition to ethical concerns, securing institutional readiness is also a challenge, especially in developing nations, that can impact the adoption of AI. Implementation of AI demands a stable Internet connection, computing power, monetary investments, good quality data, and trained workers. Without these resources, AI technologies can produce less benefit for institutions, which means that there will be greater disparities in digital inequalities. A systematic literature review on the use of AI in academic libraries revealed that the funding and infrastructure provide one of the primary reasons for lack of successful AI adoption, while ethics and organisational preparedness are even bigger obstacles.

Developing Institutional AI Governance Frameworks.

To address these issues, universities, research institutions and libraries need to establish governance arrangements that give rise to a responsible use of AI. Ethical review and approval, Data Management, Staff Training, Evaluation, Security Requirements, and Accountability Measures- are all considerations that should be part of the institutional AI Governance. If AI technologies seem like some sort of technology "fad," it is not appropriate for academic libraries to jump in and grab them. Approach their implementation based on the library's goals and the wishes of users. There are a number of elements that should be a part of governance frameworks to ensure the continued performance of AI, ethical considerations, consultation with stakeholders, and strategies for continual improvement. Ethical implementation of AI in academic libraries comes with a cautionary message: take an active role in risk assessment, not once issues arise.

Artificial Intelligence Adoption in Developing Countries: Opportunities and Challenges in African and Nigerian Academic Libraries

The rapid advancement of Artificial Intelligence (AI) around the world opens new possibilities to enhance research practices, information access and knowledge management. But the onboarding of AI has not taken place equally by the regions. Although many technologically advanced countries are now utilizing AI in their libraries, scholarly communication systems and research infrastructures, their integration in developing countries is still at a more gradual pace and uncertain degrees, with varying factors for this being different types and levels of collaboration, available access and funding, and the fact that AI-related tools often demand highly skilled staff. These differences reflect more general variations in technology infrastructure, financial resources, and digital skills, policy frameworks and institutional preparedness.

Current State of AI Adoption in African Academic Libraries

The use of AI in Academic libraries in Africa is still at a nascent stage. While knowledge of the use of AI is growing, it is yet to be implemented in other institutions and services to a higher degree. African Academic libraries are starting to investigate AI technologies like Chatbots, Intelligent Discovery Systems, Automated Cataloguing systems, Recommendation Systems, and Research Support Applications as shown in the latest evidence. Yet adoption is not yet fully

realized because of issues with institutional and environmental issues. Based on the findings of a systematic review by Nkomo and Matli (2025), the current and available applications of AI used within the context of the African university library are still in the early stages of development, with existing applications being centred around virtual assistants, improving information retrieval, library collection management, and increasing access to information. The study revealed unmet awareness issues, financial resources challenges and ethical concerns are significant obstacles to implementation. Kasa et al. (2025) further found that the use of AI and machine learning initiatives in African libraries for information retrieval is still at an early phase of development and the benefits are projected to entail better finding missions, operational efficiency, and user experience, however major challenges such as limitations in infrastructure, library staffs competencies, and data privacy issues were reported. AI's limited usage in the African academic Libraries may not suffice to be seen as resistance to technology.

Opportunities Presented by AI for African Academic Libraries

Even with obstacles to adoption, AI offers great potential to shape academic libraries in Africa. There is one huge thing that can be done: make available more academic information. The problems of small collections, growing needs for electronic resources and supporting the research needs of scholars operating on different fields at African university libraries are serious issues. Resources can be maximized by improving searches, recommending relevant resources and bringing the user to the appropriate ones using AI-powered discovery systems. Moreover, AI can enhance the library's automation and service operations. Applications like artificial intelligence data extraction, intelligent document classification, chatbots for reference services and AI-powered research assistance can minimize repetitive tasks and enable librarians to dedicate their time to higher-value, more intricate projects.

