

ARTIFICIAL INTELLIGENCE-BASED SERVICES IN LIBRARIES: THE CASE STUDY OF THE CHOSEN LIBRARIES AT THE UNIVERSITY OF DELHI

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Abstract

Artificial Intelligence (AI) is becoming dominant in the nature of academic library discovery, reference, access and research support services. This paper suggests and outlines a multi-site research of AI-facilitated practices and applications in the selected libraries of Delhi: Delhi University Library System (DU), Jawaharlal Nehru University (JNU), National Law University Delhi (NLUD), Jamia Millia Islamia (Jamia), Guru Gobind Singh Indraprastha University (IPU), and Dr. B.R. Ambedkar University Delhi (AUD). Using international policy recommendations and the latest findings on chatbots, AI-based discovery, analytics, and responsible adoption, the article establishes a research design to trace AI preparedness, find use-cases and limitations, as well as assess user and staff perceptions. The suggested methodology relies on the mixed-method design (service audit, surveys, interviews, and the analysis of documents) and suggests an effective framework of data interpretation. The research will help in making practical suggestions on how governance, ethics, privacy, inclusion, training, and procurement should be approached to align the use of AI with the fundamental academic library principles, which include intellectual freedom, equitable access, and user trust. (repository.ifla.org)

Keywords: Competencies; Emerging Skills; Library Professionals; User's Expectations; Electronic Environment

1. INTRODUCTION

The university ecosystem of academic libraries in Delhi works in a high-demand setting: huge population of users, interdisciplinary programs, rapid growth of e-resources, and increasing requirements to provide 24x7 digital services. Libraries are hence embracing new high information systems (discovery platforms, IRs, remote access, federated search and analytics). In this regard, AI is no longer a hypothetical technology of the future, but rather a collection of working capabilities natural language interfaces, recommender systems, automated metadata enrichment, predictive analytics, intelligent search ranking and conversational reference services.

Nonetheless, AI in libraries also introduces professional and regulatory issues: how algorithmic decisions are made transparent, risks of privacy and surveillance, automated classification and retrieval bias, and the blurring of the boundary between the assisted and

automated judgment of the professional. According to the policy interventions created by IFLA, the implementation of AI in libraries should be characterized by ethical principles, privacy concerns, accessibility, and a sense of intellectual freedom. (repository.ifla.org)

The article hence creates a systematic scholarly research design + interpretive paradigm to investigate AI implementations in some of the libraries of Delhi university-DU, JNU, NLUD, Jamia, IPU, and AUD, in such a way that the adoption of AI is not judged solely on efficiency, but also on the impact of AI to users, trust and governance.

2. IDEA AND VISION: AI IN LIBRARIES

Artificial Intelligence in libraries is the application of computational methods, which simulate, or enhance, human cognitive activity, such as the interpretation of queries in natural language, metadata classification and extraction, user needs prediction, summaries, or automated repetitive decisions. AI is usually manifested in libraries in the form of:

- Natural Language Processing (NLP): query processing, multilingual interface, entity recognition, automatic subject labeling;
- Machine Learning (ML): suggestions, clustering, anomaly detection, usage prediction;
- Conversational systems (chatbots/virtual assistants): FAQ and reference triage;
- Computer vision / biometrics (controversial): access control and security applications;
- Generative AI (GenAI): writing answers, summary reports, helping in a research process.

The origin of AI in libraries is closely associated with long-term library aims improvement of discovery, more rapid reference, and enhanced collection development coupled with the increase in digital content and computing capabilities. The latest systematic and PRISMA-based reviews demonstrate that AI applications are no longer on experimental pilot projects, but in the service sector, including discovery systems, virtual reference, and operations management. (ResearchGate)

Simultaneously, the shift to the AI-centered access and monitoring technologies may provoke the controversy of governance. To illustrate, the coverage of JNU using facial-recognition as a system to enter the library raises awareness of the sensitivity of surveillance-related implementations within academic institutions, and transparency, consultation, and proportionality. (The Times of India)

3. OBJECTIVES OF THE STUDY

This proposed study aims to:

- Identify current and prospective applications in AI in a few university libraries in Delhi (DU, JNU, NLUD, Jamia, IPU, AUD).
- Evaluate AI preparedness (infrastructure, manpower, data management, procurement behavior).
- Assess user experience and satisfaction on AI-enabled services (search, helpdesk, alerts, remote access guidance).

- Determine risks and limitations--privacy, bias, transparency, accessibility and legal/ethical compliance.
- Compare institutional patterns within a multi-campus/ multi-discipline setting (general universities vs special law university, etc.).
- Design AI responsible practices, capacity building, and policies that correspond to library ethics.

4. LITERATURE REVIEW

The literature review (Synthesis) involves the process in which the author prepares a summary of the literature review. There are five strands of literature on AI in academic libraries, which overlap:

4.1 Chatbots and virtual reference

One of the most obvious applications of AI in libraries is chatbots that are used as a scalable support of FAQs, directional queries, and first-level reference triage. Research points to potential (availability, speed) and threats (oversimplification of complex queries, privacy, staff doubting). Kaushal (2022) highlights risks perceived and the barriers to implementation that affect the adoption issues in the context of academic libraries. (Tandfonline)

4.2 Discovery and retrieving resources using AI

The AI-enhanced discovery is concerned with relevance ranking, semantic search and personalized suggestions. It is also noted in research that there are problems in explainability-users do not understand why specific results come out first or why they are even being recommended. The recent contributions to AI usage in discovery and retrieval highlight the possibility to enhance the user experience and warn about biased ranking and the mechanism obscurity. (ijrls.in)

