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Challenges in Adopting Artificial Intelligence in Academic Libraries in Chhattisgarh: A Theoretical Perspective.

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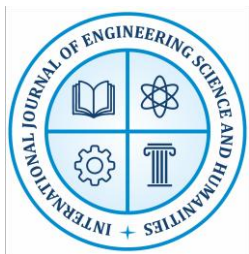
Abstract

Artificial Intelligence (AI) is increasingly transforming the functioning of academic libraries by supporting information discovery, automated reference services, intelligent search, recommendation systems, metadata generation, digitisation, plagiarism detection, user analytics, translation, summarisation and research assistance. However, the adoption of AI in academic libraries is not merely a technological transition; it involves infrastructural, financial, human-resource, ethical, organisational and policy-related challenges. This theoretical paper examines the major challenges associated with the adoption of AI in academic libraries in Chhattisgarh. The paper is based on a conceptual review of scholarly literature, professional reports and policy documents relating to AI, academic libraries, digital transformation and higher education. Two objectives guide the discussion: (1) to identify the major technological, organisational, human, financial and ethical challenges affecting AI adoption in academic libraries in Chhattisgarh; and (2) to develop a conceptual framework for responsible and sustainable AI adoption in academic libraries. The analysis indicates that inadequate digital infrastructure, limited AI-related competencies among library professionals, financial constraints, data-quality issues, privacy and security concerns, algorithmic bias, lack of institutional policies, vendor dependence and resistance to organisational change represent interconnected barriers. The paper argues that AI adoption should therefore be approached through a sociotechnical and human-centred framework rather than as a simple procurement exercise. The proposed framework emphasises infrastructure readiness, staff capacity building, data governance, ethical safeguards, institutional policy, phased implementation and continuous evaluation.

Keywords: Artificial Intelligence, Academic Libraries, AI Adoption, Library Automation, Chhattisgarh, Digital Libraries, Library Professionals, AI Ethics, Higher Education

1. Introduction

Academic libraries are undergoing a profound transformation as higher education progressively moves beyond conventional print-oriented information services towards digitally mediated, networked, data-intensive and increasingly intelligent information environments. The emergence of Artificial Intelligence (AI) represents a particularly consequential phase in this transformation because it extends the capabilities of traditional library automation from routine transaction



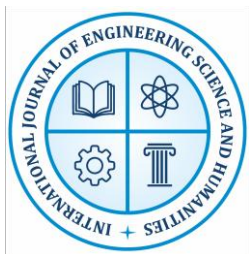
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processing towards systems capable of learning from data, recognising patterns, interpreting natural language, generating responses, predicting user needs and supporting complex decision-making. In this context, the contemporary academic library is increasingly conceptualised not merely as a repository of scholarly materials but as an intelligent knowledge infrastructure that integrates digital resources, computational technologies, human expertise and data-driven services. Asemi, Ko, and Nowkarizi (2021) observed that AI-based and intelligent systems possess considerable potential across several library functions, including information organisation, storage and retrieval, reference services, resource management and user-oriented applications.

The growing significance of AI in academic libraries is closely associated with the expanding volume, diversity and complexity of scholarly information. Contemporary researchers and students increasingly interact with electronic journals, institutional repositories, bibliographic databases, e-books, research datasets, multimedia resources and open-access platforms. Within such an information-intensive environment, conventional keyword-based retrieval mechanisms may not always adequately address increasingly sophisticated information needs. AI technologies, including machine learning, natural-language processing (NLP), knowledge graphs, recommender systems, intelligent search interfaces, chatbots and generative AI, can facilitate more context-sensitive and personalised interactions between users and information resources. These technologies can support semantic searching, automated question answering, recommendation of relevant scholarly materials, subject classification, metadata enrichment, text extraction, optical character recognition, translation, summarisation and research assistance. Recent systematic evidence indicates that reference and information services constitute one of the prominent areas of AI application in academic libraries, while funding and competency development remain important institutional challenges.

The transition from automation to intelligence is therefore conceptually important. Traditional library automation largely concentrated on digitising and streamlining predefined processes such as acquisition, cataloguing, circulation, serials control and bibliographic searching. AI-enabled library environments, in contrast, introduce a more adaptive technological paradigm in which systems can analyse large datasets, infer relationships, identify patterns and generate outputs based on probabilistic or learned models. Asemi et al. (2021) demonstrated that intelligent systems can be applied to both technical and public library services, thereby extending the technological possibilities of libraries beyond conventional automation. Consequently, AI should not be interpreted simply as another software package added to an existing library management system; rather, it represents a potentially transformative technological layer that can reshape workflows, professional competencies, service design and user-library interaction.



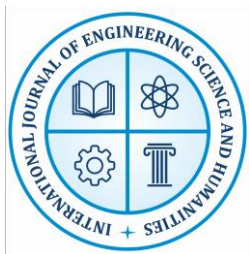
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AI also has considerable implications for the personalisation of academic library services. Recommendation algorithms can analyse patterns of resource use and potentially assist users in discovering related books, articles, databases and research materials. AI-supported reference services can provide immediate responses to routine enquiries, while NLP-based interfaces can allow users to formulate information requests in conversational language rather than relying exclusively on controlled vocabularies or complex search syntax. Similarly, AI-supported metadata generation and classification can assist librarians in processing increasingly large digital collections. These applications may contribute to greater efficiency, responsiveness and accessibility; however, their effectiveness depends upon the quality of underlying data, system design, institutional infrastructure and professional oversight. Zondi et al. (2024), in their review of AI implementation in academic library services, identified infrastructure limitations, financial constraints and shortages of specialised expertise as significant barriers, particularly within developing-country contexts.