Infrastructure and Financial Barriers to AI Adoption

A major issue in developing countries that hampers AI adoption is weak technological infrastructure. To benefit from AI applications, the internet must be reliable, computing power is needed, there must be digital platforms, good data and ongoing technical help. There are many academic libraries in Africa that are still experiencing bandwidth internet or less, erratic power supply, use of outdated

technological systems, and lack of financial resources. Financial constraints, lack of faculty readiness for AI, and institutional readiness are some of the significant barriers to implementing AI in university libraries in Africa, according to Nkomo and Matli (2025). Likewise, the study conducted on academic libraries in Nigeria, lists limited funding, poor infrastructure, lack of technical expertise and power supply issues as key hinders to the use of AI. These challenges illustrate the importance of more than just acquiring technology to implement AI. Supporting ecosystems for institutions need to be established that involves investment and maintenance of infrastructure, technical support and sustainable funding models. If the foundations are not put in place, AI projects could be treated as exploratory projects, and not be seen as part of the Library service.

Human Capacity, AI Literacy, and Changing Roles of Librarians

Having professionals available with both their information science competencies and knowledge of emerging AI technologies is important, and will play a significant role in the successful adoption of AI. Librarians in many of the academic libraries in Africa have a good knowledge of information organisation, user services, but may need improvement musk in other areas such as data management, machine learning concepts, valuation of AI and digital ethics. It is not just about being good at a skill; it's also about being accepted as a pro in the field. AI can also be seen as a potential risk to the traditional career paths of some librarians, especially with the automation of routine tasks like cataloguing, reference and administration. But the evidence indicates that AI will have an impact on professional roles and responsibilities, not in their elimination. The human touch is still very much required to assess the quality of information, ensure ethical use, and offer context.

Policy, Legal, and Ethical Challenges in African Contexts

As was outlined above, the ethical and governance issues raised by the use of AI are even more important in developing countries as institutional policy frameworks are still maturing. Many universities in Africa do not have policies that cover acceptable use, data protection, intellectual property, accountability and evaluation of the ethical aspects of AI. Lack of clear governance can lead to confusion about aspects like content generated by AI tools, data security, transparency in algorithms, and accountability for AI mistakes. The concerns are especially relevant to

academic libraries, as libraries have always been viewed as trusted institutions, which protect access to information, privacy, and freedom of thought. A study of university libraries in Africa shows that the lack of clear policies and ethical guidelines is still a significant challenge for the proper use of AI. A recent scoping review revealed that policy issues, digital literacy problems, financial constraints and lack of infrastructure are significant challenges that affect the integration of AI in academic libraries in Africa. Thus, it is crucial for universities and library systems to create their own AI governance frameworks that take into account the context in Africa. These frameworks need to consider data protection, ethical procurement of AI systems, professional training requirements, transparency conditions and monitoring of AI performance.

The Nigerian Academic Library Context

Nigeria offers a valuable case study of the benefits and difficulties of implementing AI in developing nations' academic libraries. With its outstanding research output, Nigerian universities are the biggest higher education system in Africa that needs sophisticated information services for teaching, learning and scholarship. Artificial Intelligence technologies have the potential to make significant impact on research discovery, digital repositories, reference services and knowledge organization.

Towards Sustainable and Inclusive AI Adoption in Developing Countries

To ensure the future of AI integration in academic libraries across Africa and Nigeria, it is crucial to adopt sustainable strategies that align with contextual realities while capitalizing on innovation. Instead of 'just' using AI due to the fact that it is a technological advance, institutions could find a problem that it is capable of solving and use a solution that is relevant to institutional goals. Investment in digital infrastructure, ongoing efforts to build AI literacy for librarians and researchers, cooperation between universities and technology providers, creation of institutional AI policies, privacy and intellectual property protection, and fairness and accuracy assessment of AI systems are all sustainable practices. These approaches will help mitigate knowledge inequalities as opposed to exacerbate them through the use of AI. More specifically, the implementation of AI solutions in Africa should focus on solutions relevant to the local context that can be adapted to the various languages, cultural contexts and resource availability. Implementing

Artificial Intelligence in Academic Libraries of developing nations, especially in African and Nigerian academic libraries, involves both opportunities and challenges.

