

Assessing the Adoption of Artificial Intelligence in Library Information Systems Through a Global Survey

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Abstract - Purpose: The fast pace of integrating AI technologies in library and information systems has raised increased academic as well as applied concern about assessing the degree to which AI is being adopted and its implications. The aim of this research is to assess the present state of AI adoption in library information systems through literature review and develop an empirical survey instrument for the same. **Methodology:** Twenty scholarly articles written between 2022 and 2026 across countries like Africa, Asia, Europe, and North America were systematically reviewed. On the basis of TAM theory, Diffusion of Innovations (DOI) theory, and TOE Theory, a survey questionnaire was created to cover issues pertaining to the awareness, adoption, advantages, disadvantages, and ethics involved. **Findings:** From the review, it can be found that while there is moderate to high awareness about the existence of AI tools among librarians, not all use these technologies to an equal extent. The main enablers of adoption are perceived usefulness, management support, and presence of infrastructure; while the barriers include skills deficiencies, lack of funding, resistance to change, and ethical challenges related to data protection. **Originality:** The main aim of this current research is to fulfill two objectives, one being the synthesis of various results from studies done all over the world regarding the utilization of AI technology within the library settings and the second one to develop an effective survey framework that could be replicated.

Keywords: Artificial Intelligence, Library Information Systems, Technology Adoption, Global Survey, TAM, Smart Libraries, Information Services

I. INTRODUCTION

The emergence of artificial intelligence (AI) has seen significant developments take place within the library and information sciences (LIS) sector. Being recognized as conservers of information, libraries are facing increased pressure to integrate artificial intelligence in an attempt to adapt to the new demands in terms of information needs of users, and to maintain relevance in the modern world. From chatbots to assist users in various queries, automated cataloguing of the library books, search prediction models to recommendation systems, artificial intelligence is being deployed through several avenues within library operations (Ayinde et al., 2026; Okunlaya et al., 2022).

Although the potential for use of these technologies is clear, uptake is uneven. Studies found in peer-reviewed literature from 2022 through 2026 show that while there has been increasing recognition of the existence of AI technologies among library practitioners worldwide, implementation is hampered by issues that vary depending on the region due to differences in institutional, infrastructural, and human resources (Shahzad et al., 2026; Begum & Elahi, 2025; Togia et al., 2026). Libraries operating in developing countries, especially those located in Sub-Saharan Africa, South Asia, and parts of the Middle East, experience greater difficulties than their counterparts in developed (Idhalama & Nwachukwu, 2025). There is still some fragmentation in this body of knowledge although the body itself continues to

grow. The studies conducted in this area have mostly dealt with single countries or library types, thereby preventing comparisons across countries. Moreover, attempts at employing theoretical perspectives on the adoption of artificial intelligence technologies, which include the Technology Acceptance Model (TAM), Diffusion of Innovation (DOI) model, and Technology-Organization-Environment (TOE) perspective, have not been consistent (Sang, 2025).

In light of the above, this study sets out to achieve two major objectives that are interconnected: (1) for conducting a comparative review of the available literature on the adoption of AI technology in library information systems from an international perspective, bringing together various results from different regions and identifying common trends in the process of adoption and factors affecting it, thus overcoming drawbacks of earlier country-specific studies; and (2) In line with the study's objectives, a survey questionnaire was developed to operationalize the theoretical framework and measure AI adoption in library information systems.

This study is organized in the following manner. Literature review is done in section 2. Theoretical framework is described in section 3. Methodology used in this research is discussed in section 4. Global adoption trends are analyzed in section 5. Survey instrument designed for this purpose is discussed in section 6.

II. LITERATURE REVIEW

AI Applications in Library Services

The number of studies discussing the application of artificial intelligence technology in library settings has also grown substantially over the past few years due to increased practical interest from library managers and academic interests from researchers working within Library and Information Science field (Kalbande et al., 2024; Andersdotter, 2023). Indeed, several systematic reviews have already been conducted, including the works by Shahzad et al. (2025) and Ayinde et al. (2026), and confirmed that AI usage in the library context involves intelligent referencing, NLP-based querying, metadata creation, recommendation engines, and predictive analytics.

