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ENHANCING USER EXPERIENCE THROUGH AI INTEGRATION IN LIBRARY SERVICES AND DELIVERY AMONG LIBRARIANS IN NATIONAL OPEN UNIVERSITY LIBRARIES

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Abstract
The study, Enhancing User Experience through AI Integration in Library Services and Delivery among Librarians in National Open University Libraries (NOUN), examines the transformative potential of artificial intelligence (AI) in addressing the unique challenges faced by NOUN's library services in an open and distance learning (ODL) environment. Libraries at NOUN serve a geographically dispersed user base, relying heavily on digital tools. However, traditional systems often fail to meet user needs due to accessibility barriers. AI technologies can enhance service delivery by improving efficiency, accessibility, and user satisfaction. The research highlights that many librarians are only moderately aware of AI's benefits, with insufficient training and limited availability of AI tools worsening the problem. Findings reveal that the extent of awareness of artificial intelligence among NOUN librarians is moderate. The study also revealed that AI tools such as chatbots, automated cataloguing systems, recommendation systems, OCR tools, and library analytics were absent in NOUN. The study further found infrastructural limitations and financial constraints to be the critical barriers to integrating artificial intelligence in NOUN libraries. Capacity-building initiatives, financial investment, and modern infrastructure are identified as crucial strategies for addressing these barriers. The study concludes that addressing these challenges through training, funding, and infrastructure upgrades as recommendations, are critical to leveraging AI's potential to improve resource accessibility, service delivery, and user satisfaction in NOUN libraries.

Keywords: User Experience, AI Integration, Library Services and Delivery, Librarians, National Open University Libraries.

Introduction

Libraries are the cornerstone of academic institutions, serving as vital hubs for learning, research, and intellectual growth. They play a crucial role in the academic ecosystem by

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providing access to a wealth of information resources, fostering critical thinking, and supporting educational excellence. In this digital age, Abayomi, Adenekan, Abayomi, Olateju, Ajayi and Aderonke (2021) inferred that libraries have evolved beyond their traditional function of storing books and printed resources, to become dynamic spaces that integrate technology, promote collaborative learning, and cater to the diverse needs of students, faculty, and researchers. Libraries also provide access to a vast collection of resources, including books, journals, databases, and multimedia content. These resources are essential for supporting the curriculum, facilitating research, and enabling lifelong learning, most especially for distance learners, the focus for this study. The finding of Akinyemi (2023) inferred that libraries bridge the gap between students and high-quality, authoritative information, ensuring equitable access regardless of socioeconomic background.

In an open and distance learning university like NOUN, where most students engage in learning at a distance, the integration of AI becomes a strategic highest importance. Unlike conventional/ campus-based institutions, the NOUN library system must cater for users who mostly access resources remotely, often through digital tools. AI technologies have the potential to address key challenges in this context, such as ensuring continuous access to resources, providing personalized learning pathways, and maintaining up-to-date, relevant content. For instance, machine learning systems can be used to analyse user interaction data, offering customized recommendations for books, journals, and other resources. Similarly, AI-driven predictive analytics can help librarians anticipate resource demands, ensuring that the library remains responsive to user needs in real-time (Ali, Naeem, Bin & Bhatti, 2021).

The advent of artificial intelligence (AI) has transformed how organizations and institutions deliver services, driving efficiency, personalization, and innovation across various sectors, including education and information management. Libraries, as pivotal knowledge hubs, are evolving from traditional, manual processes to adopting cutting-edge technological solutions to meet the dynamic needs of users. This transformation is particularly relevant in the context of academic libraries, such as those serving the National Open University of Nigeria (NOUN), where the diverse and geographically dispersed user base requires adaptable, user-centred and efficient service delivery. AI integration into library services offers a wide range of opportunities to enhance user experiences. These include automating routine tasks such as cataloguing, classification, and material indexing, which allows librarians to focus on more complex and specialized responsibilities (Ibrahim, & Okpala, 2024). Furthermore, AI systems can provide real-time assistance through chatbots, streamline search processes with intelligent recommendation engines, and facilitate advanced data analysis to anticipate user needs and preferences (Fabunmi & Akinyemi, 2025). These capabilities align with the mission of NOUN libraries to deliver high-quality, accessible, and equitable information services to support academic achievement and lifelong learning among its students, staff, and researchers.

