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Librarian awareness, perception and acceptance and the utilization of artificial intelligence in library services in universities in South-South Nigeria

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Abstract: The purpose of the study was examined librarians' awareness, perception and acceptance of artificial intelligence and utilization in library service. To achieve this objective, three research questions and three hypotheses were stated. Empirical and theoretical literature were reviewed conceptually, theoretically, and empirically. A cross sectional research design was used to collect information from 342 librarians in the libraries in the study area. A questionnaire title: Librarian Perception, Awareness and Acceptance and Utilization of Artificial Intelligence (LPAAUAIQ) was used for data collection. and the data collected were analysed using simple regression and the result presented appropriate. The study demonstrated that perception, awareness, and acceptance significantly contribute to the utilization of AI in libraries. Positive perceptions of AI's usefulness, heightened awareness of its capabilities, and acceptance of AI as a valuable tool are crucial factors that drive its adoption and integration into library services. These findings are consistent with the Technology Acceptance Model (TAM), which highlights perceived usefulness and ease of use as critical determinants of technology acceptance. Implications for the study were discussed.

Keywords: librarians' awareness, perception, acceptance of artificial intelligence and utilization in library service.

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Introduction

Artificial intelligence (AI) has become an increasingly integral part of modern library systems, transforming how information is accessed, managed, and disseminated. The integration of AI technologies into library services enhances efficiency, personalizes user experiences, and optimizes resource management. Libraries, as centers of knowledge and learning, are leveraging AI to streamline operations, improve cataloging processes, and facilitate advanced research capabilities.

One significant application of AI in libraries is the development of intelligent search systems. These systems use natural language processing (NLP) and machine learning algorithms to provide more accurate and relevant search results, thereby improving the user experience. For instance, AI-powered search engines can understand context and semantics, enabling users to find information more efficiently (Chen et al., 2021). Furthermore, AI technologies such as chatbots and virtual assistants are being deployed to assist library patrons with inquiries and support, offering 24/7 assistance and reducing the workload on library staff (Smith & Jones, 2020).

Another critical area where AI is making an impact is in the automation of cataloging and metadata management. Traditional cataloging methods are often time-consuming and prone to human error. AI can automate these processes, ensuring faster and more accurate classification of resources. According to research by Johnson (2022), the use of AI in cataloging not only accelerates the organization of materials but also enhances the discoverability of resources, making it easier for users to access relevant information. Moreover, AI is being utilized to enhance data analytics within libraries. By analyzing user behavior and interaction data, AI can provide valuable insights into how library services are used and identify areas for improvement. This data-driven approach enables libraries to tailor their services to meet the evolving needs of their users (Williams & Brown, 2019).

Previous studies have extensively explored various facets of AI applications in libraries. For example, Smith and Jones (2020) investigated the role of AI-powered virtual assistants in improving user support services. Chen et al. (2021) focused on the efficacy of intelligent search systems in enhancing user experience. Johnson (2022) examined the automation of cataloguing processes using AI, while Williams and Brown (2019) discussed the impact of data analytics on library service optimization. However, despite these valuable contributions, there remains a significant gap in understanding the influence of staff perception, awareness, and acceptance of AI on its effective utilization in libraries.

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Staff perception refers to how library staff view and interpret the role and impact of AI within their work environment. This includes their beliefs about AI's potential benefits, drawbacks, and overall influence on library operations and services (Robert & Edam-Agbor, 2017; Edam-Agbor, & Odu,2017). Positive perceptions may lead to greater enthusiasm and willingness to engage with AI tools, while negative perceptions can result in resistance and reluctance to adopt new technologies. Awareness pertains to the extent to which library staff are knowledgeable about AI technologies, their functionalities, and their applications within the library context. This involves understanding how AI can be integrated into various library processes, the potential improvements it offers, and any limitations or challenges associated with its use. Higher levels of awareness can foster a more informed and proactive approach to AI adoption. Acceptance is the degree to which library staff are willing to embrace and use AI technologies in their daily tasks. This involves not only an intellectual acknowledgment of AI's benefits but also a readiness to incorporate AI tools into their workflows. Acceptance is often influenced by both perception and awareness, as well as by the organizational culture and the support provided for AI implementation.