Specific regional research studies have added valuable insight to the global situation. For example, Li (2024), through his work conducted in China, identified a fast embracement of AI technologies in both government and private libraries, and highlighted efficiency and customer satisfaction as the key benefits of its use. Giwa et al. (2024) in their study carried out in Nigeria noted that despite being well aware of AI tools, academic librarians in Southwestern Nigerian institutions lacked clear implementation plans for these technologies. In South Asia, readiness for AI adoption in the context of academic libraries was studied by Jabeen (2025) in the case of Pakistan and Begum & Elahi (2025) in the case of Bangladesh (Hussain & Khan, 2025; Jan et al.,

2024). It has been found out that information professionals recognized the capabilities of AI yet had some doubts regarding their readiness for using it.

There have also been studies undertaken within the environments of Europe and North America. For example, Yoon et al. (2022) undertook a survey of librarians in North American organizations and discovered a somewhat positive attitude toward artificial intelligence technologies, together with concerns about biases within algorithms and data protection issues. According to Togia et al. (2026), in Greece, there was a relatively positive attitude toward AI; however, the use of AI technologies by organizations in Greece was limited due to financial constraints and training deficiencies.

Determinants of AI Adoption

Several recurring factors that impact the effective implementation of AI technology in libraries have been identified from the relevant literature. These are, for instance, management commitment, usefulness perception, usability, and availability of ICT infrastructures, amongst others. The existence of organizational policies for digital transformation and financial provisions for training is two more important (Subuhpoto et al., 2026; Shahzad et al., 2025; Shahzad et al., 2026). Deficiencies in the ICT infrastructure that include inadequate high-speed broadband capability, unreliable local area networks, and adequate high-computing infrastructure to support real-time AI inference represent core roadblocks to achieving technological success (Idhalama & Nwachukwu, 2025; Adeyemi & Muhammed-Jamiu, 2025; Olatoye et al., 2025). It is worth noting that some of the limitations occur with different severity depending on whether the libraries in question operate in developing nations. Therefore, the trend regarding the adoption of artificial intelligence within libraries across the world may continue being polarized going forward.

Gaps in the Existing Literature

Although much work has been done in the field of literature reviewed, there are a few major gaps that exist. One, most studies have been done within the borders of one country, making comparisons across nations impossible. Two, different models of theoretical approach have been used without agreement being reached on which would be the best one to apply in the study of the adoption of artificial intelligence technology in LIS environment. Three, there is an absence of standardized questionnaire techniques that can provide similar data globally. The current study aims at filling the above research gaps by integrating results from 20 global research articles so as to harmonize regional data differences and by adopting a standard multidimensional questionnaire for cross-country analysis.

III. THEORETICAL FRAMEWORK

Three distinct but related theories will form the theoretical basis of this study in order to create a coherent framework to

understand AI adoption within the library information system.

Firstly, the Theory of Technology Acceptance Model (TAM) was developed by Davis in 1989. The TAM suggests that the two major factors predicting technology adoption are perception of its usefulness and ease of use. This theory has proven to be extremely useful in the field of library technology adoption studies (Yoon et al., 2022).

Additionally, the concept of Diffusion of Innovations (DOI) can further expand the current study's theoretical approach. According to the work by Rogers (1962/2003), DOI is concerned with how innovations become widespread within a social group over time. The five stages described by this theory include knowledge, persuasion, decision, implementation, and confirmation – all of which correlate to the reality of AI adoption within libraries (Ayinde et al., 2026).

The Technology-Organization-Environment (TOE) framework, proposed by Tornatzky and Fleischer (1990), represents another institutional approach that involves analyzing the relationship among technology attributes, organizational characteristics, and the environment to identify the conditions for adoption. The TOE model has also been used by Sang (2025) with regard to the adoption of AI in a Kenyan university library.

On the whole, these three frameworks have been integrated into an integrated, multilevel approach that encompasses the various levels at which technology adoption occurs, including individual perception (TAM), organizational or environmental constraints (TOE), and the innovation diffusion process (DOI). The combination of these different perspectives allows the questionnaire to go beyond focusing on individual variables, thus providing an all-encompassing evaluation of how AI adoption will be influenced by institutional and personal factors (Table I).

