# ARTIFICIAL INTELLIGENCE (AI) AND THE FUTURE OF LIBRARIES: EMPOWERING LIBRARIANS IN THE 5TH INDUSTRIAL REVOLUTION

By

# LUCKY B.O. OWRAIGBO (CLN) USMAN N. ABUBAKAR (PHD, CLN) AND CHIKAODILI LORETTA KANU (PHD, CLN)

#### Abstract

This study explores the transformative potential of artificial intelligence (AI) in shaping the future of libraries and empowering librarians in the 5th Industrial Revolution. The study has 3 research objectives. The study employed a descriptive research design. The target population consisted of over 10,000 librarians across Nigeria. A sample of 50 librarians was selected from three state chapters of the Nigerian Library Association: Abuja, Niger State, and Anambra State. A structured questionnaire served as the primary data collection instrument. The instrument underwent face and content validity assessment by experts and achieved a Cronbach's alpha reliability coefficient of 0.89, indicating strong internal consistency. Data were analyzed using mean scores. The findings revealed that AI is significantly altering librarians' roles, requiring them to become not just curators but also navigators of digital information, data analysts, and trainers in AI literacy. Essential skills identified include proficiency in AI tools, data interpretation, and ethical considerations surrounding AI implementation. The study concluded that AI empowers librarians by enhancing their efficiency, expanding their service offerings, and elevating their professional standing. The study recommends that library schools incorporate AI-related training into their curricula, and that libraries invest in professional development programs to equip librarians with the necessary skills to thrive in the AI-driven library landscape. The implication of this study is that since AI tools are not available nor used by librarians to deliver services, it will affect the librarians effectiveness with the use ; of the tools thereby leading to user dissatisfaction

**Keywords:** Artificial intelligence, libraries, librarians, 5th Industrial Revolution, empowerment, skills, competencies, professional development.

### Introduction

The 5th Industrial Revolution (5IR), characterized by the convergence of advanced technologies like artificial intelligence (AI), internet of things (IoT), biotechnology, and nanotechnology, is rapidly transforming industries and societies (Schwab, 2017). This revolution is fundamentally reshaping how information is accessed, created, and disseminated. The sheer volume of data generated in the 5IR presents both opportunities and

challenges. While access to information has become more democratized than ever before, the ability to effectively navigate, evaluate, and utilize this information has become increasingly crucial (Manyika et al., 2017). The 5IR necessitates new approaches to knowledge creation, emphasizing collaboration, innovation, and adaptability. It calls for individuals and organizations to embrace lifelong learning and develop the digital literacy skills needed to thrive in this rapidly evolving environment. The implications for information professionals, including librarians in libraries, are profound, requiring them to adapt their roles and services to meet the demands of the 5IR.

Libraries, traditionally seen as physical repositories of books and other materials, are undergoing a significant transformation. They are evolving into dynamic digital hubs and community spaces, offering a wide range of services beyond simply lending books (Aina, 2018). Modern libraries provide access to digital resources, online databases, and virtual learning environments, catering to the diverse needs of their users (Obiekwe & Agim, 2021). They are becoming centers for digital literacy training, helping individuals develop the skills needed to navigate the digital world. Libraries also play a crucial role in fostering community engagement, providing spaces for collaboration, learning, and social interaction. According to Agim, Mohammed and Obande (2024), they are increasingly recognized as essential community assets, supporting education, research, and economic development. This evolution requires librarians to embrace new technologies and develop new skills to effectively serve their communities in the digital age.

The rise of artificial intelligence (AI) is having a profound impact on libraries, offering opportunities to enhance services, improve efficiency, and personalize user experiences. AI applications in libraries are rapidly expanding, encompassing areas such as chatbots for user assistance, automated cataloging and classification, personalized information retrieval, and predictive analytics for collection development (Bhattacharya,

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2022). AI-powered tools can help librarians manage vast amounts of data, automate repetitive tasks, and provide customized services to meet the specific needs of individual users. For example, AI-powered search engines can improve information retrieval by understanding user intent and providing more relevant results. Chatbots can handle routine inquiries, freeing up librarians to focus on more complex tasks. However, the integration of AI in libraries also raises important questions about ethical considerations, data privacy, and the future role of librarians in an increasingly automated environment. It is crucial for librarians to understand the potential benefits and challenges of AI to effectively leverage this technology for the betterment of library services.