The purpose of this study is to address this gap by examining how staff perceptions, awareness, and acceptance of AI impact its implementation and utilization in library settings. Understanding these factors is crucial, as the successful integration of AI technologies relies not only on the technological infrastructure but also on the human element—particularly the attitudes and readiness of library staff. This study aims to provide insights that can inform strategies for fostering a more supportive environment for AI adoption in libraries, ultimately enhancing their operational efficiency and service delivery.

Statement of the problem

The underutilization of artificial intelligence (AI) in libraries remains a significant issue despite the substantial benefits that AI can offer in enhancing library operations and services. The root causes of this problem are multifaceted, including negative staff perceptions, lack of awareness, and resistance to accepting AI technologies. These human factors are critical, as they directly influence the willingness and ability of library staff to integrate and utilize AI tools effectively.

The non-utilization of AI in libraries can have profound effects. Libraries that fail to adopt AI technologies miss out on opportunities to improve efficiency in cataloging, streamline information retrieval, and provide personalized user experiences. This not only hampers the quality of service delivery but also places libraries at a disadvantage in an increasingly digital and data-driven world. The gap between the potential benefits of AI and its actual use in libraries can lead to inefficiencies, outdated practices, and a diminished role of libraries as central hubs of knowledge and research support.

Over the years, various efforts have been made to address this issue. Training programs and workshops have been implemented to enhance staff awareness and skills related to AI. Investments in AI infrastructure and pilot projects have been initiated to demonstrate the value of AI in library settings. Despite these efforts, the problem of non-utilization persists, indicating that technological solutions alone are insufficient without addressing the underlying human factors.

Existing research has extensively explored the technical applications of AI in libraries, such as intelligent search systems (Chen et al., 2021), AI-powered virtual assistants (Smith & Jones, 2020), and automated cataloging processes (Johnson, 2022). However, there remains a significant research gap in understanding the influence of staff perception, awareness, and acceptance on the effective utilization of AI in libraries. Previous studies have highlighted the importance of these factors but have not comprehensively examined their impact in a cohesive manner.

This study seeks to address this gap by investigating how staff perceptions, awareness, and acceptance of AI influence its utilization in library settings. By focusing on these human elements, the study aims to provide insights into the barriers to AI adoption and identify strategies to foster a more supportive environment for AI integration. The findings will contribute to developing targeted interventions that can enhance staff readiness and willingness to embrace AI, ultimately leading to more effective and widespread use of AI technologies in libraries.

Statement of hypothesis

The following hypothesis were stated for this study

i. There is no significant contribution of staff awareness on utilization of AI in library services.

ii. There is no significant contribution of staff perception on utilization of AI in library services.

iii. There is no significant contribution of staff acceptance on utilization of AI in library services.

Literature review

The utilization of artificial intelligence (AI) in libraries has been a topic of significant interest and study in recent years. AI technologies offer numerous advantages that can transform traditional library operations, such as enhancing search capabilities, automating cataloging processes, and providing personalized user assistance. The integration of AI in libraries involves the application of machine learning, natural language processing, and data analytics to improve service efficiency and user experience (Chen et al., 2021).

Intelligent search systems are among the most prominent applications of AI in libraries. These systems leverage AI to understand the context and semantics of user queries, thereby delivering more accurate and relevant search results. This capability greatly enhances the user experience, making information retrieval more efficient and effective (**Ofem et al, 2024a, 2024d**; Chen et al., 2021). Additionally, AI-powered virtual assistants and chatbots have been implemented to provide round-the-clock support to library users, addressing inquiries and assisting with information needs without human intervention (Smith & Jones, 2020).

Automation of cataloging and metadata management is another significant area where AI is utilized in libraries. Traditional cataloging methods are labor-intensive and prone to errors. AI can automate these processes, ensuring faster and more accurate classification of library materials, which enhances discoverability and access to resources (Edam-Agbor, & Orim, 2015). Johnson,

2022). Furthermore, AI-driven data analytics help libraries analyze user behavior and interaction patterns, providing insights that can inform service improvements and strategic planning (Williams & Brown, 2019). The successful utilization of AI in libraries is not solely dependent on the availability of advanced technologies. It is equally influenced by the awareness, perception, and acceptance of AI among library staff. These three factors are interrelated and collectively determine the extent to which AI can be effectively integrated into library operations.

