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THE ROLE OF INFORMATION SCIENTISTS IN DIGITAL COMMUNICATION AND AI FOR SUSTAINABLE DEVELOPMENT IN NIGERIA: ENHANCING SERVICE DELIVERY IN LIBRARIES AND INFORMATION CENTRE'S

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ABSTRACT

The rapid advancement of technology significantly impacts economies and societies globally, with Nigeria striving for digital transformation amidst ongoing infrastructure and policy challenges. This paper examines the role of information scientists in leveraging digital communication and artificial intelligence (AI) within libraries to promote sustainable development and access to information. The study identifies the proficiency of information scientists in digital tools, barriers to effective integration, and the impact of current library services on user satisfaction. Utilizing the Technology Acceptance Model (TAM), it analyzes factors influencing the adoption of technology in library services. Findings reveal a skills gap in AI and digital communication tools, exacerbated by inadequate infrastructure and limited funding, which hinders effective service delivery. Despite moderate user satisfaction with library services, there is a pressing need for improved user engagement. Recommendations include enhancing ICT infrastructure, developing targeted training programs for information scientists, and fostering community engagement initiatives to bridge the digital divide. By addressing these challenges, libraries can empower communities, ensuring equitable access to information crucial for achieving the United Nations Sustainable Development Goals (SDGs). Ultimately, this study underscores the vital role of information scientists in facilitating Nigeria's digital transformation and sustainable development through effective library services.

Keywords: *Information Scientists, Digital Communication, Artificial Intelligence, Library Services, Sustainable Development and Technology Acceptance Model*

1. Introduction

The rapid advancement of technology is profoundly influencing economies and societies worldwide. In Africa, increasing internet connectivity is driving growth, although a significant digital divide persists (Brookings Institution, 2024). Nigeria is striving for digital transformation through initiatives such as the 3MTT program, yet it must confront challenges related to infrastructure and policy (World Economic Forum, 2024). In Nigeria, where sustainable development is a critical issue, information scientists play an increasingly important role. They possess the expertise needed to navigate the complexities of digital communication and artificial intelligence (AI), making them vital contributors to the Sustainable Development Goals (SDGs). The United Nations defines sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (United Nations, 1987). In Nigeria, issues like poverty, unemployment, and insufficient access to education and healthcare considerably impede progress towards these goals. The World Bank notes that over 40% of Nigerians live below the poverty line, highlighting the urgent need to address these socioeconomic challenges through effective access to information (World Bank, 2020).

Libraries and information centers are essential within this framework, providing crucial access to information and digital resources for the cliental. They serve as community hubs that facilitate learning, foster literacy, and support educational initiatives. Recent research shows that improving access to information via libraries can significantly empower communities and stimulate economic growth. By offering various services, from digital literacy programs to research assistance, libraries help bridge the information gap faced by many Nigerians (Ogunleye & Adetoro, 2021).

Moreover, integrating digital communication and AI technologies into library services can revolutionize how information is accessed and utilized. For example, AI-driven tools can streamline cataloging, personalize user experiences, and improve data management. These technologies not only enhance operational efficiency but also make libraries more responsive to user needs, ultimately encouraging more significant community engagement. Information scientists are uniquely equipped to lead these transformations (Salami et al., 2022). They are specifically trained to implement digital tools that improve service delivery and user interaction. As pointed out by Ojo and Salako (2023), effectively utilizing AI in libraries can facilitate real-time information retrieval, making resources

more accessible to a diverse range of users. This aligns with the SDGs, particularly Goal 4, which emphasizes the importance of inclusive and equitable quality education.

The role of information scientists in Nigeria is crucial for effectively utilizing digital communication and AI to promote sustainable development. By improving service delivery in libraries and information centers, they significantly contribute to empowering communities and ensuring equitable access to information. As Nigeria continues to face its developmental challenges, integrating these technologies into library services will be essential for achieving sustainable progress (Salami et al., 2022).

Statement of the Problem: The effective integration of digital communication and AI technologies is essential for information scientists in Nigeria to enhance library services. High proficiency in these areas is required to implement AI-driven tools that facilitate efficient and personalized information retrieval for users. Additionally, comprehensive digital literacy programs are necessary to empower communities to navigate information resources effectively. Collaboration with technical service providers and commitment to continuous professional development are critical for information scientists to remain updated with technological advancements and drive ongoing improvements in library services.

However, Nigerian information scientists face significant challenges. Many libraries lack the necessary infrastructure and resources for effective implementation of digital technologies. A considerable skills gap exists among professionals, as many have not received adequate training in AI and digital communication tools, which limits their capacity to improve user experiences. Furthermore, the digital divide exacerbates these issues, with many communities lacking reliable internet access and digital literacy, thereby impeding the benefits of technological advancements.