#### **Statement of the Problem**

The 5th Industrial Revolution is transforming the landscape of information access and knowledge creation, presenting both challenges and opportunities for libraries. Libraries are evolving into dynamic digital hubs and community spaces, playing a vital role in supporting education, research, and community engagement. The rise of AI offers tremendous potential for enhancing library services and empowering librarians to better serve their users. However, the 5th Industrial Revolution demands a new set of skills for librarians. While AI presents powerful tools, there's a growing concern about whether librarians are adequately prepared to leverage these technologies effectively. Existing studies often discuss the need for digital literacy, but they often overlook the specific skills required to integrate AI into library workflows and services. This study addresses this gap by examining the specific competencies librarians need to work with AI, not just alongside it. It will explore how AI can empower librarians to develop these essential skills and adapt to the changing demands of the profession.

# **Research Questions**

- 1. What are the impacts of AI on Librarians' Roles in the 5th Industrial Revolution?
- 2. What are the required new skills and competencies for Librarians to Effectively Work with AI Technologies?
- 3. What are the impacts of empowering librarians through AI integration in libraries?

#### **II. Literature Review**

### Characteristics of the 5IR key technologies and societal shifts

The 5th Industrial Revolution (5IR), also known as Industry 5.0, represents a significant departure from previous industrial revolutions, characterized by the convergence of advanced technologies and their profound impact on society (Schwab, 2017). It builds upon the foundation of the 4th Industrial Revolution, which focused on digitalization and connectivity, but goes beyond simply automating processes. The 5IR emphasizes human-machine collaboration, personalization, and intelligent systems that can adapt and learn. Key technologies driving this revolution include artificial intelligence (AI), internet of things (IoT), big data analytics, cloud computing, blockchain, virtual and augmented reality, 3D printing, biotechnology, and nanotechnology (Manyika et al., 2017). These technologies are not only evolving rapidly on their own but are also converging to create synergistic effects, leading to unprecedented levels of automation, customization, and interconnectedness. This technological convergence is blurring the lines between the physical, digital, and biological worlds, creating new possibilities for innovation and problem-solving.

One of the defining characteristics of the 5IR is the shift towards human-centricity. While previous industrial revolutions often focused on increasing efficiency and productivity, the 5IR recognizes the importance of human capital and well-being (Hermann et al., 2016). It emphasizes the role of technology in empowering individuals, enhancing their skills, and

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creating more fulfilling work experiences. The 5IR also places a strong emphasis on sustainability, recognizing the need to balance economic growth with environmental protection and social responsibility. The societal shifts brought about by the 5IR are profound and far-reaching. The rapid pace of technological change is creating new opportunities and challenges for individuals, organizations, and governments (Uzoagba, Agim, & Ezejiofor, 2024). The 5IR is transforming the nature of work, leading to the creation of new jobs and the displacement of others. It requires individuals to adapt and acquire new skills to remain competitive in the labor market. The 5IR is also impacting education, necessitating a shift towards more personalized and skills-based learning approaches. Furthermore, the 5IR is raising important ethical considerations related to data privacy, algorithmic bias, and the benefits of the 5IR are shared broadly and that its risks are mitigated. The 5IR is not just a technological revolution; it is a societal transformation that requires careful consideration of its implications and proactive efforts to shape its trajectory.

### **AI Applications in Libraries**

Artificial intelligence (AI) is rapidly transforming various aspects of library operations and services, with a growing body of literature documenting its diverse applications. One prominent use case is the implementation of AI-powered chatbots for user assistance (Bhattacharya, 2022). These chatbots can handle routine inquiries, provide 24/7 support, and guide users in navigating library resources, freeing up librarians to focus on more complex tasks. AI is also being employed in cataloging and classification, automating the process of tagging, categorizing, and organizing library materials (Lee & Choi, 2018). This not only improves efficiency but also enhances the accuracy and consistency of metadata, making it easier for users to discover relevant resources. AI-driven recommendation systems can suggest books, articles, and other resources based on user preferences and reading history, creating more engaging and tailored experiences (Zhang et al., 2020). AI can also be used to analyze user data to identify trends and patterns, allowing libraries to anticipate user needs and develop targeted services. For example, AI can predict which resources are likely to be in high demand, enabling libraries to optimize their collection development strategies. Moreover,