The transformation also has important implications for the professional role of librarians. AI does not necessarily imply the disappearance of professional librarianship; instead, it can alter the nature of professional work and the competencies required for effective service delivery. Cox (2023) argues that AI is likely to affect academic library work and consequently raises questions concerning professional competencies, occupational roles and the future configuration of library work. Librarians may increasingly be required to develop competencies in data literacy, AI literacy, prompt formulation, algorithmic awareness, digital scholarship, information ethics, privacy protection and critical evaluation of AI-generated information. Thus, technological adoption without corresponding human-capacity development may produce underutilised systems or inappropriate applications. The issue is consequently not only whether an institution can procure AI-enabled technologies but whether its library workforce can understand, evaluate, govern and effectively integrate those technologies into scholarly information services.

At the same time, the incorporation of AI introduces a complex set of ethical, legal and epistemological considerations. AI systems may generate inaccurate, incomplete or misleading information; reproduce biases embedded within training datasets; obscure the provenance of information; and create challenges concerning privacy, intellectual property and accountability. These concerns become particularly significant in academic libraries because libraries traditionally operate according to professional principles of intellectual freedom, equitable access, privacy, transparency and responsible information stewardship. The International Federation of Library Associations and Institutions (IFLA) emphasises that AI presents both opportunities for equitable access to knowledge and significant ethical and societal concerns, requiring libraries to engage with AI through principles of responsibility, inclusiveness, privacy,



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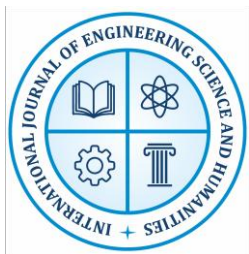
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openness and accountability. Similarly, IFLA's 2025 statement on copyright and AI highlights the importance of legitimate access to datasets, text-and-data mining, copyright considerations and institutional capacity-building when libraries engage with AI technologies.

The ethical dimension has become even more prominent with the rapid emergence of generative artificial intelligence (GenAI). Tools based on large language models have introduced new possibilities for conversational reference assistance, summarisation, translation, research support and content generation. Nevertheless, their probabilistic nature creates concerns regarding factual accuracy, fabricated references, bias, data privacy, authorship and academic integrity. UNESCO (Miao & Holmes, 2023) advocates a human-centred approach to generative AI in education and research, emphasising ethical validation, privacy protection, appropriate regulation and institutional capacity development. For academic libraries, this suggests that AI adoption should be accompanied by information-literacy initiatives that enable students, researchers and faculty members to critically evaluate AI-generated outputs rather than treating them as inherently authoritative.

The Indian higher education ecosystem provides an important institutional setting for examining these developments. The University Grants Commission (UGC) has increasingly emphasised digital transformation, emerging technologies and institutional capacity development within higher education. Its Guidelines for Institutional Development Plans for Higher Education Institutions identify AI, machine learning, data analytics and other emerging technologies as important components of future-oriented skills and institutional development. The guidelines also recognise the importance of digital infrastructure, including high-speed connectivity, ICT systems, digital information access and data-management capabilities. Significantly for academic libraries, the UGC guidelines identify the development and updating of digital libraries and the provision of ubiquitous access to digital books, journals, periodicals and other scholarly resources as important institutional functions. They further refer to the use of AI and other information and communication technologies for automating services.

Within this national context, academic libraries in Chhattisgarh represent an important but comparatively under-examined setting for investigating AI adoption. The state's higher education landscape encompasses universities, government and private colleges, professional institutions and research-oriented organisations that differ substantially in their technological infrastructure, financial resources, staffing patterns, digital maturity and institutional priorities. Such heterogeneity means that AI adoption cannot reasonably be assumed to occur uniformly across the state. Institutions with advanced ICT infrastructure, reliable high-speed connectivity, established digital repositories, adequate library budgets and technically competent personnel



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may possess considerably greater capacity to experiment with and implement AI-enabled services than resource-constrained institutions.

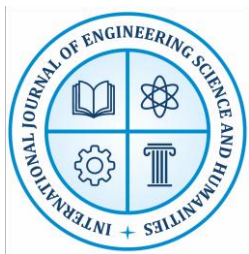
Accordingly, the central issue is not simply whether AI technologies are available to academic libraries, but whether libraries possess the broader conditions required for their sustainable adoption. These conditions may include technological infrastructure, financial resources, staff competencies, leadership support, data quality, interoperability, cybersecurity, ethical governance, institutional policies and mechanisms for continuous evaluation. Recent international literature similarly indicates that successful AI implementation requires careful planning, adequate funding, collaboration and proactive institutional support rather than technology procurement alone (Zondi et al., 2024).

Therefore, the study of challenges in adopting Artificial Intelligence in academic libraries in Chhattisgarh requires an integrated institutional perspective. Technological barriers may include inadequate hardware, connectivity and interoperability; financial barriers may involve acquisition, licensing, maintenance and infrastructure costs; human-resource barriers may arise from insufficient AI, data and digital-literacy competencies; while organisational barriers may involve limited strategic planning, weak leadership support and inadequate institutional policies. In addition, ethical and governance-related challenges concerning privacy, algorithmic bias, copyright, transparency, accountability and responsible use require systematic attention. Recent research on AI implementation strategies in academic libraries similarly emphasises the need for institutional preparedness and structured implementation approaches rather than fragmented technological experimentation.