Moreover, the incorporation of AI can foster inclusivity by removing barriers to access. Through natural language processing (NLP) and adaptive technologies, AI can accommodate users with varying levels of digital literacy or physical disabilities, thus enhancing accessibility. This aligns with NOUN's principal goal to democratize education and promote lifelong learning. However, the adoption of AI in library services also includes the need for important investment in technology infrastructure, and the requirement for librarian training to effectively deploy and manage AI tools (Yusuf, Adebayo, Bello, & Kayode, 2022).

Statement of the Problem

The National Open University of Nigeria (NOUN) faces significant challenges in delivering efficient and user-friendly library services to its geographically dispersed learners due to its reliance on traditional systems. Limited digital solutions hinder accessibility, causing delays in

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resource access and frustration among students, particularly those in rural areas with low digital literacy. The absence of automated assistance tools further exacerbates these issues, leaving users without real-time support. Librarians also struggle with manual operations and a lack of technological skills, reducing their ability to adopt innovative solutions. Integrating artificial intelligence (AI) into NOUN's library services could address these challenges by automating tasks, offering personalized resource recommendations, and improving real-time support. This study explores AI's potential to enhance accessibility, efficiency, and user satisfaction in NOUN's library system, ultimately improving the learning experience for its diverse academic community.

Purpose of the Study

The following objectives are stated for the study:

1. Identify the extent of awareness of artificial intelligence among NOUN librarians for services delivery.
2. State the AI tools available in NOUN libraries for service delivery.
3. Identify the challenges of integrating artificial intelligence in NOUN libraries for service delivery.
4. Proffer solutions to improve the use of artificial intelligence in NOUN libraries for service delivery.

Research Questions

The following research questions were postulated for the study:

1. What is the extent of awareness of artificial intelligence among NOUN librarians for services delivery?
2. What are the AI tools available in NOUN Libraries for service delivery?
3. What are the challenges of integrating artificial intelligence in NOUN libraries for service delivery?
4. What are the strategies to improve the use of artificial intelligence in NOUN libraries for service delivery?

Literature Review

Artificial Intelligence (AI) is increasingly transforming library services, yet studies indicate that many Nigerian librarians have limited awareness and exposure to its full potential. While AI technologies such as chatbots and automated cataloguing are gradually being adopted, most librarians are only familiar with basic applications (Safana & Fri, 2024). The level of AI awareness among librarians is influenced by factors such as institutional support, access to professional development, and training opportunities. Bello et al. (2022) found that librarians who participate in technology-focused workshops and conferences are more likely to adopt AI innovations, leading to improved service delivery and resource optimization.

Despite the global trend of integrating AI into library operations, adoption in Nigerian libraries remains limited. AI tools can streamline resource discovery, enhance information retrieval, and reduce staff workload, improving overall efficiency. However, Nigerian libraries have been slow to implement advanced AI-driven systems. While some institutions have introduced chatbots to assist users and improve response times, more sophisticated applications, such as personalized recommendation systems, remain largely absent (Jatto, 2024). Orubebe, Oloniruha, and Oladokun, (2024) argue that technical and infrastructural challenges, alongside insufficient funding, have hindered the widespread adoption of AI in Nigerian academic libraries.

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The integration of AI technologies faces multiple challenges, including financial constraints, a lack of technical expertise, and resistance to change. AI implementation requires significant investment in infrastructure, training, and software, but many Nigerian institutions struggle with inadequate budgets (Ibrahim & Okpala, 2024). Additionally, some librarians lack the necessary skills to effectively manage AI tools, while others resist their adoption due to concerns about job security and unfamiliarity with new systems (Fabunmi & Akinyemi, 2025). Ethical issues related to data privacy and security also pose challenges, as weak regulatory frameworks make it difficult to enforce responsible AI usage in libraries.

To improve AI integration in Nigerian libraries, strategic initiatives must be implemented. Upgrading digital infrastructure, providing structured AI training programs, and fostering collaborations with technology providers can enhance adoption (Eiriemiokhale & Sulyman, 2023). Increased funding through government grants, corporate sponsorships, and partnerships with international organizations can also help libraries afford the costs of AI implementation (Bello et al., 2022). Raising awareness through educational campaigns and user training can improve AI acceptance and engagement (Bakiri, Mbembati & Tinabo, 2023). Finally, addressing the digital divide by ensuring equitable access to AI-driven services and enhancing digital literacy will allow a broader range of users to benefit from AI-powered library solutions (Orubebe, Oloniruha, & Oladokun, 2024).