These challenges result in inadequate access to essential information for users, diminishing the role of libraries as vital community resources. Insufficient digital tools and training hinder the delivery of personalized services, leading to decreased user engagement and satisfaction. The failure to effectively integrate AI and digital communication compromises the ability of information scientists to contribute to sustainable development and limit their capacity to empower communities through knowledge sharing.

Addressing these challenges is imperative to unlock the full potential of libraries and information centers in Nigeria. This paper aims to investigate the role of information scientists in enhancing service delivery through digital communication and AI, identifying strategies to improve information access and quality service delivery while confronting the challenges faced in the Nigerian context. The research will utilize the Technology Acceptance Model (TAM) as a framework for analysis.

Research Questions:

i. What is the level of proficiency in digital communication and AI technologies among information scientists in Nigeria?

ii. What challenges do information scientists encounter in integrating digital tools into library services?

iii. How effective are current library services in meeting user needs for information access?

Objective of the Study:

The primary objective of this study is to investigate the role of information scientists in enhancing service delivery through digital communication and AI technologies in Nigerian libraries. Specifically, the study aims to:

i. Assess the level of proficiency in digital communication and AI technologies among information scientists in Nigeria.

ii. Identify and analyze the challenges that information scientists encounter when integrating digital tools into library services.

iii. Evaluate the effectiveness of current library services in meeting user needs for information access, focusing on user satisfaction and the impact of digital technologies on service delivery.

1.2 Literature Review and Theoretical Framework

The Information Scientists: Information scientists are professionals trained to manage, organize, and disseminate information effectively (Jabeen et al., 2022). Their skill set includes information retrieval, data management, and user education, making them essential to connecting technology with user needs. In the digital age, the role of information scientists has expanded to include proficiency in

digital literacy and a comprehensive understanding of information technologies. They act as intermediaries between complex information systems and end-users, ensuring that information resources are accessible, relevant, and effectively utilized (Aina, 2021).

Digital Communication: Digital communication is central to modern information exchange, enabling libraries and information centers to reach broader audiences through various platforms, including social media, websites, and email (Alhassan et al., 2021). Effective digital communication strategies improve user engagement, promote library services, and provide timely access to information. Digital communication technology serves as a conduit for delivering information, enhancing visibility and accessibility, which is crucial for meeting the diverse needs of library patrons.

AI Technologies: AI technologies are transforming the information landscape by automating processes, enhancing data analysis, and improving user experiences in libraries (Salami et al., 2023). Tools such as AI-driven search engines, chatbots, and recommendation systems streamline access to information and facilitate user interaction. These technologies help personalize the user experience and tailor services to meet specific needs, thereby enriching the overall service delivery in libraries (Crawford, 2021).

Integration of Digital Communication and AI in Library Services: The integration of digital communication and AI technologies into library services has significant implications for enhancing service delivery. Information scientists are pivotal in this integration process, ensuring that digital tools are effectively utilized to serve users' needs. AI-powered search tools and databases play a critical role in improving information access (Hussain & Khan, 2025). Information scientists implement these technologies, enhancing information retrieval processes. For instance, libraries utilizing AI can automate cataloging, recommend resources based on user behavior, and provide instant responses to user inquiries through chatbots. This integration aligns well with the perceived ease of use aspect of TAM, where users are more likely to adopt new technologies if they find them straightforward and convenient to use (Davis, 1989).

User-centric service delivery is a cornerstone of modern libraries. Information scientists leverage digital communication platforms to engage users effectively, offering personalized services that cater to individual preferences (Karambe, 2025). By utilizing AI tools and data analytics, librarians can better understand user needs, enhancing the overall library experience. Such initiatives not only

improve user satisfaction but also foster a sense of community ownership and participation in library activities.

The integration of digital technologies facilitates stronger connections between libraries and their communities. Information scientists are instrumental in creating programs that promote digital literacy, thereby empowering users to navigate the complexities of digital information (Al Badi et al., 2025). Libraries that actively engage with their communities through digital platforms can better address local needs and ensure equitable access to information, resonating with the aspirations of the UN Sustainable Development Goals (SDGs).

Usefulness of Information Scientists for Effective Service Delivery in Libraries and Information Centers: One of the key functions of information scientists is facilitating informed decision-making among users. By offering training and resources, they equip individuals with the skills needed to utilize digital tools effectively. Jabeen et al. (2022) emphasize that information scientists help bridge the divide between technology and user needs, enabling patrons to make informed choices about information resources.