AI adoption in academic libraries should be understood as a multidimensional process of institutional transformation rather than a narrowly technological intervention. The successful transition towards intelligent academic libraries depends upon the alignment of infrastructure, financial capacity, human competencies, data governance, ethical safeguards and service objectives. In the context of Chhattisgarh, examining these dimensions is particularly significant because variations in institutional readiness may determine whether AI becomes an effective mechanism for improving scholarly information services or remains an underutilised technological investment. The present perspective therefore positions AI adoption as a process requiring readiness assessment, capacity building, responsible governance, strategic implementation and continuous evaluation, thereby providing a substantive foundation for investigating the major challenges confronting academic libraries in Chhattisgarh.

2. Background of AI in Academic Libraries

Artificial Intelligence (AI) has progressively evolved from a specialised field of computer science into a general-purpose technological capability with implications for education, research,



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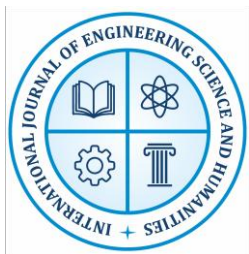
information management and knowledge services. Broadly, AI refers to computational systems designed to perform functions that traditionally require aspects of human cognitive capability, such as learning, reasoning, pattern recognition, natural-language processing, prediction, classification and decision support. In the library and information-science domain, AI is increasingly understood not as a single technology but as an interconnected group of computational approaches—including machine learning, natural-language processing, computer vision, recommender systems, intelligent agents, generative AI and predictive analytics—that can augment the acquisition, organisation, discovery, interpretation and delivery of information. IFLA notes that AI is already associated with familiar information activities such as recommendation, auto-suggestion, transcription, text summarisation, translation and plagiarism detection, while also creating new possibilities for making library collections more accessible and machine-readable.

The emergence of AI represents an important transition from conventional library automation towards intelligent and adaptive library environments. Traditional automation primarily sought to computerise established workflows, including cataloguing, circulation, acquisition, serials management and bibliographic searching. AI, by contrast, can analyse large volumes of structured and unstructured data, identify relationships and patterns, generate predictions, interpret natural-language queries and support context-sensitive interactions. Consequently, AI has the potential to transform libraries from systems that primarily facilitate access to information into environments that can actively assist users in discovering, interpreting and managing scholarly knowledge. A recent systematic review of AI adoption in academic libraries identified applications across technical services, reference and information services, administration and circulation, collection development, information literacy and user education, and professional development and collaboration.

Major Areas of AI Application in Academic Libraries

AI can be integrated into a broad spectrum of academic-library functions. One important area is intelligent discovery and information retrieval. AI-supported discovery systems can move beyond simple keyword matching by analysing semantic relationships between concepts, documents and user queries. Such systems can potentially improve the precision and relevance of search results, particularly when users formulate information needs in natural or conversational language. Recent developments in AI-enabled discovery have further strengthened interest in semantic search, personalised retrieval and conversational interfaces within scholarly information environments.

A second major application is AI-based reference and virtual assistance. Chatbots and conversational agents can respond to routine enquiries, guide users towards appropriate



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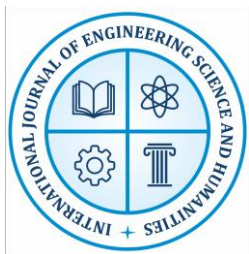
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databases and resources, explain library procedures and provide preliminary assistance outside conventional service hours. A systematic review of AI applications in academic reference services found that natural-language processing and self-learning techniques have been used in university libraries, although concerns remain regarding response quality, privacy, bias, linguistic limitations, cost, network infrastructure, training and the availability of specialised expertise.

AI also offers substantial possibilities in metadata generation, classification and subject indexing. Academic libraries manage increasingly large digital collections in which manual description and metadata creation can be time-consuming. AI can assist librarians by generating preliminary metadata, identifying named entities, extracting keywords, classifying documents and producing summaries. IFLA identifies descriptive AI as particularly relevant to libraries because computer vision, speech-to-text and related techniques can help transform photographs, manuscripts, audiovisual materials and other special collections into machine-readable information and improve their discoverability. Importantly, AI-generated metadata should generally be understood as an augmentation of professional work rather than an unconditional replacement for expert cataloguing and subject analysis.

Another significant domain is digitisation and document processing. Optical Character Recognition (OCR), computer vision and intelligent document-processing technologies can facilitate the conversion of scanned materials into searchable digital text. These capabilities are particularly relevant for historical collections, institutional repositories and special collections containing manuscripts, photographs, newspapers and other non-machine-readable materials. AI-assisted transcription and description can potentially reduce repetitive processing requirements and increase access to previously difficult-to-search collections. IFLA similarly identifies transcription, translation, summarisation and content description as areas in which AI can improve access to knowledge.

AI can further contribute to research support and scholarly communication. Researchers increasingly require assistance in literature discovery, document screening, summarisation, citation analysis, thematic identification and research-data management. AI-supported tools can assist with identifying potentially relevant literature, extracting information from large document sets and organising research materials. Libraries may consequently expand their role from conventional information provision towards AI-supported research facilitation and digital scholarship. IFLA observes that as researchers increasingly employ AI in their own scholarly activities, libraries may have an expanding role in supporting data discovery, copyright, data management and preservation.