Methodology

Descriptive survey design was used for this study. The study surveyed 60 librarians at the National Open University of Nigeria using a Google Form questionnaire, both the HQ library and across the centre libraries. Out of the 60 respondents, 44 filled in the form correctly. Data was analysed using SPSS, with simple percentage, mean scores, and standard deviation as the analysis values. The mean response was interpreted using a 4-point scale, with a criterion mean of 2.50 was used to interpret the data, with values equal to or above this threshold indicating agreement. The data was arranged into tables based on the questionnaire and evaluated using mean (x) scores and standard deviation (SD). Linear regression was used to test hypotheses, with a P-value of 0.05 indicating no significant relationship between variables.

Interpretation of Results

Table 1: Demographic Characteristics of Respondents

Gender	**Frequency**	**Percent**
Male	20	45.5
Female	24	54.5
Total	44	100.0
Highest Academic Qualification	**Frequency**	**Percent**
Ph.D	20	45.5
Mphil	2	4.5
Master degree	10	22.7
First degree	10	22.7
Others	2	4.5
Total	44	100.0

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Years of work experience	Frequency	Percent
1-10 Years	5	11.4
11- 20 Years	30	68.2
21-30 Years	2	4.5
31 years and above	7	15.9
Total	44	100.0

The gender distribution of respondents above shows a slightly higher representation of females. Out of the 44 participants, 24 (54.5%) were female, while 20 (45.5%) were male. Regarding the highest academic qualifications, nearly half of the respondents (20 participants, 45.5%) had attained a Ph.D. A smaller proportion (10 participants, 22.7%) held a Master's degree, and an equal number (10 participants, 22.7%) held a First degree. Only a few respondents (2 participants, 4.5%) had an MPhil or other qualifications. The majority of respondents (30 participants, 68.2%) had between 11 and 20 years of work experience. A smaller proportion (7 participants, 15.9%) reported having 31 years or more, while those with 1-10 years (5 participants, 11.4%) and 21-30 years (2 participants, 4.5%) constituted the minority. The data as presented in the table highlights a diverse respondent profile in terms of gender, academic qualifications, and work experience, with a notable concentration of participants possessing advanced degrees and significant professional experience (11-20 years).

Research Question 1: What is the extent of awareness of artificial intelligence among NOUN librarians for services delivery?

Table 2: Extent of Awareness of Artificial Intelligence among NOUN Librarians for Service Delivery

Items Statement	VHE	HE	LE	VLE	Mean	SD*	Des.
I am aware of the concept of Artificial Intelligence (AI) for services in NOUN library.	0 (0.0)	2 (4.5)	34 (77.3)	8 (18.2)	3.14	0.46	A
I am confident in my ability to use AI-powered tools effectively in my daily tasks at NOUN Library.	11 (25.0)	24 (54.5)	9 (20.5)	0 (0.0)	1.95	0.68	D
I have received sufficient training on how AI can be used to improve library services at NOUN.	2 (4.5)	33 (75.0)	8 (18.2)	1 (2.3)	2.18	0.54	D
AI tools such as chatbots, recommendation systems, and automated cataloguing are available for use in NOUN libraries.	31 (70.5)	9 (20.5)	4 (9.1)	0 (0.0)	1.39	0.66	SD
I have encountered challenges in accessing or using AI tools in NOUN libraries.	1 (2.3)	7 (15.9)	34 (77.3)	2 (4.5)	2.84	0.53	A
I am aware of any specific AI-based tools currently used by NOUN libraries.	9 (20.5)	32 (72.7)	3 (6.8)	0 (0.0)	1.86	0.51	D

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I think there is a lack of awareness about the benefits of AI among NOUN librarians.	0 (0.0)	3 (6.8)	12 (27.3)	29 (65.9)	3.59	0.62	SA
I believe that increased training and awareness programs would improve the use of AI in NOUN libraries.	2 (4.5)	4 (9.1)	5 (11.4)	33 (75.0)	3.57	0.85	SA
Overall Mean					**2.57**	**0.61**	A