The literature also highlights the potential of AI to enhance accessibility for users with disabilities. AI-powered tools can provide real-time translation, text-to-speech functionality, and other assistive technologies, making library resources more accessible to a wider audience. Furthermore, AI is being used to develop innovative solutions for visually impaired users, such as AI-powered apps that can describe images and other visual content. While the adoption of AI in libraries is still in its early stages, the existing literature suggests that AI has the potential to transform library services in profound ways, improving efficiency, enhancing user experiences, and expanding access to information.

### How technology has already affected librarian roles and the anticipated impact of AI

The role of librarians has been in constant evolution, shaped by technological advancements throughout history. Even before the rise of artificial intelligence (AI), technology had a significant impact on how librarians operate and the services they provide. The introduction of online databases, library management systems, and the internet itself transformed libraries from primarily physical spaces to hybrid environments offering both physical and digital resources (Aina, 2018). Librarians adapted by developing new skills in digital resource management, online information retrieval, and user training on electronic

resources. They became essential guides in navigating the increasingly complex digital landscape, helping users locate, evaluate, and utilize information effectively.

The anticipated impact of AI on the role of librarians is profound and multifaceted. While some may fear that AI will replace librarians, the prevailing view is that AI will augment and enhance their capabilities, allowing them to focus on more complex and humancentric tasks (Bhattacharya, 2022). AI can automate routine tasks such as cataloging, data entry, and answering basic inquiries through chatbots, freeing up librarians to dedicate their time to activities that require uniquely human skills, such as critical thinking, creativity, and interpersonal communication. Librarians will likely become more involved in data analysis, using AI-generated insights to understand user needs and trends, and to inform collection development and service planning. They will also play a crucial role in curating and evaluating AI-generated information, ensuring its accuracy and reliability.

Furthermore, the role of librarians as educators and community engagement specialists is expected to grow. As information becomes increasingly accessible through various channels, librarians will play a vital role in helping users develop the critical thinking skills needed to navigate the information landscape and distinguish credible sources from misinformation (Olanrewaju & Akanwa, 2022). They will also be instrumental in promoting digital literacy and bridging the digital divide, ensuring that everyone has access to information and the skills needed to use it effectively. The librarian of the future will be a hybrid professional, combining traditional library skills with expertise in emerging technologies, data analysis, and community engagement.

#### Empowerment of librarians and how AI can contribute

Empowerment, in the context of librarianship, can be defined as the process of enabling librarians to have greater control over their work, access to resources, and the ability

# International Journal of Information Resource Management (IJIRM) Volume 2, Number 2 (2025)

to influence decisions that affect their profession and the communities they serve (Zimmerman, 1995). It encompasses several dimensions, including professional development, access to information and technology, autonomy in decision-making, and opportunities for leadership and advocacy. According to Bhattacharya (2022) empowered librarians are not simply passive recipients of information or implementers of policies; they are active agents of change, capable of shaping the future of libraries and contributing to the advancement of information access and literacy. This empowerment is crucial for attracting and retaining talented individuals in the library profession, fostering innovation, and ensuring that libraries remain relevant and responsive to the evolving needs of their communities. It also contributes to increased job satisfaction, professional growth, and a stronger sense of purpose among librarians.

Artificial intelligence (AI) has the potential to significantly contribute to the empowerment of librarians in several ways. For instance, AI-powered tools can assist with tasks like cataloging, information retrieval, and answering basic user queries, allowing librarians to dedicate more time to user engagement, research support, and community outreach (Agim, Abah & Ezejiofor, 2023). AI can also empower librarians by providing them with data-driven insights into user needs and trends. Furthermore, AI can empower librarians by enhancing their professional skills and expanding their scope of influence. According to Agim, Abah and Ezejiofor (2023), the availability and utilization of AI-powered chatbots is essential for addressing service delivery challenges in libraries. Therefore, by providing access to AI-powered learning resources and training programs, librarians can develop expertise in areas such as data analysis, digital curation, and AI ethics. This new knowledge and skillset will allow librarians to take on new roles and responsibilities, becoming leaders in the digital transformation of libraries. They can also leverage AI tools to create more

personalized and engaging learning experiences for library users, further enhancing their role as educators and community engagement specialists.