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Recommendation systems and user-behaviour analytics constitute another emerging area. By analysing patterns of resource utilisation, searches and interactions, AI systems can potentially identify relationships among information resources and generate personalised recommendations. Such applications may assist users in discovering relevant books, articles, databases and related scholarly materials. At the institutional level, analytics can also support collection-development decisions by identifying usage trends and potentially helping libraries understand changing information requirements.

AI has also become increasingly relevant to multilingual information access. Translation technologies can reduce language barriers by facilitating access to scholarly information across linguistic boundaries. This is particularly significant in multilingual educational environments such as India, where users may interact with information resources in English as well as regional and national languages. IFLA specifically recognises improved translation as one of the potential ways in which AI can strengthen access to information and knowledge.

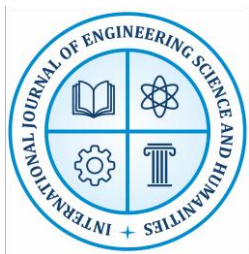
Emerging Role of Generative AI

The rapid emergence of Generative Artificial Intelligence (GenAI) has expanded the scope of AI applications in academic libraries. Large language models and related generative systems can produce natural-language responses, summaries, translations and other forms of textual content. For libraries, this creates possibilities for conversational reference assistance, research guidance, information-literacy instruction, summarisation and support for routine documentation. However, generative AI also introduces distinctive concerns, including inaccurate or fabricated information, inadequate source attribution, algorithmic bias, privacy risks, copyright questions and difficulties in explaining how particular outputs have been generated. IFLA consequently emphasises that libraries should approach AI through principles such as privacy, openness, accountability, equitable access and responsible use.

The increasing relevance of these issues has resulted in a shift from asking “What can AI do for libraries?” towards a more comprehensive question: “Under what institutional, professional and ethical conditions can AI be responsibly adopted by libraries?” This distinction is particularly important because technological availability does not automatically translate into successful institutional adoption.

Barriers and Institutional Challenges

Despite its considerable potential, AI adoption is associated with substantial technological, financial, human and organisational barriers. IFLA identifies ethical concerns, limited staff skills, cost, organisational culture, data availability and quality, uncertainty regarding value, and the lack of suitable turnkey solutions among the important barriers confronting libraries. A recent systematic review of academic-library AI adoption similarly found that funding was one of the



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most frequently reported institutional challenges, with 14 of 29 reviewed studies identifying funding as a major barrier. The review also emphasised the importance of retraining librarians to develop competencies related to AI-enhanced communication tools, chatbot integration and prompt engineering.

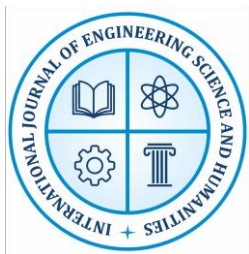
Human-resource preparedness is therefore a critical dimension of AI adoption. Librarians may require competencies in AI literacy, data literacy, algorithmic awareness, prompt formulation, digital research methods, privacy, copyright and critical evaluation of AI-generated information. IFLA argues that AI literacy can build upon the established information-literacy role of libraries, incorporating an understanding of how AI systems work, what kinds of problems they can appropriately address, and the implications of bias, privacy, explainability and social impact.

The Indian context provides further empirical evidence of the growing importance of user perceptions and AI awareness. Haris et al. (2025) investigated AI perceptions and adoption among academic-library users in India using 383 responses. Their analysis examined relationships between demographic characteristics and AI-related knowledge, perceptions and attitudes. The study reported that educational level was associated with differences in AI knowledge, while gender and age did not show significant differences in perceptions in the analysed sample. This finding reinforces the importance of examining not only institutional infrastructure but also the knowledge, awareness and preparedness of library users when considering AI adoption.

Conceptual Understanding of AI Adoption

Taken together, the literature indicates that AI adoption in academic libraries is a multidimensional institutional phenomenon. It cannot be adequately measured merely by the presence or absence of an AI tool. Rather, meaningful adoption requires the alignment of several interdependent dimensions:

1. Technological readiness – adequate hardware, connectivity, software, interoperability, cybersecurity and digital infrastructure.
2. Financial readiness – sustainable funding for acquisition, licensing, integration, maintenance and technological upgrading.
3. Human-resource readiness – librarians and technical personnel possessing appropriate AI, data and digital competencies.
4. Organisational readiness – leadership support, strategic planning, institutional policies, collaboration and organisational capacity for change.
5. Data readiness – availability, quality, interoperability, accessibility and responsible governance of library and user data.



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6. Ethical and legal readiness – mechanisms addressing privacy, bias, transparency, accountability, copyright, intellectual property and responsible AI use.
7. User readiness – students, researchers and faculty possessing sufficient AI and information literacy to interact critically and responsibly with AI-enabled library services.

Accordingly, AI adoption should be conceptualised as a continuous process of technological integration, professional adaptation, organisational learning and ethical governance, rather than as a one-time procurement decision. IFLA's recent guidance similarly encourages libraries to evaluate both the opportunities and risks associated with AI and to undertake collaborative, informed decision-making grounded in established library values.