Key: VHE – Very High Extent, HE – High Extent, LE– Low Extent, VLE – Very Low Extent – Decision

The data in Table 2 indicates a moderate level of awareness of AI among NOUN librarians, with an overall mean score of 2.57 (SD = 0.61). While some librarians acknowledge the concept of AI in library services, most have low awareness and limited confidence in using AI-powered tools in their daily tasks. The availability of AI tools, such as chatbots and automated cataloging, is perceived to be minimal, and many librarians report not having received sufficient training on AI applications. Challenges in accessing and using AI tools are also noted, suggesting difficulties in implementation. Additionally, there is strong agreement that awareness of AI benefits is lacking, and many librarians believe that increased training and awareness programs would enhance AI adoption in library services. These findings indicate a need for structured training initiatives and improved access to AI technologies to support more efficient service delivery.

Research Question 2: What AI tools are available in NOUN Libraries for service delivery?

Table 3: AI Tools Available in NOUN Libraries for Service Delivery

Items Statement	SD	D	A	SA	Mean	SD*	Des.
Chatbots and Virtual Assistants: ChatGPT, Copilot, Gemini	6 (13.6)	31 (70.5)	5 (11.4)	2 (4.5)	2.07	0.66	D
Automated cataloguing Systems	33 (75.0)	7 (15.9)	4 (9.1)	0 (0.0)	1.34	0.65	SD
Recommendation systems	4 (9.1)	35 (79.5)	5 (11.4)	0 (0.0)	2.02	0.46	D
Plagiarism Detection Software	0 (0.0)	0 (0.0)	30 (68.2)	14 (31.8)	3.32	0.47	A
Search Optimization Tools	0 (0.0)	4 (9.1)	29 (65.9)	11 (25.0)	3.16	0.57	A
Optical Character Recognition (OCR) Tools	11 (25.0)	31 (70.5)	2 (4.5)	0 (0.0)	1.80	0.51	D
Library Analytics and Usage Monitoring	10 (22.7)	30 (68.2)	4 (9.1)	0 (0.0)	1.86	0.55	D
Digital Reference Services	0 (0.0)	1 (2.3)	34 (77.3)	9 (20.5)	3.18	0.45	A
Advanced Search and Retrieval Engines	0 (0.0)	3 (6.8	12 (27.3)	29 (65.9)	3.59	0.62	SA

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Virtual and Augmented Reality (VR/AR) for Library Tours and Learning	10 (22.7)	31 (70.5)	3 (6.8)	0 (0.0)	1.84	0.53	D
Overall Mean					**2.42**	**0.55**	

Key: SD – Strongly Disagree, D – Disagree, A – Agree, SA – Strongly Agree – Decision

Tables 3 present availability of artificial intelligence (AI) tools in the National Open University of Nigeria (NOUN) libraries and the significant different in the availability of artificial intelligence (AI) tools in NOUN library services to improve user experience for remote and diverse users. The table indicates that most AI tools, such as chatbots, automated cataloguing systems, recommendation systems, OCR tools, and library analytics, are largely unavailable in NOUN libraries, with mean scores ranging between 1.34 and 2.07 (disagreement levels). Respondents identified some tools as available, including plagiarism detection software (Mean = 3.32), search optimization tools (Mean = 3.16), digital reference services (Mean = 3.18), and advanced search engines (Mean = 3.59). The overall mean score (2.42) reflects moderate to low availability of AI tools, with significant gaps in key areas necessary for enhancing library services.

Research Question 3: What are the challenges of integrating artificial intelligence in NOUN libraries for service delivery?