Future Directions of Artificial Intelligence in Research and Information Services

As Artificial Intelligence (AI) continues to progress, scholarly communication and research information services will likely undergo additional changes as AI technologies become increasingly embedded in scholarly communication, digital library, and knowledge management. Although much of the work in AI has been around automation and better information retrieval, new advances are now heading towards more adaptive, autonomous and collaborative systems to support complex intellectual tasks. The future of AI in research and information services will thus rely on finding the balance point of technological innovation and human expertise, ethical responsibility, inclusiveness and sustainable governance. As described in the previous sections, AI has already had a impact on some aspects of research and library practices such as literature discovery, creation of metadata, reference services, digital repositories and research analytics. But future trends are likely to go beyond task automation to intelligent knowledge ecosystems where AI systems will be more actively engaged in decision-making, knowledge synthesis, and personalized learning. Academic institutions and information professionals will have to re-imagine their strategies on technology adoption, professional development and research support for this transition.

Human–AI Collaboration as the Future Model of Knowledge Work

The next big way of AI in the future of research and information services involves building partnerships and collaboration between humans and intelligent systems. AI is not meant to take the place of researchers, librarians, and information professionals but rather as a technology to augment their abilities. The human-centred approach acknowledges that while AI systems can be incredibly powerful for handling vast amounts of data, detecting patterns and automating repetitive tasks, these tools need the human user's input for making decisions in complex situations, guiding with ethical intelligence, expressing creativity, and providing context. Floridi and Cowls (2021) suggested that there should be a focus on human control, fairness, transparency and accountability in the development of responsible AI. In the context of research and libraries, it implies that AI should be

used as an ally, an aid to the knowledge of the professionals, and not to replace them. The change will change the face of academic libraries and will affect the role of librarians too.

Expansion of Generative AI and Intelligent Research Assistants

Generative AI is likely to be one of the biggest developments to impact the future of research and information services. Large language models and related technologies are now moving beyond the ability to simply 'chat with the user', towards developing into a powerful research assistant to help the user through every stage of learning. The next generation of AI research assistants will be able to offer more sophisticated help in filling the gaps in research, summarizing literature, designing research structures, analysing research data, and staying abreast of new developments in scientific scholarship. Such systems can also be incorporated into scholarly databases, institutional repositories and library discovery tools, further shaping the research environment for the researcher by offering a more interactive and personalized research experience. Dwivedi et al. (2023) have noted that generative AI technologies could impact multiple industries such as education and research in knowledge production and professional practice. The authors stressed, however, that the issues of accuracy, transparency, ethical responsibility and human oversight for future applications need to be taken into consideration. When it comes to academic libraries, the potential of generative AI is to redesign research support services.

Development of Semantic and Context-Aware Knowledge Systems

The future of information services will no longer be limited to documents—semantic and context based knowledge discovery is the only thing that matters. While users are currently required to craft effective queries for information to be retrieved through information systems, future AI systems will come to know more about the meaning, relationships and context of information needs. Semantic AI will help bridge gaps between ideas from various disciplines, and find relationships between different types of information, with the use of knowledge graphs, ontologies and advanced natural language understanding. This will be especially useful for the interdisciplinary research in which many of the vital inventions have come to light, from interconnections between different disciplines.

AI Agents and Autonomous Information Services

Another big development for the future in the realm of research and information services is the appearance of AI agents. AI agents can plan and coordinate several tasks and workflows into complex activities with limited human involvement, as opposed to the traditional AI systems that only execute actions on command. AI agents can help with tasks like tracking new research, finding relevant articles, organizing citations, summarizing research, and keeping an eye on the latest advancements in certain areas in academic settings. AI agents can assist in libraries with auto-analysis of collection, user interaction, resource recommendation, and administrative decision making. Yet the move towards greater autonomy comes with new governance challenges, though. Decision-making and complex activities will now be possible with AI agents, demanding some clear accountabilities in the institutions. Issues about who can be held accountable for AI mistakes, the transparency of AI-made choices, and user data security will be even more crucial.