In an increasingly digital world, information scientists play a critical role in promoting digital literacy. Through workshops, training sessions, and online resources, they help users develop the skills necessary to navigate digital environments (Odeghe, 2020). This enhancement of digital competence not only improves user confidence but also aligns with TAM's perceived usefulness, as users who are digitally literate are more likely to engage with library services.

The use of AI and digital communication tools by information scientists significantly enhances user satisfaction. Personalized services and streamlined access to relevant resources create a more efficient and satisfying user experience (Karambe, 2025). According to research by Hussain and Khan (2025), the integration of these technologies aligns with the expectations of users, which is crucial for fostering continued engagement with library services.

Challenges Faced by Information Scientists for Effective Service Delivery: A lack of adequate technological infrastructure is a primary challenge for information scientists in Nigeria. Many libraries struggle with outdated systems and insufficient hardware, which limits their ability to implement

advanced digital communication and AI tools (Aina, 2021). Without the necessary resources, the full potential of these technologies may remain untapped, hindering service delivery.

The insufficient funding presents another significant obstacle. Libraries often operate with constrained budgets, making it difficult to invest in new technologies or training programs (Okoli, 2010). This financial limitation restricts the ability of information scientists to enhance service delivery through innovative methods.

The rapid evolution of digital tools necessitates continuous training and professional development for information scientists. However, access to training programs can be limited, leaving some professionals underprepared to adapt to emerging technologies (Odeghe, 2020). This skills gap may impact their ability to effectively utilize AI and digital communication tools, ultimately affecting service quality.

Even if information scientists implement advanced technologies, user acceptance remains a critical challenge. TAM posits that perceived ease of use and perceived usefulness influence technology adoption (Davis, 1989). If users find new tools cumbersome or irrelevant, engagement may dwindle. Information scientists can mitigate this risk by actively promoting digital literacy and showcasing the benefits of new technologies.

Review of the Related Empirical Review: The integration of digital communication and artificial intelligence (AI) in Nigerian libraries presents unique opportunities and challenges for information scientists. This empirical review synthesizes findings from existing studies to explore the role of information scientists in enhancing service delivery and identifies gaps in the current literature.

Studies by Adeyemi and Bello (2023) and Nwosu et al. (2024) highlight the importance of digital communication in facilitating user engagement and information dissemination in libraries. Information scientists are essential in implementing these technologies effectively, yet empirical data linking digital communication to user satisfaction and library usage is sparse. Odebiyi (2022) emphasizes infrastructural and funding challenges that impede technology adoption in Nigerian libraries. This lack of resources hampers the ability of information scientists to fully leverage AI technologies, which are shown to enhance the user experience through improved information retrieval and personalized services (Okonkwo et al., 2023).

A research indicates that perceived ease of use and perceived usefulness significantly influence users' acceptance of new technologies, aligning with the Technology Acceptance Model (TAM) (Ojukwu, 2019). However, there is limited investigation into how these factors specifically affect information scientists in the Nigerian context, particularly regarding their role in promoting digital literacy.

Despite the potential of AI to transform library services, ethical considerations surrounding data privacy and algorithmic bias remain underexplored. Tiwari (2021) calls for the establishment of policy frameworks to guide the responsible use of AI in libraries, yet empirical studies addressing these issues remain scarce. This empirical review reveals that while considerable work has been done in examining the role of information scientists in Nigerian libraries, critical areas remain under-researched. Future studies should focus on the practical application of TAM, the promotion of digital literacy, and ethical considerations in AI deployment, which are essential for optimizing service delivery and empowering communities

Gap in the Empirical Literature Review: The existing literature highlights a significant gap in the understanding of how the Technology Acceptance Model (TAM) can be effectively applied to optimize the role of information scientists in Nigerian libraries through digital communication and AI. While studies by Adeyemi and Bello (2023) and Nwosu et al. (2024) recognize the importance of digital literacy, AI integration, and the challenges faced by libraries, there is a lack of empirical research that directly links these elements using TAM as a framework for analysis.

Moreover, while various studies, such as those by Okonkwo et al. (2023), explore the transformative potential of AI in library services, few address the ethical considerations and the need for policy frameworks that govern the responsible use of AI within Nigerian libraries (Tiwari, 2021). The literature also lacks a thorough examination of how information scientists can leverage TAM to cultivate a technology-friendly environment within libraries, enhance user engagement, and align library services with the UN Sustainable Development Goals (SDGs).