Table 4: Challenges of Integrating Artificial Intelligence in NOUN Libraries for Service Delivery

Items Statement	**SD**	**D**	**A**	**SA**	**Mean**	**SD***	**Des.**
Infrastructural Limitations	0 (0.0)	0 (0.0)	41 (93.2)	3 (6.8)	3.07	0.26	A
Financial Constraints	0 (0.0)	2 (4.5)	35 (79.5)	7 (15.9)	3.11	0.44	A
Lack of Skilled Personnel	1 (2.3)	37 (84.1)	6 (13.6)	0 (0.0)	3.09	0.47	A
Resistance to Change	8 (18.2)	31 (70.5)	5 (11.4)	0 (0.0)	1.93	0.55	D
Ethical and Privacy Concerns	0 (0.0)	0 (0.0)	35 (79.5)	9 (20.5)	3.20	0.41	A
Digital Divide	0 (0.0)	3 (6.8)	28 (63.6)	13 (29.5)	3.23	0.57	A
Future Prospects	0 (0.0)	6 (13.6)	9 (20.5)	29 (65.9)	3.52	0.73	SA
Lack of Capacity Building and Training	0 (0.0)	2 (4.5)	11 (25.0)	31 (70.5)	3.66	0.57	SA
Overall Mean					**3.10**	**0.50**	

Key: SD – Strongly Disagree, D – Disagree, A – Agree, SA – Strongly Agree – Decision

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Table 6 presents the challenges of integrating artificial intelligence (AI) in the National Open University of Nigeria (NOUN) libraries. Major challenges like infrastructural limitations (93.2% agreed, Mean = 3.07) and financial constraints (79.5% agreed, Mean = 3.11) were identified as critical barriers. Lack of skilled personnel (84.1% agreed, Mean = 3.09) and ethical/privacy concerns (79.5% agreed, Mean = 3.20) and digital divide scored high (Mean = 3.23) were also significant. For challenges regarding capacity building, the most pressing challenge was the lack of capacity-building and training programs, with a high mean score of 3.66 and 70.5% strongly agreeing. However, resistance to change was less significant, with a low mean score of 1.93, indicating librarians are generally open to adopting AI. Also, there was strong optimism about the potential of AI in library services, with a mean score of 3.52, reflecting the belief that AI integration is achievable with proper interventions. The integration of AI in NOUN libraries faces significant challenges, particularly related to infrastructure, funding, skill development, and digital equity. However, librarians remain optimistic about the future of AI in service delivery, emphasizing the need for investments in training, infrastructure, and supportive policies to overcome these barriers.

Research Question 4: What are the strategies to improve the use of artificial intelligence in NOUN libraries for service delivery?

Table 5: Strategies to Improve the Use of Artificial Intelligence in NOUN Libraries for Service Delivery

Items Statement	SD	D	A	SA	Mean	SD*	Des.
Investment in Infrastructure	2 (4.5)	3 (6.8)	33 (75.0)	6 (13.6)	2.98	0.63	A
Capacity Building and Training	0 (0.0)	0 (0.0)	11 (25.0)	33 (75.0)	3.75	0.44	SA
Collaborative Partnerships	2 (4.5)	3 (6.8)	11 (25.0)	28 (63.6)	3.48	0.82	A
Securing Adequate Funding	0 (0.0)	2 (4.5)	8 (18.2)	34 (77.3)	3.73	0.54	SA
Raising Awareness and User Engagement	3 (6.8)	8 18.2)	21 (47.7)	12 (27.3)	2.95	0.86	A
Addressing Ethical and Privacy Concerns	0 (0.0)	0 (0.0)	26 (59.1)	18 (40.9)	3.41	0.50	A
Bridging the Digital Divide	1 (2.3)	2 (4.5)	31 (70.5)	10 (22.7)	3.14	0.59	A
Future Outlook	0 (0.0)	1 (2.3)	10 (22.7)	33 (75.0)	3.73	0.50	SA
Overall Mean					**3.40**	**0.61**	A

Key: SD – Strongly Disagree, D – Disagree, A – Agree, SA – Strongly Agree – *Decision*

Table 5 presents the strategies to enhance the adoption and use of artificial intelligence (AI) tools in NOUN libraries. The table identifies the top strategies as capacity building and training, rated as the most important strategy with a mean of 3.75, emphasizing the need to equip

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librarians with the skills to utilize AI effectively, following by securing adequate funding which was identified as critical, with a mean of 3.73, highlighting the importance of financial resources for AI implementation and future outlook which optimism about AI's potential was strongly supported (mean = 3.73). Other key strategies include: (mean=3.48), indicating the need for external support and collaboration, addressing ethical and privacy concerns (mean = 3.41) reflecting the importance of tackling ethical issues in AI adoption, bridging the digital divide (mean=3.14), this strategy stressed the importance of equitable access to digital tools. Areas needing improvement include investment in infrastructure (mean=2.98), indicating moderate agreement on the need for infrastructural improvements, raising awareness and user engagement (mean = 2.95), suggesting a need for enhanced communication and engagement strategies. The overall mean score of 3.40 indicates strong agreement on the necessity of implementing these strategies. To improve the use of AI in NOUN libraries, a comprehensive approach involving training, funding, collaboration, and infrastructure is essential. Efforts to address privacy concerns and the digital divide, coupled with sustained optimism for prospects, will drive successful AI adoption.