3. Need for the Study

The increasing availability of generative AI and machine-learning applications has created new possibilities for academic libraries. However, technological availability does not automatically result in successful institutional adoption.

For academic libraries in Chhattisgarh, several contextual questions become important:

1. Are existing hardware and network infrastructures sufficient for AI-enabled services?
2. Do librarians possess adequate AI and data-literacy competencies?
3. Can institutions allocate sustainable financial resources for AI systems?
4. Are library databases sufficiently clean, structured and interoperable?
5. Are policies available for privacy, copyright, data protection and responsible AI use?
6. Can libraries evaluate the accuracy and reliability of AI-generated information?
7. How can institutions prevent AI from weakening professional judgement and information literacy?

These questions establish the need for a theoretical examination of AI adoption challenges in the state's academic-library environment.

4. Objectives of the Study

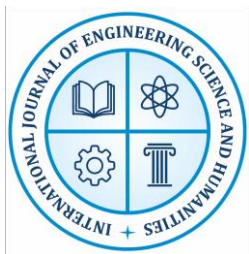
1. To identify and analyse the major technological, financial, human-resource, organisational, data-related and ethical challenges associated with the adoption of Artificial Intelligence in academic libraries in Chhattisgarh.
2. To develop a conceptual framework for responsible, sustainable and human-centred adoption of Artificial Intelligence in academic libraries in Chhattisgarh.

5. Methodology

The present study is theoretical and conceptual in nature. It does not employ a primary survey or generate statistical estimates from librarians or library users in Chhattisgarh.

The study is based on a structured conceptual review of:

- scholarly literature on AI and academic libraries;



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- professional library literature;
- international guidance on responsible AI;
- higher-education policy documents;
- AI risk-management frameworks; and
- literature concerning digital transformation and library automation.

The conceptual analysis uses the sociotechnical perspective as its principal theoretical orientation. Under this perspective, successful AI adoption depends on the interaction between technology, people, organisational structures, data and institutional policies.

The NIST AI Risk Management Framework provides an additional governance perspective through four functions—Govern, Map, Measure and Manage—for addressing AI-related risks.

7. Major Challenges in AI Adoption

1. Inadequate Technological Infrastructure

AI-enabled library services require reliable internet connectivity, adequate computing resources, appropriate library-management systems, interoperable databases and secure digital environments.

Institutions with limited infrastructure may find it difficult to implement sophisticated AI applications. In such situations, the problem is not simply the absence of AI software but the absence of the technical ecosystem required to operate it effectively.

For academic libraries in Chhattisgarh, infrastructural variation between institutions can therefore become an important determinant of AI readiness.

7.2 Financial Constraints

AI adoption may involve expenditure on:

- software;
- cloud services;
- servers;
- APIs;
- cybersecurity;
- database integration;
- professional training;
- maintenance; and
- technical support.

The initial cost may be accompanied by recurring subscription and maintenance expenditure. Consequently, institutions need to evaluate total cost of ownership rather than treating AI adoption as a one-time purchase.



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7.3 Lack of AI Competencies among Library Professionals

AI changes the competency requirements of library professionals. Traditional competencies in cataloguing, classification, reference service and information retrieval remain important, but librarians increasingly require knowledge of:

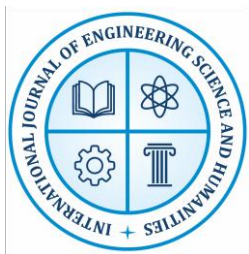
- AI literacy;
- prompt formulation;
- data literacy;
- machine-learning concepts;
- AI evaluation;
- privacy;
- copyright;
- algorithmic bias;
- cybersecurity; and
- digital ethics.

UGC regulations already recognise computerisation, automation, digitalisation and innovative library services as relevant components of professional library development.

The challenge is therefore not the replacement of librarians by AI, but the transformation of librarian competencies.

Table 1: Major Challenges Affecting AI Adoption in Academic Libraries in Chhattisgarh

S. No.	Challenge Dimension	Major Challenge	Possible Implication for Academic Libraries
1	Technological	Inadequate hardware, connectivity and system interoperability	Limits implementation of AI-enabled services
2	Financial	High acquisition, subscription and maintenance costs	Restricts adoption, particularly in resource-constrained institutions
3	Human Resources	Limited AI and data-literacy competencies	Reduces effective utilisation of AI systems
4	Data	Poor-quality, incomplete or	Can reduce accuracy of AI outputs



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		unstructured data	
5	Privacy	Collection and processing of user data	Creates confidentiality and data-protection concerns
6	Cybersecurity	Vulnerability of digital information systems	Increases institutional and user risks
7	Ethical	Bias, opacity and unreliable AI-generated information	Can affect equitable access and information quality
8	Organisational	Resistance to technological and workflow changes	Slows institutional adoption
9	Policy	Lack of institutional AI governance policies	Produces inconsistent and potentially unsafe AI use
10	Vendor Dependence	Dependence on external commercial platforms	May reduce institutional control over data and systems
11	Copyright	Uncertainty regarding AI-generated and AI-processed content	Creates legal and scholarly communication concerns
12	User Literacy	Limited ability to critically evaluate AI-generated information	May increase misinformation and inappropriate reliance on AI

Source: Conceptual synthesis based on the reviewed literature and policy frameworks. IFLA identifies ethics, staff skills, cost, organisational culture, data quality and lack of turnkey solutions among barriers to library AI implementation.