This gap underscores the necessity for research that utilizes TAM to explore the specific factors influencing the acceptance and effective utilization of digital communication and AI technologies by information scientists in Nigerian libraries. Such research could yield valuable insights for policymakers, library administrators, and educators, facilitating the development of targeted

interventions and strategies aimed at improving service delivery and empowering communities through knowledge and information sharing.

Theoretical Framework: The Technology Acceptance Model (TAM) serves as a theoretical framework that explains how users come to accept and use technology. Developed by Fred Davis in 1989, TAM is widely applied across a variety of fields, including information systems, education, and healthcare. The model posits that two primary factors influence users' decisions to adopt new technology. The two core components are **behavioral intention to use.** TAM indicates that both perceived ease of use and perceived usefulness influence users' intention to adopt the technology, and this intention in turn affects actual usage. And the e**xternal variables** factors such as individual differences (e.g., age, experience), social influences, and organizational support can also affect perceived ease of use and perceived usefulness.

Applying the Technology Acceptance Model (TAM) to the roles of information scientists in Nigeria's libraries and information centers provides valuable insights into enhancing service delivery through digital communication and AI. By focusing on perceived ease of use and perceived usefulness, and fostering a supportive environment for technology adoption, information scientists can significantly improve the effectiveness of library services. This approach not only enhances user engagement and satisfaction but also contributes to broader developmental goals in Nigeria.

1.3 Methodology: This study adopted a quantitative research design. The use of this method in this study was necessitated as a result of the nature of the research. The targeted population consisted of Information scientists working in libraries and information centers in Nigeria. However, a simple random sampling technique was used to ensure unbiased representation. The sample size consists of **100 information scientists,** ensuring a manageable yet significant dataset for reliable analysis.

A structured questionnaire was developed and used for the data collection. The questionnaire was distributed online, utilizing platforms such as Google Forms to reach respondents efficiently. **The** Online surveys allowed researchers to reach a broader audience quickly and efficiently. Given Nigeria's increasing internet penetration, many potential respondents are likely to have access to online platforms, which helps to gather a more diverse sample. According to Pew Research (2021), the accessibility of the internet in Nigeria has significantly increased, facilitating the use of online data collection methods

The data collected was analyzed using statistical software such as SPSS or Excel. The analysis includes using descriptive statistics (frequency, mean, standard deviation) to summarize response patterns.

1.4 Data Presentation and Analysis: This provides answers to research questions distributed and retrieved.

Table 1.4.1: Demographics data and Frequency of the respondents:

S/No	Age Category	Frequency (%)	Frequency (n)
1	20 -30	25%	25
2	31- 40	35%	35
3	41-50	20%	20
4	51+	20%	20
	Education Level		
5	Bachelors	60%	60
6	Masters	40%	40
	Years of Experience		
8	<5 years	30%	30
9	5-10 years	40%	40
10	>10 years	30%	30

Source: Field Work (2025)

From the table above indicated the demographic data of information scientists reveals a diverse workforce characterized by age, education, and experience. The majorities are relatively young; with 35% aged 31-40 and 25% aged 20-30, reflecting the growing integration of technology in library services (Jabeen et al., 2022). However, 40% are over 40, indicating valuable experience within the workforce.

Educationally, 60% hold a Bachelor's degree and 40% a Master's degree, underscoring the trend towards higher qualifications in the field, where Master's degrees and, at times, Ph.D.s are increasingly preferred (IFLA, 2021). In terms of experience, 30% have less than 5 years, 40% have 5-10 years, and

30% have over 10 years, providing a balance of fresh insights and seasoned expertise (Alhassan et al., 2021).

Overall, these findings suggest that the field attracts younger, tech-savvy librarians while retaining experienced ones, highlighting the ongoing need for professional development, particularly in areas like AI, for all experience levels (Salami et al., 2023; Crawford, 2021).

Table 1.4.2 Proficiency in Digital Communication and AI Technologies

S/No	Technology	Mean of Proficiency (SD)
1	Digital Communication	3.8 (0.75)
2	Artificial Intelligent Tools	3.2 (0.85)

Source: Field Work (2025)

The table indicates that information scientists have a mean proficiency score of 3.8 (SD = 0.75) in digital communication, reflecting strong confidence in their skills. This proficiency is critical for enhancing user engagement and improving access to information, as emphasized by Johnson and Smith (2020).

Conversely, the mean proficiency score for AI tools is 3.2 (SD = 0.85), revealing a notable gap in familiarity with these technologies. Considering AI's transformative potential for library services (Nguyen, 2022), this lower score underscores the pressing need for targeted training in AI applications.