Awareness of AI refers to the level of knowledge and understanding that library staff have about AI technologies and their potential applications in the library context. Awareness encompasses familiarity with AI tools, their functionalities, and the benefits they offer. High levels of awareness are crucial for enabling staff to recognize the value of AI and to explore its applications in their work (Orim, et al., 2019; Chen et al., 2021). Perception of AI involves the attitudes and beliefs that library staff hold regarding AI technologies. Positive perceptions, such as viewing AI as a beneficial and supportive tool, can foster enthusiasm and willingness to engage with AI applications. Conversely, negative perceptions, which may include fears of job displacement or skepticism about AI's effectiveness, can lead to resistance and reluctance to adopt AI (Smith & Jones, 2020).

Acceptance of AI is the degree to which library staff are willing to embrace and use AI technologies in their daily tasks. Acceptance is influenced by both awareness and perception. Staff who are well-informed about AI and hold positive attitudes towards it are more likely to accept and integrate AI tools into their workflows. Acceptance is also shaped by the organizational culture and the support provided for AI adoption, such as training programs and leadership endorsement (Johnson, 2022).

The relationship between these factors is cyclical. Increased awareness can lead to more informed and positive perceptions of AI, which in turn can enhance acceptance. As staff become more accepting of AI, their willingness to engage with and utilize AI technologies grows, creating a more conducive environment for AI integration. Conversely, low awareness and negative perceptions can hinder acceptance, impeding the successful implementation of AI in libraries. Understanding this relationship is critical for addressing the barriers to AI adoption in libraries. Efforts to promote AI utilization should focus not only on technological advancements but also on increasing awareness, improving perceptions, and fostering acceptance among library staff. This holistic approach can ensure that AI technologies are effectively integrated and utilized, ultimately enhancing the overall efficiency and service quality of libraries.

Theoretical foundations

The Technology Acceptance Model (TAM), proposed by Fred Davis in 1989, is a foundational framework for understanding how users come to accept and use technology. The basic postulation of TAM is that two primary factors influence an individual's decision to adopt and use a new technology: perceived usefulness (PU) and perceived ease of use (PEOU). Perceived usefulness is defined as the degree to which a person believes that using a particular system would enhance their job performance. In contrast, perceived ease of use refers to the degree to which a person believes that using the system would be free of effort.

These two factors shape users' attitudes toward the technology, which in turn influences their behavioral intention to use it, ultimately determining their actual use. The basic assumptions of TAM include the idea that users' perceptions of a technology's usefulness and ease of use are critical determinants of their acceptance and that external factors, such as training and user support, can indirectly influence acceptance through their impact on PU and PEOU.

The implication of TAM for this study on the utilization of AI in libraries is significant. Understanding how library staff perceive the usefulness and ease of use of AI technologies can provide insights into their willingness to adopt these tools. For instance, if staff believe that AI can significantly enhance their efficiency in cataloging and information retrieval (high PU) and find AI systems user-friendly and straightforward to operate (high PEOU), they are more likely to develop a positive attitude toward AI adoption. This positive attitude increases their behavioral intention to use AI, leading to actual usage. Conversely, if staff perceive AI as complex and difficult to use or are skeptical about its benefits, their likelihood of adopting AI decreases.

By applying TAM, this study can identify specific areas where interventions, such as targeted training programs and user support initiatives, can be implemented to improve staff perceptions of AI's usefulness and ease of use. This approach can help bridge the gap between the potential benefits of AI and its actual utilization in libraries, ensuring that technological advancements translate into practical improvements in library operations and services. Understanding these dynamics can guide strategies to foster a more supportive environment for AI adoption, ultimately enhancing the overall efficiency and effectiveness of library services.

Empirical literature

Smith and Jones (2020) investigated how librarians' perceptions of AI impact its adoption in academic libraries. They found that librarians with positive perceptions of AI's usefulness and benefits were more likely to adopt AI technologies. The study revealed that perceptions of AI enhancing job performance and improving service delivery significantly influenced AI adoption. The findings suggested that addressing negative perceptions through training and awareness programs could increase the acceptance and utilization of AI in libraries. Specifically, the study highlighted that perceived usefulness was a stronger predictor of AI adoption than perceived ease of use.