TABLE I THEORETICAL FRAMEWORKS APPLIED IN AI ADOPTION STUDIES IN LIBRARIES

Framework	Application Context	Key Reference(s)
TAM	Perceived usefulness, ease of use	Yoon et al., (2022)
TOE Framework	Technology-Organization-Environment adoption context	Sang, (2025)
UTAUT	Behavioral intention, facilitating conditions	Shahzad et al., (2025); Jabeen, (2025)
DOI Theory	Diffusion stages: awareness, interest, adoption	Ayinde et al., (2026)
Conceptual/ Mixed	Digital transformation, smart library services	Okunlaya et al., (2022); Shah et al., (2026)

Source: Compiled by authors from reviewed literature.

IV. METHODOLOGY

Research Design

The methodology adopted in this study is systematic narrative review and follows PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines. The total number of papers included in this analysis is 20 papers, published between 2022 and 2026. These papers were selected from Scopus, Web of Science, and Google Scholar databases in the disciplines of Library and Information Science, Educational Technology, and Information Systems.

In order to make the theory consistent in the research, concepts in TAM, DOI, and TOE were directly aligned to the dimensions of the survey, which ensured that each item is based on a particular determinant of AI usage.

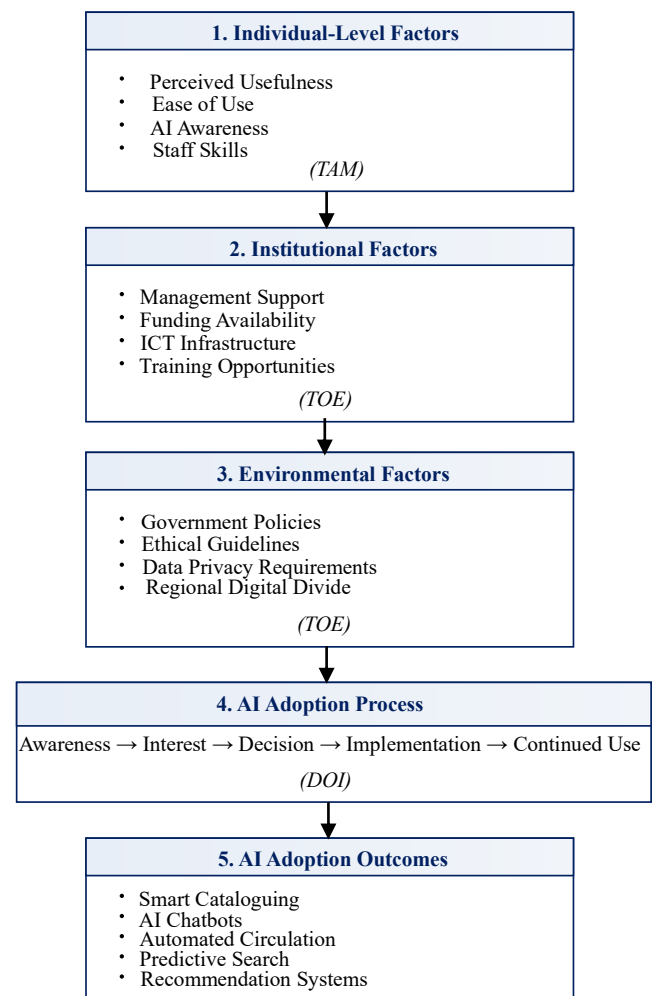


Fig. 1 Integrated Conceptual Framework for Artificial Intelligence Adoption in Library Information Systems

The integrated conceptual framework is illustrated in fig. 1. The conceptual framework is built in a hierarchical way whereby individual factors (TAM) and institutional/environmental factors (TOE) are independent variables influencing the adoption process (DOI) to finally lead to

implementation outcomes like smart cataloging, AI chatbots, and predictive searches.

Inclusion and Exclusion Criteria

These articles were considered relevant if:

- They directly focused on the topic of the adoption, readiness, and awareness of AI and its application in relation to the libraries or information services;
- They were published in English-language, peer-reviewed journals between 2022 and 2026; and
- They provided empirical findings or systematic reviews of empirical findings.

Those articles were excluded which were theoretical without any empirical basis, tangentially touched upon AI related to libraries, and those which did not have full texts available.

Data Analysis Plan

Data gathered from this instrument shall be processed via Python 3.10+, to guarantee replicability. Particularly, numerical analysis shall utilize NumPy and Pandas packages, whereas visual presentation of multi-dimensional adoption patterns in various geographic areas shall be facilitated by Matplotlib and Seaborn packages. This computational methodology allows for creation of a uniform data processing procedure, which translates raw survey data into reliable and replicable information.