Discussion of Findings

On the extent of awareness of artificial intelligence among NOUN librarians for service delivery. The study found that the extent of awareness of artificial intelligence among NOUN librarians is moderate. The findings support Safana and Fri (2024), who found that while Nigerian librarians recognize AI's potential, their knowledge remains limited to basic applications such as chatbots and automated cataloguing. Furthermore, Bello et al. (2022) emphasized that AI adoption is heavily influenced by institutional support, training, and professional development opportunities, which were found to be lacking among NOUN librarians.

On the AI tools are available in NOUN Libraries for service delivery. The study also revealed that AI tools such as chatbots, automated cataloguing systems, recommendation systems, OCR tools, and library analytics were absent in NOUN. The findings support Jatto (2024), who reported that while some Nigerian libraries have adopted chatbots and automated indexing, more advanced AI applications remain largely absent due to limited funding and infrastructure. Orubebe, Oloniruha, and Oladokun (2024) similarly found that Nigerian academic libraries struggle with technical and infrastructural challenges, restricting AI implementation.

On the challenges of integrating artificial intelligence in NOUN libraries for service delivery. These findings align with Ibrahim and Okpala (2024), who noted that AI adoption in Nigerian libraries is hampered by inadequate budgets, outdated infrastructure, and a lack of technical expertise. Fabunmi and Akinyemi (2025) also found that some librarians resist AI integration due to concerns about job displacement and unfamiliarity with AI systems, though this study found that resistance to change (Mean = 1.93) was not a major issue among NOUN librarians. Additionally, ethical and privacy concerns (Mean = 3.20) were a significant challenge, supporting Koltay (2023), who argued that weak regulatory frameworks make responsible AI usage difficult in Nigerian libraries. The digital divide (Mean = 3.23) was another key concern, further reinforcing Orubebe, Oloniruha, and Oladokun (2024), who emphasized inequitable access to AI tools due to technological disparities.

On the strategies to improve the adoption and utilization of artificial intelligence (AI) tools in NOUN libraries. The most highly recommended strategy is capacity building and training, which is identified as crucial for equipping librarians with the skills needed to effectively use AI and achieve exceptional work performance. Orubebe, Oloniruha and Oladokun (2024) advocated for the implementation of structured training programs and workshops that emphasize practical skills and hands-on experience for librarians. Additionally, Ibrahim and

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Okpala (2024).) stressed the importance of increasing government funding while also exploring alternative funding options, such as grants, donations, and corporate sponsorships, to enable libraries to make necessary investments in AI technologies.

Conclusion

Hence there is a growing recognition of AI's potential in libraries, the extent of awareness among NOUN librarians remains a critical factor in determining its adoption and effectiveness. Addressing barriers to awareness through professional development, institutional support, and training can empower librarians to harness AI's transformative capabilities, ultimately enhancing service delivery and user satisfaction. Its adoption and integration will encourage on the use of AI tools such as chatbots and automated cataloguing systems to enhance service delivery in NOUN libraries, though their implementation remains at a foundational level. But by addressing infrastructural, financial, and training barriers will be crucial for unlocking the full potential of AI in NOUN libraries, ultimately improving resource accessibility and user satisfaction.

Recommendation

The following recommendations are deduced from the study.

1. The university library management should create more awareness and advocacy on AI and its benefits, to enable proper usage.
2. The university library should integrate AI tools such as chatbots, automated cataloguing systems, recommendation systems, OCR tools, and library analytics regardless of their location or technological capabilities in order to encourage use by librarians.
3. The university management should make a budgetary allocation than overcome barriers to infrastructural limitations and financial constraints to integrating artificial intelligence.
4. The university library should invest in capacity building and training, which is identified as crucial for equipping librarians with the skills needed to effectively use AI

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