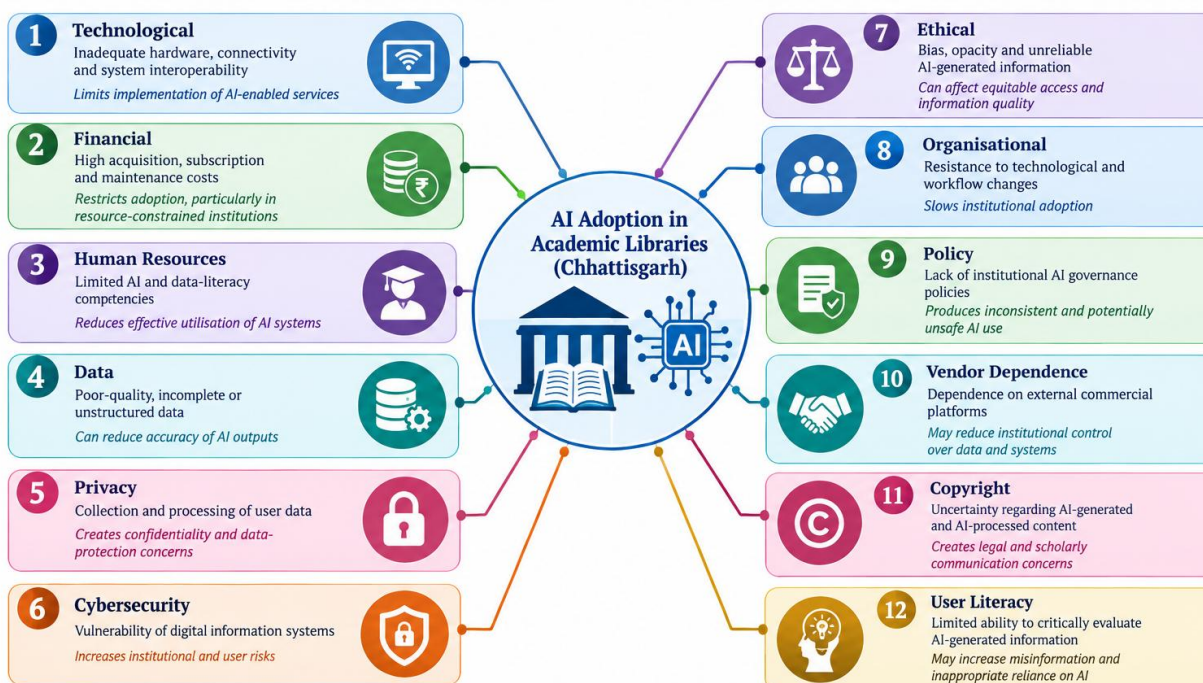
Table 1 demonstrates that the challenges associated with AI adoption are multidimensional rather than exclusively technological. Infrastructure and financial resources constitute the basic enabling conditions, but their presence alone does not guarantee successful implementation.

The human-resource dimension is particularly important because AI-based services require library professionals who can evaluate system outputs rather than merely operate software. Data quality also has a direct conceptual relationship with AI effectiveness: unreliable or incomplete library data can contribute to unreliable outputs.

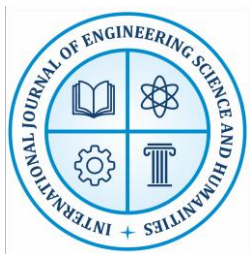
The ethical dimension is equally significant. AI systems may process user queries, reading interests, research behaviour and other forms of information. Consequently, privacy, cybersecurity and responsible data governance must be integrated into AI adoption from the beginning.

The table further indicates that institutional policy is a cross-cutting requirement. Without appropriate governance, individual departments or librarians may use AI tools inconsistently, creating differences in data handling, quality control and professional practice.

Figure 1: Major Challenges Affecting AI Adoption in Academic Libraries in Chhattisgarh



Source: Conceptual synthesis based on the reviewed literature and policy frameworks.
IFLA identifies ethics, staff skills, cost, organisational culture, data quality and lack of turnkey solutions among barriers to library AI implementation.



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9. AI Adoption and the Human Dimension

A major misconception concerning AI in libraries is that technological adoption necessarily implies workforce replacement. A more appropriate interpretation is that AI may redistribute professional work.

Routine activities may increasingly be automated, while librarians may devote greater attention to:

- research consultation;
- information-literacy education;
- scholarly communication;
- digital curation;
- research-data support;
- copyright guidance;
- AI literacy; and
- critical evaluation of information.

Thus, professional transformation rather than simple technological substitution should be the principal conceptual focus.

10. Data Quality and Information Reliability

Academic libraries operate with bibliographic, institutional, user and scholarly data. AI systems depend heavily on the quality of the underlying data.

Poor metadata can produce:

- inaccurate recommendations;
- incorrect classifications;
- irrelevant search results;
- incomplete discovery;
- inappropriate summarisation; and
- misleading associations.

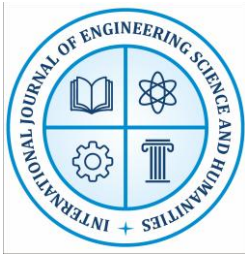
Generative AI introduces an additional problem: systems may produce fluent but inaccurate information. Consequently, librarians need to maintain a clear distinction between **AI-assisted information discovery and verified scholarly information**.