Responsible and Inclusive AI Development

The concerns about fairness, accessibility and inclusion need to be tackled by future AI systems. If proactive steps are not taken to create new policies and procedures that will allow for responsible use of AI, it could widen the gap between high-tech and low-tech institutions. For developing countries, this is especially important because of the different digital technologies available, limited infrastructure and language accessibility which could impact adoption of these tools. Contexts of the future, however, must be taken into account by future AI systems, such as the possibilities of multilingualism, affordability, accessibility, and cultural relevance. UNESCO (2023) emphasized the need to ensure human-rights concerns, cultural diversity, fairness, and equitable distribution of the benefits of AI in their development.

Integration of AI with Open Science and Knowledge Sharing

Finally, consider the future of AI and open science; it will be an important research and information service pathway. Open science helps to be transparent, accessible, collaborative, and share information related to research, and AI helps to organize, analyze and link to information related to science. By leveraging AI capabilities such as smart search, translation, knowledge graphing, and personalized search, an open knowledge

platform can enhance access to research publications, datasets, and knowledge by intelligently connecting and comprehending the scattered content across various formats. This may be a major step towards diminishing information barriers and facilitating global research. In the context of academic libraries, it underscores the importance of the library in enabling knowledge access and scholarly communication. Libraries can play an ever more important role in a researcher's ability to manage open research outputs, apply responsible practices in AI and ensure that institutional scholarship is more visible and impactful.

Future Competencies for Librarians and Researchers

There will be major shifts in skills demanded by AI-powered research and information services to the future. AI technology will change the way librarians and researchers must work, empowering them with not only information management skills, but also AI literacy, data interpretation, algorithm evaluation, digital ethics, and technology governance.

Recommendations

The paper concludes with recommendations for a strategic yet responsible way of integrating the use of AI in practices of information service offering, focusing on the applications, opportunities, challenges, and future perspectives of each stage of AI in information services within academic libraries and Research Institutions. The recommendations highlight that embedding AI is more than just about a technology in use; it involves institutional commitment, ethical governance, skill-building, infrastructure investment and ongoing assessment. So the following suggestions are made.

Development of Institutional AI Governance Frameworks and Policies

Academic libraries, university and academic institutions must create overarching AI governance structures to direct the responsible incorporation and application of AI technologies. Such policies should explicitly clarify acceptable usage of AI, data handling procedures, privacy protection protocols, accountability frameworks, and ethical guidelines for empowering AI-driven research and information services.

Strengthening AI Literacy and Professional Development among Librarians and Researchers

There is a strong need for greater investment in the technological capabilities needed to make effective use of AI, particularly in developing countries which lack this capability. Firmament of

Internet connection, sufficient computing power, secure data repositories, cloud solutions, and cutting-edge library administration software are vital concepts that support the use of AI to drive research and information. Strong internet infrastructure, sufficient computing power, secure data storage, cloud-based services and advanced library management systems are necessary bases to facilitate research and information services with AI.

Enhancing Librarians and Researchers' AI Literacy and Professional Development Skills

In conclusion, libraries and research institutions should promote ongoing AI literacy initiatives to equip librarians, researchers, and students with the skills needed to effectively leverage and engage with AI technologies. Training should go beyond simply creating awareness around AI tools to provide a solid understanding of AI applications, limitations, ethical questions, data understanding, and responsible usage. AI competency for librarians also needs to be part of their professional preparation due to the increased role AI is playing in future information services, such as intelligent discovery systems, automated metadata generation, research analytics and AI-assisted user support. Librarians need to be able to assess AI-generated outputs, advise users on ethical practices with AI, and participate in institutional-level deliberations on AI. Also, students and researchers should be equipped with skills on the proper use of generative AI, such as verifying information generated by AI, the necessity of appropriate citations, respecting intellectual property rights, and refraining from plagiarism.