Chen, Zhang, and Li (2021) explored the levels of awareness and acceptance of AI among public library staff and their impact on AI utilization. The survey results showed that higher awareness levels were correlated with greater acceptance and use of AI technologies. Interviews revealed that staff who were more informed about AI's capabilities and applications were more open to integrating AI into their workflows. The study emphasized the need for comprehensive training programs to enhance staff awareness, which, in turn, would lead to higher acceptance and effective utilization of AI. The authors concluded that improving staff awareness was crucial for successful AI implementation in public libraries.

Johnson and Williams (2022) conducted a case study to understand the role of acceptance in the adoption of AI-based tools in research libraries. They found that libraries with higher levels of staff acceptance of AI were more successful in integrating AI

technologies into their operations. The interviews revealed that acceptance was influenced by factors such as organizational culture, leadership support, and perceived benefits of AI. Libraries that fostered a culture of innovation and provided strong support for AI initiatives saw higher levels of acceptance and utilization. The study highlighted the importance of creating a supportive environment for AI adoption, emphasizing that acceptance is a critical factor in successful AI implementation in research libraries.

Brown and Davis (2021) examined librarians' perceptions and acceptance of AI technologies and how these factors influenced AI utilization. The study found that positive perceptions of AI, such as beliefs in its potential to improve efficiency and accuracy, significantly influenced acceptance and adoption. The survey indicated that librarians who perceived AI as beneficial were more likely to integrate AI tools into their daily tasks. The study highlighted the need for initiatives that enhance positive perceptions of AI, suggesting that demonstrating tangible benefits could increase acceptance and utilization in libraries.

Ahmed and Nair (2020) investigated the levels of awareness and utilization of AI technologies in university libraries. The survey results showed that librarians with higher awareness of AI's capabilities and applications were more likely to use AI tools. Focus group discussions revealed that lack of awareness was a major barrier to AI adoption. The study concluded that increasing awareness through targeted training and information sessions could enhance AI utilization. It also recommended incorporating AI-related content into professional development programs for librarians.

Gomez and Martinez (2021) explored the factors influencing acceptance of AI in public libraries. The case study revealed that acceptance was significantly influenced by perceived usefulness, perceived ease of use, and organizational support. Libraries that provided robust support for AI initiatives, including training and resources, saw higher levels of acceptance among staff. The study emphasized that addressing staff concerns and demonstrating the practical benefits of AI could enhance acceptance and utilization in public libraries.

Thompson and Howard (2019) examined how librarians' perceptions of AI influenced its utilization in special libraries. The study found that positive perceptions, particularly regarding AI's ability to enhance information retrieval and user services, were strongly correlated with higher utilization rates. The survey indicated that librarians who perceived AI as an asset to their work were more likely to adopt and use AI technologies. The study recommended fostering positive perceptions through success stories and case studies demonstrating AI's benefits in special libraries.

Patel and Kumar (2021) investigated the role of awareness and training in the adoption of AI in school libraries. The study found that librarians who received training on AI technologies had higher awareness levels and were more likely to adopt AI tools. Interviews revealed that training programs significantly improved librarians' confidence in using AI, leading to increased acceptance and utilization. The study concluded that comprehensive training programs are essential for enhancing awareness and promoting the adoption of AI in school libraries.

Nguyen and Lee (2020) explored the acceptance and implementation of AI in national libraries. The case study found that acceptance was influenced by factors such as leadership support, organizational culture, and perceived benefits. Libraries with strong leadership endorsement and a culture that encouraged innovation saw higher acceptance and successful implementation of AI technologies. The study emphasized the importance of leadership in promoting AI adoption and creating a supportive environment for staff to embrace AI tools.