### Methodology

The study used the descriptive research design. The target population are librarians and a sample of 50 librarians were selected from 3 state chapters of the Nigerian Library Association namely, Abuja, Niger state and Anambra state. Questionnaire was the tool used to collect data. The instrument was subjected to validity and Cronbach Alpha reliability test which gave a reliability coefficient of 0.89. Collected data were analyzed mean score.

## **Results and Discussion**

#### Table 1: Impact of AI on Librarians' Roles in the 5th Industrial Revolution

Statement	Mean	SD	Decision
AI enhances librarians' ability to manage digital resources efficiently.	3.20	0.65	Agree
AI automates routine tasks, allowing librarians to focus on more strategic activities.	3.10	0.70	Agree
AI tools assist in providing personalized services to library users.	3.05	0.60	Agree
AI integration requires librarians to acquire new technical skills.	2.90	0.75	Agree
AI poses challenges to traditional ethical standards in librarianship.	2.85	0.80	Agree
AI changes the nature of information retrieval processes in libraries.	2.80	0.70	Agree
AI impacts the job security of librarians by automating certain roles.	2.75	0.85	Agree
Grand Mean	2.95		Agree

The table illustrates librarians' perceptions of how AI is reshaping their roles in the 5th Industrial Revolution. All the statements were with mean scores above between 2.50 which indicated agreement. In this view, the librarians agreed that AI integration requires them to acquire new technical skills (Mean = 2.90, SD = 0.75), poses challenges to traditional ethical standards in librarianship (Mean = 2.85, SD = 0.80), changes the nature of information retrieval processes in libraries (Mean = 2.80, SD = 0.70), impacts job security by automating certain roles (Mean = 2.75, SD = 0.85), AI enhances their ability to manage digital resources efficiently (Mean = 3.20, SD = 0.65), automates routine tasks allowing focus on more

strategic activities (Mean = 3.10, SD = 0.70), and assists in providing personalized services to library users (Mean = 3.05, SD = 0.60). The grand mean of 2.95 suggests an overall agreement among librarians that AI is significantly influencing their traditional roles and responsibilities.

This result is in line with that of Cox et al. (2022) who explored the definition and implications of artificial intelligence for librarians, highlighting the necessity for librarians to understand AI concepts to effectively integrate these technologies into library services. Similarly, a study by Das and Islam (2021) systematically reviewed the application of AI and machine learning in libraries, emphasizing the transformative potential of these technologies in automating tasks and enhancing service delivery. Furthermore, a study titled "The Intelligent Libraries: Innovation for a Sustainable Knowledge System in the Fifth (5th) Industrial Revolution" examined how libraries can strategically integrate advanced technologies to redefine their mission in the face of complex challenges.

Table 2: Required	Skills and Co	ompetencies for	Librarians to	Effectively	Work with .	AI
Technologies						

Statement	Mean	SD	Decision
Proficiency in data analysis and interpretation	3.25	0.60	Agree
Understanding of machine learning algorithms	3.15	0.65	Agree
Ability to manage and curate large datasets	3.10	0.70	Agree
Knowledge of AI ethics and responsible use	2.95	0.75	Agree
Skills in programming languages relevant to AI applications	2.90	0.80	Agree
Competence in using AI-driven information retrieval systems	2.85	0.85	Agree
Capacity to educate users about AI tools and applications	2.80	0.78	Agree
Grand Mean	3.00		Agree

The table presents the perceptions of 50 Nigerian Library Association members regarding the necessary skills and competencies for librarians to effectively engage with AI technologies. All of the statements were with mean scores above 2.50 which indicated agreement such that librarians agreed on the importance of knowledge in AI ethics and responsible use (Mean = 2.95, SD = 0.75), skills in programming languages relevant to AI applications (Mean = 2.80, SD = 0.80), competence in using AI-driven information retrieval systems (Mean = 2.80, SD = 0.78), the capacity to educate users about AI tools and applications (Mean = 2.80, SD = 0.78), necessity for proficiency in data analysis and interpretation (Mean = 3.25, SD = 0.60), understanding of machine learning algorithms

(Mean = 3.15, SD = 0.65), and the ability to manage and curate large datasets (Mean = 3.10, SD = 0.70). The grand mean of 3.00 suggests an overall strong agreement among librarians on the critical skills and competencies required to work effectively with AI technologies.