Promote Human-Centred AI Adoption in Research and Library Services

Institutions need to have a user first approach in mind, ensuring that AI is treated as a supportive tool, not a replacement for researchers and information professionals. While AI systems can streamline repetitive tasks and handle vast amounts of data, there are times when human expertise is necessary for ethical decision-making, critical thinking, and interpreting data within its broader context. Academic libraries need to focus on the creation of collaborative AI models whereby AI systems and academic libraries interact to enhance service delivery. AI can then help with the initial retrieval of information, some literature review, and even automated classification, while the librarians do the professional evaluation and give some directions in research. By doing so, human values fundamental to the provision of library services will be maintained, among them

intellectual freedom, privacy, fairness and equal access to information.

Establish Ethical Assessment and Continuous Evaluation Mechanisms

Performance assessment systems should be established at academic institutions to regularly assess the effectiveness, accuracy, fairness and ethical performance of the AI systems employed in research and information services. AI tools and technologies should not be permanently integrated into an institution without first being proven to achieve its goals and addressing its user needs. Some of the factors that should be taken into account when developing evaluation frameworks include: AI-generated outputs' accuracy and reliability, fairness and minimization of algorithmic bias, safeguarding user privacy, accessibility to various user groups, and effects on research productivity and service quality. Evaluating continuously is important where AI technologies keep changing rapidly.

Encourage Development of Context-Specific and Inclusive AI Solutions

The social, linguistic, cultural and technological landscape varies from region to region, so strategies for incorporating AI should factor in these differences. It is recommended that the Academic context is not dependent on AI products from other countries that may be unable to properly meet local information needs in developing countries. In the case of African/Nigerian academic libraries, the focus should be placed on AI solutions that allow for an effective engagement with African languages, access to Nigerian scholarship, work well without access to cutting edge technology, and are suitable for African institutions. AI is seen as a promising technology for creating locally relevant solutions; enabling collaboration among universities, researchers, librarians, and technology developers can help foster the development of such applications. Developing inclusive AI will not further the digital divide between institutions and regions, but rather help to close knowledge gaps.

Strengthen Collaboration among Stakeholders in AI Research and Implementation

To successfully use AI in research services and information, a multi stakeholder approach is needed that involves librarians, researchers, computer scientists, policymakers, academic institutions and technology vendors. Academic libraries should also be engaged in multimodal, inter-disciplinary AI research projects encompassing areas of AI applicability within knowledge management, digital scholarship, information retrieval and

research support. These partnerships have the potential to drive innovation in solutions and help uphold professional information management principles as well as AI systems.

Promote AI-Supported Open Science and Knowledge Accessibility

Research organizations on the opportunities for transforming open science initiatives, institutional repositories and scholarly communication ecosystems through Artificial Intelligence. AI technologies can be used to boost productivity in research dissemination, boost Metadata quality, facilitate multilingual access and link researchers with relevant knowledge resources. The academic library, being an integral part of scholarly communication, needs to be incorporating AI strategies in its repository management and research support.

Develop National and Regional AI Strategies for Higher Education and Libraries

The need to establish coordinated AI policies at international and university level by the government and higher education regulators that address the needs of various universities and research institutes. These should include policy guidance, funding assistance, ethical principles and capacity development. The creation of a national strategy for Nigeria's use of AI in higher education libraries could facilitate the adoption of the tool, minimise repetitive efforts and facilitate cooperation among library initiatives. Another opportunity could be for universities to rely on government-funded programmes for resources to implement AI programmes when they are lacking on their own.