Survey Instrument Development

In order to guarantee the replication of results, the survey was designed after a thorough process of operationalizing the constructs. All seven dimensions (Awareness, Adoption Status, Perceived Benefits, Challenges, Readiness, Institutional Factors, and Ethical Use) were formulated based on TAM, DOI, and TOE models. In addition, the questions in the survey were technically consistent throughout different languages and institutions, as a five-point Likert scale was

used to measure the responses (1=Strongly Disagree to 5=Strongly Agree).

V. GLOBAL PATTERNS OF AI ADOPTION IN LIBRARY INFORMATION SYSTEMS

Awareness and Exposure

Based on previous studies on this subject matter, it is evident that there is a noticeable trend regarding the moderate to high levels of awareness about artificial intelligence in the case of librarians from across the globe, although there is much variability in terms of the meaning of such awareness. For example, Giwa et al., (2024) found out that a large number of academic librarians in Nigeria exhibit a certain level of awareness concerning AI technology or applications. Additionally, relatively informed attitudes about AI were found out by Yoon et al., (2022) in North America.

Such differences in awareness levels can be traced back to discrepancies in professional development, internet access, and organizational culture. It is evident that the libraries of research universities demonstrate high awareness levels compared to smaller universities or teaching institutions (Jabeen, 2025).

Current Adoption Rates and Types of Applications

It would appear that in many cases studied, the actual use of AI in library operations is less widespread compared to people's awareness. The most prevalent uses of AI are search aids based on artificial intelligence technology, use of chatbots to help with references, library circulation automation, and AI-based recommendation systems. The more sophisticated AI technologies such as prediction of future developments for purposes of collection development and individualized learning paths through artificial intelligence technology are found in rich libraries of developed countries only.

Table II summarises the key AI applications, adoption challenges, and reference sources across geographic regions based on the reviewed literature.

TABLE II AI APPLICATIONS AND CHALLENGES IN LIBRARIES BY REGION

Region	AI Applications	Key Challenges	Key Reference(s)
Asia (China, Pakistan)	AI chatbots, smart cataloguing, ML-based retrieval	Infrastructure gaps, limited funding	Subuhpoto et al., (2026); Li, (2024)
Africa (Nigeria, Kenya)	Digital reference services, automated circulation	Skill deficits, resistance to change	Giwa et al., (2024)
South Asia (Bangladesh, India)	Predictive search, AI-driven user analytics	Low AI literacy, policy gaps	Begum & Elahi, (2025)
North America	Virtual assistants, NLP-based discovery tools	Privacy concerns, ethical considerations	Yoon et al., (2022)
Europe (Greece)	Automated metadata, semantic search	Budget constraints, training needs	Togia et al., (2026)
Middle East / Global	Smart library systems, recommendation engines	Sustainability, digital divide	Okunlaya et al., (2022); Adeyemi & Jamiu, (2025)

Source: Compiled by authors from reviewed literature

Enabling Factors

However, several common enablers for the use of artificial intelligence in libraries appear in all reviewed regional settings. Firstly, strong institutional leadership and management support have been positively linked to adoption in literature (Subuhpoto et al., 2026; Shah et al., 2026; Sang, 2025). Secondly, having ICT infrastructure in place, specifically high-speed internet access, computers and advanced computer hardware, as well as an advanced library management system, has been considered essential for adopting and successfully using the technology (Idhalama & Nwachukwu, 2025; Li, 2024). Thirdly, providing library workers with training on AI and encouraging professional development in terms of using the technology positively influences adoption (Jabeen, 2025; Shahzad et al., 2026). Finally, favorable policies that explicitly encourage or even mandate the use of AI in libraries can be considered an enabling factor.

Barriers and Challenges

The obstacles to adopting AI technologies in the library sector can be described as multi-dimensional, sometimes even being self-reinforcing. One of the most commonly discussed obstacles, one that is applicable across different

regions considered, is the skills gap existing amongst library staff (Begum & Elahi, 2025; Togia et al., 2026). The above lack can be directly attributed to an inadequacy of institutional funding directed towards professional training in the specific area of AI literacy, particularly in relation to data preparation, machine learning, and the ethical use of automation technologies.