Human verification remains essential, particularly in research-oriented library services.

11. Privacy and Ethical Challenges

Academic libraries have traditionally valued confidentiality and intellectual freedom. AI introduces new questions because intelligent systems may process user interactions and behavioural data.

Potential concerns include:



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- user-search histories;
- borrowing records;
- reading patterns;
- research interests;
- personal identifiers;
- institutional credentials; and
- interaction data with AI systems.

UNESCO's guidance emphasises that institutions need policies capable of protecting privacy and ensuring ethical, safe, equitable and meaningful use of generative AI.

Therefore, AI adoption in academic libraries should incorporate privacy-by-design principles.

12. Algorithmic Bias and Equity

AI systems learn from datasets and therefore may reproduce biases present in those datasets.

In academic libraries, bias may affect:

- search rankings;
- recommendations;
- automated subject classification;
- language representation;
- knowledge visibility; and
- access to scholarly information.

This is particularly relevant in multilingual and culturally diverse environments. AI systems should therefore be evaluated for language coverage, cultural representation and accessibility rather than being judged solely on technical performance.

13. Institutional and Policy Challenges

Successful AI implementation requires institutional leadership.

Libraries should develop policies addressing:

1. permitted AI applications;
2. user-data protection;
3. copyright;
4. AI-generated content;
5. verification requirements;
6. procurement standards;
7. vendor accountability;
8. cybersecurity;
9. staff training; and
10. periodic evaluation.



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The UGC's Institutional Development Plan framework recognises emerging technologies such as AI and machine learning and also highlights the development and updating of digital libraries. This provides a broader policy context for integrating AI within institutional digital-development strategies.

Table 2: Conceptual Framework for Responsible AI Adoption

Stage	Core Requirement	Proposed Institutional Action	Expected Outcome
1	Institutional Readiness	Establish AI vision, leadership and implementation committee	Strategic direction
2	Infrastructure Readiness	Strengthen connectivity, hardware, digital systems and interoperability	Technical preparedness
3	Human Capacity	Conduct continuous AI, data and digital-literacy training	Competent library workforce
4	Data Governance	Clean metadata and establish data-quality standards	More reliable AI outputs
5	Ethical Governance	Develop privacy, copyright, bias and transparency policies	Responsible AI environment
6	Pilot Implementation	Introduce AI gradually in selected library services	Controlled experimentation
7	Human Oversight	Require professional verification of critical AI outputs	Quality assurance
8	User Literacy	Train students and researchers in critical AI use	Responsible user behaviour
9	Evaluation	Monitor accuracy,	Evidence-based



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		cost, usability, equity and security	improvement
10	Institutional Scaling	Expand successful applications across library services	Sustainable AI integration

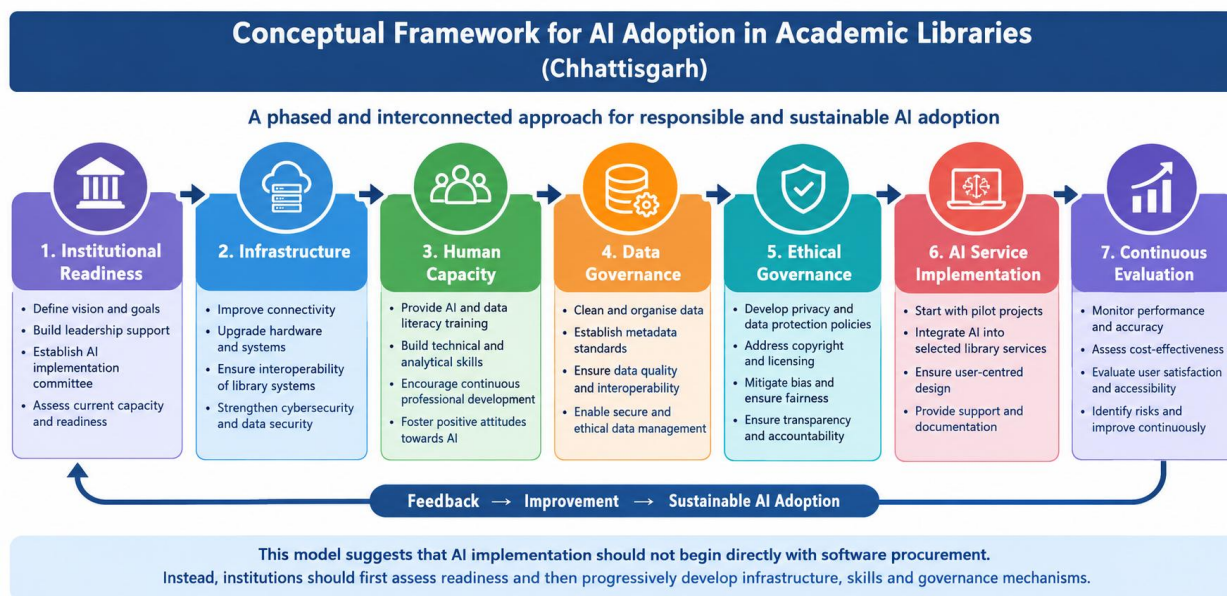
Table 2 proposes a phased model of AI adoption rather than immediate large-scale implementation. The first stage involves institutional readiness, because AI adoption requires leadership and coordination across library, IT and academic administration.