Method

The study was a cross sectional design that made use of 342 librarians in six universities in South- South Nigeria. The purposive sampling techniques was used to select these respondents due to the difficulties in selecting the sample of the study. a questionnaire title: Librarian Perception, Awareness and Acceptance and Utilization of Artificial Intelligence (LPAAUAIQ) was used for data collection. the instrument was validated by experts and the reliability was established using Cronbach aloha and the coefficient of the sub scales were high to be used for the study. Data collection was carried out by the researcher with the help of research assistants and the data collected were analysed using simple regression and the result presented appropriate

Result

Hypothesis one

There is no significant contribution of staff awareness on utilization of AI in library services. To test the hypothesis, simple regression was used and the result revealed that R=.784; which implies that appositive relationship exist between awareness and use of AI in library services. More so , the result produced an Adj R^2=.610 which is an indication that the variance in utilization of AI can be attributed to 61.0% contribution of staff awareness . A cursory looks at the analysis of variance (ANOVA) result showed that (F=214.80, p<.001) which implies that there is a s significant contribution of staff awareness on utilization of AI in library services. Hence, the null hypothesis is rejected.

Table 1: Simple regression analysis of the contribution of staff awareness on utilization of AI in library services

Source of variation	SS	df	MS	F	p-val
Between	2102.90	1	2102.90		
Within	3329.99	340	9.79	214.80	.000
Total	5432.89	341			

R=.784; R^2=.614 ;Adj R^2=.610

Hypothesis two

There is no significant contribution of staff perception on utilization of AI in library services. To test the hypothesis, simple regression was used and the result revealed that R=.776 which implies that appositive relationship exists between staff perception s and use of AI in library services. More so, the result produced an R^2=.602 which is an indication that the variance in utilization of AI can be attributed to 60.2% contribution of staff perception. A cursory looks at the analysis of variance (ANOVA) result showed that (F=124.06, p<.001) which implies that there is a s significant contribution of staff perception on utilization of AI in library services. Hence, the null hypothesis is rejected.

Table 2: Simple regression analysis of the contribution of staff perception on utilization of AI in library services

Source of variation	SS	df	MS	F	p-val
Between	1452.78	1	1452.78		
Within	3980.11	340	11.71	124.06	.000
Total	5432.89	341			

R=.776; R^2=.602 ;Adj R^2=.597

Hypothesis three

There is no significant contribution of staff acceptance on utilization of AI in library services. To test the hypothesis, simple regression was used and the result revealed that R=.543 which implies that a positive relationship exist between staff acceptance and use of AI in library services. More so, the result produced an Adj Adj R^2=.254 which is an indication that the variance in utilization of AI can be attributed to 25.4% contribution of staff acceptance. A cursory looks at the analysis of variance (ANOVA) result showed that (F=65.24, p<.001) which implies that there is a s significant contribution of staff acceptance on utilization of AI in library services. Hence, the null hypothesis is rejected

Table 3: Simple regression analysis of the contribution of staff perception on utilization of AI in library services

Source of variation	SS	df	MS	F	p-val
Between	874.89	1	874.89		
Within	4558.0	340	13.41	65.24	.000
Total	5432.89	341			

R=.543; R^2=.294 ; Adj R^2=.254

Discussion of findings

The results of this study indicated that perception significantly contributes to the utilization of AI in the library. This finding aligns with previous research, underscoring the pivotal role that staff perceptions play in the successful adoption of AI technologies. Smith and Jones (2020) found that librarians with positive perceptions of AI's usefulness and benefits were more inclined to integrate AI tools into their daily tasks. This suggests that when staff view AI as a valuable asset that can enhance their job performance and service delivery, they are more likely to adopt and utilize these technologies.

Similarly, Thompson and Howard (2019) reported that in special libraries, positive perceptions of AI, particularly regarding its ability to improve information retrieval and user services, were strongly correlated with higher utilization rates. This finding is consistent with the Technology Acceptance Model (TAM), which posits that perceived usefulness and ease of use are critical determinants of technology acceptance (Davis, 1989). Moreover, Chen, Zhang, and Li (2021) found that higher awareness levels, which often translate into more informed and positive perceptions, were linked to greater acceptance and use of AI in public libraries. Their study emphasized the importance of awareness campaigns and training programs in shaping positive perceptions and, consequently, increasing AI utilization. The present study's findings also resonate with Gomez and Martinez (2021), who highlighted that addressing staff concerns and showcasing the practical benefits of AI could enhance acceptance and utilization in public libraries. This suggests that efforts to improve staff perceptions through targeted interventions, such as training and demonstrative use cases, are crucial for fostering a supportive environment for AI adoption.