Fiscal constraints represent a primary barrier, particularly for libraries in Sub-Saharan Africa, South Asia, and Eastern Europe, where insufficient budgetary allocations prevent the high capital expenditure required for AI-ready server infrastructure and the recurring operational costs of proprietary AI software licensing and cloud-based GPU services (Giwa et al., 2024). Organizational resistance remains a persistent barrier; this stems from apprehension regarding the potential displacement of traditional job roles, the friction associated with re-engineering established library workflows, and a lack of clear change-management strategies during the transition to AI-integrated systems (Yoon et al., 2022). Ethical barriers, specifically regarding algorithmic opacity, potential biases in predictive discovery tools, and the secure anonymization of sensitive patron data, present significant hurdles particularly as libraries must reconcile AI-driven personalization with established professional ethics regarding user privacy and intellectual freedom.

VI. PROPOSED SURVEY INSTRUMENT

Instrument Overview

TABLE III SURVEY QUESTIONNAIRE FOR ASSESSING AI ADOPTION IN LIBRARY INFORMATION SYSTEMS

Dimension	Survey Item	Response Type
Awareness & Knowledge	I am aware of AI tools used in libraries (e.g., chatbots, recommendation systems, predictive search).	Likert (1–5)
	I understand the potential benefits of AI for library operations.	Likert (1–5)
Current Adoption	My library currently implements AI technologies.	Yes/No
	Which AI applications are in use? (Select all that apply)	Multiple Choice: Chatbots, Smart cataloguing, Predictive search, Recommendation systems, Automated circulation, Other
Facilitators / Enablers	Leadership and management actively support AI adoption.	Likert (1–5)
	Adequate ICT infrastructure (high-speed internet, servers) is available for AI implementation.	Likert (1–5)
	Training and professional development for AI use is provided.	Likert (1–5)
	Financial resources are sufficient to support AI projects.	Likert (1–5)
Barriers / Inhibitors	Lack of staff skills prevents effective AI adoption.	Likert (1–5)
	Organizational resistance limits AI uptake.	Likert (1–5)
	Ethical concerns (privacy, algorithmic bias) hinder AI adoption.	Likert (1–5)
	Budget constraints affect the ability to adopt AI tools.	Likert (1–5)
Readiness	My library is technically prepared to adopt AI technologies.	Likert (1–5)
	Policies and procedures are in place to facilitate AI adoption.	Likert (1–5)
Perceived Benefits / Outcomes	AI adoption improves service quality.	Likert (1–5)
	AI adoption increases operational efficiency.	Likert (1–5)
	AI adoption enhances user satisfaction.	Likert (1–5)
	My library ensures AI tools comply with privacy regulations.	Likert (1–5)
Ethical Use & Responsible AI	My library takes measures to avoid bias in AI applications.	Likert (1–5)
	AI technologies are implemented responsibly without compromising ethical standards.	Likert (1–5)

The research methodology employed in the pursuit of the second objective of the study. To achieve the objective set forth by this research, a survey questionnaire has been created to reflect the theoretical framework discussed in the previous section. This survey questionnaire reflects various levels of factors that influence AI adoption in library information systems, such as personal, organizational, and environmental factors. The questionnaire operationalizes constructs drawn from the TAM model, the DOI model, and the TOE model to assess such measures as awareness, adoption, benefits, challenges, readiness, institutional factors, and ethical AI technology usage in libraries.

Table III serves as an exhaustive measuring instrument for assessing AI implementation in LISs. The survey questions are derived from the theoretical constructs of TAM, DOI, and TOE, which include seven dimensions, namely: awareness, current implementation, perceived benefits, challenges, readiness, organizational aspects, and ethics of application.

Table IV presents an overview of the instrument dimensions and their theoretical grounding.

TABLE IV SURVEY INSTRUMENT DIMENSIONS, ITEMS, AND THEORETICAL GROUNDING

Dimension	Survey Items	Theoretical Grounding
Awareness	AI tools known; exposure level	Giwa et al., (2024)
Adoption Status	Current use; type of tools deployed	Ayinde et al., (2026)
Perceived Benefits	Service quality; efficiency; user satisfaction	Li, (2024); Idhalama & Nwachukwu, (2025)
Challenges	Skills gap; infrastructure; resistance; ethics	Shahzad et al., (2025); Togia et al., (2026)
Readiness	Technical, financial, policy preparedness	Jabeen, (2025); Begum & Elahi, (2025)
Institutional Factors	Leadership support; funding; training policy	Sang, (2025); Shah et al., (2026)
Ethical Use	Privacy; bias; responsible AI	Olatoye et al., (2025); Adeyemi & Jamiu, (2025)