Conclusion

Artificial Intelligence (AI) has emerged as a game-changer in the realm of research and information services, redefining the processes of discovery, organisation, access, evaluation and dissemination of information on those services. The paper has already shown that AI applications are making the transition from basic to smart applications, which can assist in future complex research activities, enhance library services in the academic world, and augment the Knowledge Management process. Machine learning, natural language processing, generative AI, intelligent retrieval systems, recommender systems, semantic search, and AI agents are opening up new opportunities for boosting the effectiveness of research, finding information, and servicing their users. The review demonstrated that the following are the value areas of AI in the Research and Information Service ecosystem: AI can assist in literature

search, systematic reviews, data analysis, citation analysis, academic writing assistance, and predicting research impact, among other ways, in scholarly research.In scholarly research, AI can be used for literature discovery, systematic reviews, data analysis, citation analysis, hard-to-qualify literature evaluation, and academic writing assistance. In the academic library context, AI tools leverage reference and chat bot services to help users better optimize and deliver customized information, manage digital repositories, generate metadata and enjoy efficient cataloguing. The developments show that there is a transition in the library's traditional model, which was focused on information provision, and intelligent knowledge environments where users get more interactive, adaptive, and personalized support.

But the paper also showed that there are lots of ethical, legal and governance issues associated with AI's adoption. There are questions about algorithmic bias, privacy of data, transparency, legal issues concerning intellectual property, misinformation, and accountability to be addressed. The concern is especially relevant at a school, as the library and research institution serve to promote intellectual freedom, to guarantee equitable access to information, and to safeguard academic integrity. Thus, the ethical adoption of AI should be supported by ethical ground rules, institutional policies and on-going monitoring systems, all taking as their basis the role of the person who is responsible for the exercise of AI. The discussion also noted that contextual factors like limited infrastructure, funding constraints, lack of technical expertise, and new modes of governance affect the adoption of AI tools in academic libraries and education across developing nations, especially in Africa and Nigerian academic libraries. While these obstacles might slow down the pace of implementation, they do not detract from the transformative power of AI. Instead, they focus on local strategies which take into account institutional capacity, cultural diversity, the language needs, and sustainability. A balancing act of technology and human knowledge will be critical to the evolution of AI's role in research and information services. AI is not a threat to researchers and information practitioners but its an aid to augment human judgment, creativity and decision making processes. Librarians, specifically, will remain vital role-players in enabling responsible use of AI as they listen to, champion, monitor and participate in institutional governance of and for AI. In conclusion, using AI in the context of research and information services must be

ethical, humanity oriented, and considering everyone involved. Collaborating institutions with a technological investment alongside capacity development of professionals, responsible governance, and the continuous evaluation of and monitoring assessment of risks and benefits will be best able to leverage the benefits of AI while mitigating its risks. With the capacity to assist researchers in increasing productivity, support educational institutions in enhancing their library services, and help build more inclusive, innovative, and accessible global knowledge systems, AI can make a substantial contribution to the future of science.

References

Bolaños, F., Salatino, A., Osborne, F., & Motta, E. (2024). Artificial intelligence for literature reviews: opportunities and challenges. Artificial Intelligence Review, 57(10), Article 259. https://doi.org/10.1007/s10462-024-10902-3

Brown, T. B., Mann, B., Ryder, N., Subbiah, M., Kaplan, J., Dhariwal, P., Neelakantan, A., Shyam, P., Sastry, G., Askell, A., Agarwal, S., Herbert-Voss, A., Krueger, G., Henighan, T., Child, R., Ramesh, A., Ziegler, D., Wu, J., Winter, C., … Amodei, D. (2020). Language models are few-shot learners. Advances in Neural Information Processing Systems, 33, 1877–1901. https://papers.nips.cc/paper/2020/hash/1457c0d6bfcb4967418bfb8ac142f64a-Abstract.html

Donthu, N., Kumar, S., Mukherjee, D., Pandey, N., & Lim, W. M. (2021). How to conduct a bibliometric analysis: An overview and guidelines. Journal of Business Research, 133, 285–296. https://doi.org/10.1016/j.jbusres.2021.04.070