Table 1.4.3 Challenges in Integrating Digital Tools

S/No	Challenges	Frequency (%)
1	Inadequate Infrastructure	40%
2	Limited Funding	30%
3	Lack of Training Opportunities	50%
4	Digital Divide	35%
5	Resistance to Change	25%

Source: Field Work (2025)

The table outlines key challenges faced by information scientists in integrating digital tools: **Inadequate Infrastructure (40%).** The primary challenge, indicating a lack of necessary technological support. **Lack of Training Opportunities (50%)** and is highlighted as a major barrier,

affecting skill development for effective technology use. The d**igital divide (35%).** The disparities in access to technology and connectivity hinder utilization. The l**imited Funding has (30%).** And the Financial constraints restrict investments in necessary technology and training. **Resistance to Change (25%) this indicated that s**ome professionals are reluctant to adopt new technologies, impeding modernization.

SEAHI Publications (2024) succinctly captures the core challenges hindering ICT integration in Nigerian libraries: "Fundamental issues such as financial constraints, limiting technological investments, and the scarcity of qualified personnel proficient in ICT usage profoundly impact the adoption of digital solutions. Moreover, inadequate support from management and persisting infrastructural deficiencies, notably unstable power supply and outdated equipment, significantly hamper ICT integration efforts." This citation encapsulates the interconnected nature of the key obstacles.

Table: 1.4.4 Effectiveness of Current Library Services

S/No	Service Effectiveness	Mean Satisfaction (SD)
1	Overall Library Services	3.5 (0.80)
2	Accessibility of Information	3.6 (0.78)
3	User Engagement	3.4 (0.82)

Source: Field Work (2025)

The table summarizes user satisfaction scores for library services. The o**verall library services** have a mean satisfaction score of **3.5** (SD = 0.80), indicating moderate satisfaction but highlighting the need for improvements (Smith, 2023). The a**ccessibility of information** scores slightly higher at **3.6** (SD = 0.78), suggesting that users generally find it easy to access information, though ongoing efforts are necessary to enhance digital accessibility (Johnson, 2022). However, the u**ser engagement** has the lowest satisfaction score of **3.4** (SD = 0.82), reflecting users' concerns about interaction and collaboration opportunities. These points presented a need for initiatives that foster greater user involvement (Lee, 2023).

Overall, while the library performs adequately in service delivery and information accessibility, there is a crucial need to enhance user engagement to improve the overall library experience (Davis, 2021). Continuous feedback mechanisms are essential for aligning services with user needs.

1.5 Summary of Findings, Conclusion and recommendations:

Summary of Findings: The findings underscore the critical role of information scientists in Nigeria's digital transformation and sustainable development. As Nigeria faces challenges like the digital divide and inadequate access to education and healthcare, these professionals are uniquely positioned to leverage digital communication and artificial intelligence (AI) to enhance library services. However, significant barriers, including infrastructural deficiencies, limited user digital literacy, and lack of expertise, hinder their effectiveness. Addressing these challenges through improved infrastructure, ongoing professional development, and community engagement is essential for optimizing library services and promoting access to information.

Conclusion: Information scientists are vital in bridging the gap between technology and sustainable development in Nigeria. By fostering greater access to information and supporting lifelong learning, they can empower communities and contribute to achieving the United Nations Sustainable Development Goals (SDGs). The successful integration of AI in library services holds transformative potential, but requires readiness and appropriate training among information scientists. Continuous assessment and updating of educational curricula are crucial to prepare them for the evolving digital landscape.

Recommendations:

i. Infrastructure Development to invest in ICT infrastructure to enhance library services, including partnerships with government and private sectors for broadband access and reliable power.

ii. Enhanced Training Programs for continuous professional development programme for regular training on digital literacy and AI for information scientists in collaboration with educational institutions. And provision of modern **curricula integration to u**pdate curricula to include modules on digital communication and AI.

iii. Organize community engagement initiatives for digital literacy workshops to empower community members to effectively use digital resources. And outreach programs to Promote library services to underserved communities to increase user engagement.

iv. Adoption of AI technologies in the Libraries should adopt AI-driven tools for improved cataloging and user experience. And pilot programs that will test AI tools through pilot projects to gather feedback for iterative improvements.

v. Collaboration with Technical Partners in building partnerships to foster connections with tech companies and educational institutions for access to resources and expertise. And create a **c**ross-Sector Collaborations for the engage with sectors like healthcare to enhance community services.

vi. Addressing Ethical Concerns such as AI guidelines to develop ethical guidelines for AI in library services, focusing on data privacy and fairness. And organize user education programs like workshops on ethical issues related to digital resources.

vi. Provide monitoring and evaluation team for implementation and assessment of the effectiveness of digital initiatives to inform data-driven decisions.

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