VII. DISCUSSION

Interpreting Global Adoption Patterns

The findings from the synthesis of the literature show that the utilization of AI by libraries is characterized by a rather heterogeneous landscape that is shaped differently by geographical location. The identified trend of high levels of awareness and low to moderate levels of adoption reflects the characteristics of technologies at the early and late majority stages of adoption according to the DOI model, with variations observed at the regional and individual level (Ayinde et al., 2026). It can also be said based on TAM that

although there is a generally positive perception of the usefulness of the AI tool, ease of use remains a problem due to low ICT knowledge.

The trend observed where high awareness coupled with low to medium adoption exists is consistent with technology at its early adoption phase. However, regional differences, previously blurred due to the use of varied research techniques, have become apparent using our unified TOE approach, which emphasizes the importance of institutions and environment on these findings.

Implications for Policy and Practice

There are various important implications of this literature review for library managers, policymakers, and LIS educators (Jabeen, 2025; Shahzad et al., 2026). There must be an absolute necessity for ongoing organizational commitment towards improving the skills and capabilities of the library staff concerning their proficiency in using AI technologies.

Secondly, access to scalable ICT infrastructure, defined as consistent high-speed data communication capabilities, cloud-computing storage, and high-performance computing (HPC) computing nodes, is key in handling the intense data-processing needs of intelligent library management applications (Adeyemi & Muhammed-Jamiu, 2025; Olatoye et al., 2025). Such frameworks should emphasize the application of privacy protection technologies, reduction of biases in training data, and use of explainable AI to promote institutional accountability and respect for user rights.

Next, to mitigate the identified financial barriers, libraries should adopt consortium-based models to share the substantial capital costs of infrastructure and negotiate tiered institutional pricing for AI platform subscriptions, thereby democratizing access to high-compute resources (Shah et al., 2026; Sang, 2025).

Moreover, in order to counteract this inertia within organizations, they need to put in place change management processes that explicitly outline how the use of AI-enabled automation would complement rather than displace the contributions of humans, thus creating a culture of symbiosis.

Utility of the Proposed Survey Instrument

This seven-dimensional survey instrument suggested in this paper provides an empirically sound and practical measurement instrument for future studies regarding the adoption of AI in libraries. Through the combination of constructs from TAM, DOI, and TOE models, the instrument is capable of measuring perceptions at individual level, organisational characteristics, and institutional/environmental variables all at once, addressing the problem with the single model approach seen in most previous literature. Furthermore, the survey can be used both as a self-administered questionnaire online or face-to-face

interview, hence allowing the study to take place anywhere in the world, even places where internet access is not readily available. Through offering a uniform seven-dimensional approach, this tool prevents any fragmentation in the methodology adopted by earlier research and acts as a yardstick to measure AI usage in LIS environments in the future.

VIII.CONCLUSION

In this study, a systematic review of the global literature has been conducted regarding the use of artificial intelligence in library information systems. The analysis is based on 20 studies published between 2022 and 2026, which explore the topic from a wide range of geographic and institutional perspectives. It is found that the process of AI adoption in libraries is increasing and uneven geographically, being driven by the interplay of personal attitudes, organizational capabilities, and environmental factors. The high level of knowledge of AI technologies among librarians is combined with relatively low adoption rates depending on the specific context, demonstrating the impact of skill-based, financial, technological, and ethical factors that are especially significant for developing countries' library systems. In this study, using a combination of TAM, DOI, and TOE approaches, a validated survey instrument consisting of seven dimensions has been developed. The instrument contributes to the existing body of research through a much-needed replication methodology for future work. It is evident that there is a need for more research using this instrument to conduct surveys on a national or even global scale in order to create a dataset that allows for effective policymaking and comparison across different nations. Adopting a longitudinal design in subsequent research will be extremely useful in observing how adoption rates evolve over time in relation to any interventions conducted in training programs or policy changes within the institution or even outside of it. Further qualitative and mixed-method studies can contribute to the research by offering insight into issues that are difficult to identify through quantitative research alone. Given the fact that an increasing portion of society is governed by algorithms nowadays, the ability of libraries to adapt and adopt such technology offers great opportunities to improve the services they provide to users.

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