The study's results indicated that awareness significantly contributes to the utilization of AI in libraries. This finding is consistent with previous research emphasizing the crucial role of awareness in technology adoption. Ahmed and Nair (2020) found that higher awareness levels among university librarians were directly correlated with increased utilization of AI tools. Their study suggested that when librarians are well-informed about AI's capabilities and applications, they are more likely to embrace and integrate these technologies into their workflows. Similarly, Patel and Kumar (2021) reported that in school libraries, training programs that increased staff awareness of AI significantly improved AI adoption rates. The study highlighted that librarians who participated in these programs were more confident in using AI tools, which led to higher utilization. This finding underscores the importance of continuous education and training in enhancing awareness and, consequently, the adoption of AI technologies.

Chen, Zhang, and Li (2021) also emphasized the impact of awareness on AI acceptance and utilization in public libraries. Their research showed that librarians who were more aware of AI's potential benefits and practical applications were more likely to accept and use AI technologies. The authors concluded that comprehensive awareness campaigns and information sessions are essential to promote AI adoption. Furthermore, Gomez and

Martinez (2021) highlighted that lack of awareness was a significant barrier to AI adoption in public libraries. Their study suggested that increasing awareness through targeted interventions could address this barrier and lead to higher utilization rates.

The study's results demonstrated that the acceptance of AI significantly contributes to its utilization in libraries. This finding is in line with the Technology Acceptance Model (TAM) proposed by Davis (1989), which highlights that perceived usefulness and ease of use are critical determinants of technology acceptance. When librarians accept AI as a valuable and user-friendly tool, they are more likely to integrate it into their daily operations. Johnson and Williams (2022) found that in research libraries, higher levels of staff acceptance of AI were strongly associated with successful AI implementation. Their study revealed that acceptance was influenced by factors such as organizational culture, leadership support, and perceived benefits of AI. Libraries that fostered a culture of innovation and provided robust support for AI initiatives saw higher levels of acceptance and utilization. This suggests that creating a supportive environment can significantly enhance AI adoption.

Gomez and Martinez (2021) reported that in public libraries, acceptance was significantly influenced by perceived usefulness, perceived ease of use, and organizational support. Their findings highlighted that libraries which addressed staff concerns and demonstrated the practical benefits of AI saw higher acceptance rates, leading to increased utilization of AI technologies. This emphasizes the importance of addressing both technical and human factors to promote AI adoption. Additionally, Smith and Jones (2020) discovered that librarians' positive perceptions and acceptance of AI significantly influenced its adoption in academic libraries. Their study indicated that acceptance was a stronger predictor of AI utilization than perceived ease of use alone, underscoring the importance of fostering a positive attitude towards AI among library staff.

Conclusion /implication for the study

The study demonstrated that perception, awareness, and acceptance significantly contribute to the utilization of AI in libraries. Positive perceptions of AI's usefulness, heightened awareness of its capabilities, and acceptance of AI as a valuable tool are crucial factors that drive its adoption and integration into library services. These findings are consistent with the Technology Acceptance Model (TAM), which highlights perceived usefulness and ease of use as critical determinants of technology acceptance.

Implications for the Study

i. Libraries should invest in comprehensive training and awareness programs to enhance staff understanding and acceptance of AI technologies. These programs can help demystify AI, highlight its practical benefits, and equip staff with the necessary skills to effectively utilize AI tools.

ii. Strong leadership and a supportive organizational culture are essential for fostering positive perceptions and acceptance of AI. Library management should actively promote AI initiatives, provide necessary resources, and address staff concerns to create a conducive environment for AI adoption.

iii. Showcasing successful AI implementations through case studies and demonstrations can help build positive perceptions among library staff. Seeing the tangible benefits of AI in action can reinforce its value and encourage broader acceptance and utilization.

iv. Libraries should actively work to address misconceptions and fears about AI, such as concerns about job displacement or the complexity of AI tools. Transparent communication and reassurance about the role of AI in enhancing, rather than replacing, human efforts can alleviate these concerns.

v. Implementing a continuous evaluation mechanism to gather feedback from staff about their experiences with AI can help identify areas for improvement and ensure that AI tools are user-friendly and effectively meeting the needs of the library.

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