The result is in line with the study of Cox et al. (2022) who emphasized the necessity for librarians to understand AI concepts to effectively integrate these technologies into library services. Similarly, Lo (2023) evaluated the current AI literacy levels of academic librarians, identifying areas where further training and development are needed, which aligns with the identified competencies in this study. Furthermore, the American Library Association (ALA) has outlined various competencies for library staff, highlighting the importance of technical skills and continuous learning in adapting to emerging technologies

Statement	Mean SD	Decision
Enhances librarians' ability to manage large volumes of information	3.20 0.65	Agree
Improves efficiency in cataloging and classification processes	3.15 0.70	Agree
Facilitates personalized user services through advanced data analysis	3.10 0.68	Agree
Supports informed decision-making with predictive analytics	2.95 0.75	Agree
Reduces time spent on repetitive tasks, allowing focus on user engagement	2.90 0.72	Agree
Enhances digital literacy among librarians through continuous learning	2.85 0.80	Agree
Promotes innovative service delivery models in library operations	2.80 0.78	Agree
Grand Mean	2.99	Agree

The table presents the perceptions of members of the Nigerian Library Association regarding the impacts of empowering librarians through AI integration in libraries. From the presentation, it was evidenced that all the statements were with mean scores above 2.50 which indicated. Therefore, the librarians agreed that AI integration supports informed decision-making with predictive analytics (Mean = 2.95, SD = 0.75), reduces time spent on repetitive tasks, allowing focus on user engagement (Mean = 2.90, SD = 0.72), enhances digital literacy among librarians through continuous learning (Mean = 2.85, SD = 0.80), promotes innovative service delivery models in library operations (Mean = 2.80, SD = 0.78), AI enhances their ability to manage large volumes of information (Mean = 3.20, SD = 0.65), improves efficiency in cataloging and classification processes (Mean = 3.15, SD = 0.70), and facilitates personalized user services through advanced data analysis (Mean = 3.10, SD = 0.70), and

0.68). The grand mean of 2.99 suggests an overall agreement among librarians on the positive impacts of AI integration in enhancing various aspects of library services.

The results tallies with that of Jyoti and Kumar (2024) who explored the integration of AI in libraries, highlighting its role in automating routine tasks and enhancing service delivery, which aligns with the findings of improved efficiency and innovative services. Similarly, Das and Islam (2021) conducted a systematic review on the application of AI and machine learning in libraries, emphasizing AI's potential in managing large volumes of information and supporting decision-making processes. Furthermore, D'Souza (2024) examined the awareness and adoption of AI technologies in libraries, noting that AI supports librarians in managing information and enhances their digital literacy through continuous learning.

## Recommendations

The study recommended the following:

- 1. Implement AI-driven predictive analytics tools to assist librarians in collection development and resource allocation decisions.
- 2. Provide training programs to equip librarians with skills to interpret and utilize data insights effectively.
- 3. Adopt AI-powered automation for routine tasks such as data entry and inventory management to free up librarians' time.
- Develop user-friendly AI interfaces that allow librarians to customize automation processes according to specific needs.
- 5. Establish ongoing professional development programs focusing on AI competencies and digital literacy for librarians.
- 6. Create collaborative platforms where librarians can share best practices and resources related to AI integration.

### Conclusion

Owraigbo, L.B.O.; Abubakar, U.N.; Kanu, C.L.

The study titled "AI and the Future of Libraries: Empowering Librarians in the 5th Industrial Revolution" reveals that librarians acknowledge the significant benefits of integrating artificial intelligence (AI) into library operations. They strongly agree that AI enhances their capacity to manage extensive information, improves efficiency in cataloging, and facilitates personalized user services. Additionally, there is agreement that AI supports informed decision-making through predictive analytics, reduces time spent on repetitive tasks, promotes continuous learning, and encourages innovative service delivery models. These findings underscore the transformative potential of AI in modernizing library functions and empowering librarians to better serve their communities.

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Owraigbo, L.B.O.; Abubakar, U.N.; Kanu, C.L.

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