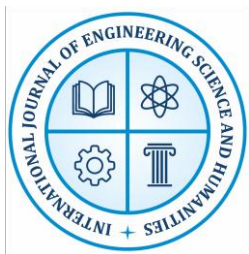
The second and third stages emphasise infrastructure and human capacity. These are foundational because sophisticated AI systems cannot be effectively used where connectivity, systems integration or professional expertise is inadequate.

The fourth and fifth stages address data and ethics. These are particularly important because AI reliability depends partly on the quality of its underlying data, while responsible implementation requires privacy, transparency and accountability.

Pilot implementation is recommended before institutional scaling. This allows academic libraries to evaluate AI applications in specific services and identify technical, financial and ethical problems before wider deployment.

The final stages emphasise human oversight and continuous evaluation. AI should therefore be treated as an **assistive institutional technology operating under professional and organisational governance**, rather than as an autonomous replacement for library expertise.





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14. Discussion

The theoretical analysis demonstrates that AI adoption in academic libraries is a complex organisational phenomenon. The central challenge is not simply whether AI technology is available but whether academic libraries possess the institutional capacity to use it responsibly.

The literature indicates a convergence around several major concerns. IFLA's analysis identifies ethics, staff skills, commercial costs, organisational culture and data quality as significant barriers. Similarly, recent research on AI and analytics in academic libraries emphasises both technical and social dimensions of adoption and identifies training and collaboration as important considerations.

The Chhattisgarh context therefore requires an approach that recognises institutional diversity. A common AI-adoption model may not be equally appropriate for every university and college library. Instead, implementation should be based on institutional readiness.

The proposed framework also aligns with the broader principles of AI risk management. NIST conceptualises AI risk management through the functions of governing, mapping, measuring and managing risk. This approach can be adapted conceptually to library environments by establishing governance, identifying risks, evaluating system performance and continuously managing emerging problems.

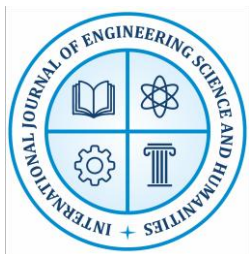
15. Conclusion

Artificial Intelligence presents substantial opportunities for the transformation of academic libraries, but its adoption also creates a complex set of technological, financial, human, organisational, data-related and ethical challenges. In the context of Chhattisgarh, these challenges need to be understood in relation to differences in institutional resources, digital infrastructure, professional competencies and organisational readiness.

The theoretical analysis demonstrates that successful AI adoption cannot be achieved merely through the acquisition of AI software. Infrastructure, data quality, professional competence, institutional policy, ethical governance and continuous evaluation must develop simultaneously.

The proposed framework places institutional readiness, infrastructure, human capacity, data governance, ethical safeguards, pilot implementation, human oversight and continuous evaluation at the centre of AI adoption. Such an approach is consistent with broader responsible-AI frameworks that emphasise governance, risk identification, measurement and management.

For academic libraries in Chhattisgarh, therefore, the future of AI should be conceptualised not as technological replacement but as human-centred augmentation of professional library services. AI can support librarians in routine and analytical activities, while professional judgement, scholarly verification, ethical responsibility and user-centred service remain essential.



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16. Implications for Academic Libraries in Chhattisgarh

The theoretical findings suggest several implications.

- **For University Authorities**

University administrations should treat AI adoption as part of institutional digital transformation rather than as an isolated library project.

- **For Library Professionals**

Librarians need continuous professional development in AI literacy, data management, information verification, copyright, privacy and ethical AI use.

- **For Library and IT Departments**

AI implementation should be collaborative. Library professionals possess domain knowledge, whereas IT professionals provide technical expertise. Joint decision-making can improve implementation quality.

- **For Policy Makers**

Higher-education authorities should encourage institutional AI-readiness frameworks that address infrastructure, training, ethics, data governance and accessibility.

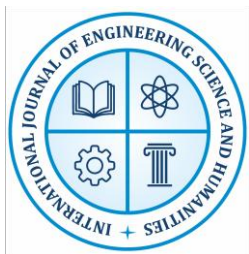
- **For Users**

Students and researchers should be trained to distinguish AI-generated responses from authoritative scholarly information and to verify AI-generated claims against reliable academic sources.

17. Recommendations

Based on the theoretical analysis, the following measures are proposed:

1. Conduct an AI-readiness audit of academic libraries before implementation.
2. Develop institutional AI policies covering privacy, copyright, security, transparency and accountability.
3. Establish continuous professional-development programmes for librarians.
4. Strengthen digital infrastructure and interoperability between library systems.
5. Improve metadata and data quality before introducing advanced AI applications.
6. Begin with low-risk pilot projects rather than immediate large-scale implementation.
7. Maintain human oversight for important information and research services.
8. Evaluate commercial AI vendors for privacy, transparency, interoperability and long-term sustainability.
9. Develop AI-literacy programmes for students and researchers.
10. Establish periodic evaluation mechanisms to measure accuracy, usability, cost-effectiveness, accessibility and ethical performance.



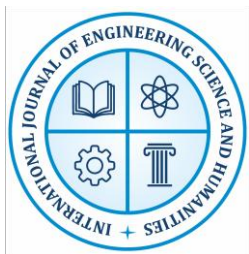
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11. Encourage collaboration between librarians, IT professionals, faculty and institutional administrators.
12. Promote multilingual and inclusive AI services suitable for the linguistic and cultural context of users.

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