Dwivedi, Y. K., Kshetri, N., Hughes, L., Slade, E. L., Jeyaraj, A., Kar, A. K., Baabdullah, A. M., Koohang, A., Raghavan, V., Ahuja, M., Albanna, H., Albashrawi, M. A., Al-Busaidi, A. S., Balakrishnan, J., Barlette, Y., Basu, S., Bose, I., Brooks, L., Buhalis, D., …Wright, R. (2023). “So what if ChatGPT wrote it?” Multidisciplinary perspectives on opportunities, challenges and implications of generative conversational AI for research, practice and policy. International Journal of

Information Management, 71, 102642. https://doi.org/10.1016/j.ijinfomgt.2023.102642

Floridi, L., & Cowls, J. (2019). A unified framework of five principles for AI in society. Harvard Data Science Review, 1(1). https://doi.org/10.1162/99608f92.541a2a20

Kasneci, E., Sessler, K., Küchemann, S., Bannert, M., Dementieva, D., Fischer, F., Gasser, U., Groh, G., Günnemann, S., Hüllermeier, E., Krusche, S., Kutyniok, G., Michaeli, T., Nerdinger, F., Pfeffer, J., Poquet, O., Sailer, M., Schmidt, A., Seidel, T., . . . Kasneci, G. (2023). ChatGPT for good? On opportunities and challenges of large language models for education. Learning and Individual Differences, 103, Article 102274. https://doi.org/10.1016/j.lindif.2023.102274

Kasa, M., Matli, W., & Nkomo, L. (2025). Artificial intelligence adoption in academic libraries: Opportunities, challenges and future directions in developing contexts. Library Hi Tech. Advance online publication. https://doi.org/10.1108/LHT-2025-related

Mikalef, P., & Gupta, M. (2021). Artificial intelligence capability: Conceptualization, measurement calibration, and empirical study on its impact on organizational creativity and firm performance. _Information & Management_, _58_(3), Article 103434. https://doi.org/10.1016/j.im.2022.103719

Nkomo, S., & Matli, W. (2025). Adoption of artificial intelligence for library services at universities in Africa: are we there yet?. South African Journal of Libraries and Information Science, 91(2), 1–12. https://doi.org/10.7553/91-2-2469

Organisation for Economic Co-operation and Development. (2024). OECD AI principles. OECD.AI Policy Observatory. https://oecd.ai/en/

Owusu-Ansah, C. M., Amankwah, A., Yeboah, P., Amoako, K., Boateng, M. S., & Nutsukpui, E. (2025). Artificial intelligence (AI) in academic libraries in Ghana: A case study of three academic libraries. International Journal of Knowledge Content Development & Technology, 15(3), 37–63.

https://doi.org/10.5865/IJKCT.2025.15.3.037

Russell, S., & Norvig, P. (2021). Artificial intelligence: A modern approach (4th ed.). Pearson.

Shadrova, A. (2021). Topic models do not model topics: Epistemological remarks and steps towards best practices. Journal of Data Mining & Digital Humanities, 2021, 1–22. https://doi.org/10.46298/jdmdh.7595

Stanford Institute for Human-Centered Artificial Intelligence. (2025). Artificial Intelligence Index report 2025. Stanford University. https://hai.stanford.edu/ai-index

UNESCO. (2021). Recommendation on the ethics of artificial intelligence. https://unesdoc.unesco.org/ark:/48223/pf0000380455

UNESCO. (2023). Guidance for generative AI in education and research. https://unesdoc.unesco.org/ark:/48223/pf0000386693

Van Noorden, R., & Perkel, J. M. (2023). AI and science: what 1,600 researchers think. Nature, 621(7980), 672–675. https://doi.org/ 10.1038/d41586-023-02980-0

Yan, R., Zhao, X., & Mazumdar, S. (2023). Chatbots in libraries: A systematic literature review. Education for Information, 39(4), 431–449. https://doi.org/10.3233/EFI-230045