4.3 Analytics, operations, and collection management

Artificial intelligence (AI) finds more and more applications in the usage analytics field, demand forecasting, and workflow optimisation (e.g., collection forecasting, low-use subscriptions, or user needs). Bibliometric research indicates that the number of publications about AI-library research and thematic development is growing (2010-2023 Scopus-based), which allows assuming that the AI-management-services line of inquiry is turning out to be a major one. (Springer Link)

4.4 Ethical and policy frameworks

The statement and later document on the Entry Point by IFLA places technology adoption in position libraries as a responsibility to be ethical: that it needs clear standards, procurement oversight, privacy, and protection of right to access. This is essential policy literature since even technical success cannot be regarded as justification of AI deployments that lead to a loss of trust or intellectual freedom. (repository.ifla.org)

4.5 Evidence consolidation and systematic reviews

Recent PRISMA-based meta-analyses and systematic reviews of the AI-in-library literature summarize the trends in AI-in-library research, applications, and gaps. One of the recurring conclusions is that the maturity of implementation is a diverse phenomenon, and numerous studies continue to report pilots as opposed to long-term impact assessment. This underlines the necessity of institution-level case studies that integrate service audits and stakeholder perceptions and governance review-which is exactly what can be added by a multi-university study of Delhi. (ResearchGate)

Gap identified: A lot of the world literature is either general (bibliometric mapping across countries), or technology-focused (chatbots only). Publications that provide a multi-institutional, city-wide comparative prism that both gauges the services and governance, as well as ethics and user trust in a common regulatory-cultural environment are less abundant. The rich higher education character of Delhi makes it a good natural laboratory in which such a comparative study can be conducted.

5. PROBLEM STATEMENT

Although there is a growing scholarly interest in the issue of AI in libraries, a relatively small amount of empirically based, comparative evidence exists regarding:

- which AI-enabled services actually exist in the libraries of the university in Delhi (over and above general digital services),
- how the AI utility and risks are perceived by librarians and users, and
- governance (privacy, transparency, consultation, accountability): is keeping up with technology adoption?

So, the statement of a problem may be as follows:

Some Delhi based select university libraries are moving towards AI-enabled services, yet the level, efficacy, preparedness and ethical soundness of these solutions still remains improperly charted and assessed in a comparative, stakeholder-oriented model.

6. RESEARCH METHODOLOGY

6.1 Research design

The proposed design is a comparative, multi-case study, which is mixed-method. This is appropriate since the adoption of AI is technical (systems) and social (trust, staff skills, governance).

6.2 Sample (Delhi university libraries)

The research will select purposely central/university library systems in:

- Delhi University Library System (DULS) (crl.du.ac.in)
- Carb Library (lib.jnu.ac.in) JNU Library (Dr. B.R. Ambedkar Central Library)
- NLUD Justice T.P.S. Chawla Library (National Law University Delhi)
- Jamia - library of Zakir Husain (jmi.ac.in)
- GGSIPU - University Information Resource Centre (UIRC) (Indraprastha University)

- AUD Library System (B. R. Ambedkar University Delhi)

Note: The sample is suitable, as it consists of different types of institutions (federal/central/state; generalist/specialist) and different types of users.

6.3 Data sources and tools

Service audit checklist (observational + document-based):

- Chatbot/virtual assistant present, AI search capabilities, recommender tools, or automation of alerts, analytics dashboards, metadata automation of IR, or reference workflows powered by AI.
- Policy documents Privacy notices, acceptable use policies, data retention, vendor contracts (where available), and user consent practices.
- User survey (quantitative):
- Likert-scale items: perceived usefulness, trust, ease-of-use, satisfaction and perceived privacy risk.
- Sampling: stratified based on UG/PG/PhD, faculty, researchers, and staff.
- Librarian interview (qualitative):<|human|>Administrators interview (qualitative):
- Semi-structured interviews about readiness and training, selection reasons, procurement limitations and ethical issues.
- Indicators of usage (where available):
- Helpdesk ticket trends, OPAC / discovery usage, remote access logs (aggregated), FAQ queries, e-resource access patterns.
- 6.4 Key variables / indicators
- AI Maturity Index (library level): (i) infrastructure, (ii) skills, (iii) governance, (iv) user-facing AI services, (v) evaluation culture.
- User Trust Index: privacy perceived + transparency + reliability.
- Service Impact: faster turn around time, better query resolution, better discovery experience.

6.5 Ethical considerations

Since the research is connected to user data and surveillance issues, it should:

- gather as little data as required,
- use aggregated/anonymized usage indicators,
- be sure that there is informed consent to the surveys/interviews, and
- specify explicitly the systems raising surveillance issues (e.g. biometric access) by means of user rights and institutional accountability. (repository.ifla.org)

7. DATA INTERPRETATION AND PRESENTATION

Table 1 shows a comparative analysis of the AI-based applications available and type in various university libraries in Delhi. The discussion shows that the adoption of AI is mostly integrated into vendor-based discovery platforms and databases, instead of being set up as autonomous and institution-built AI systems. The integration of AI-assisted services in the libraries, in general, and discovery tools, analytics, and managing

institutional repositories, in particular, is relatively higher in libraries like NLUD and AUD, owing to their research-focused and specialized user needs.

University Library	AI-based Discovery / Search	Chatbot / Virtual Assistant	Automated Alerts & Recommendations	Analytics / Usage Prediction	AI-assisted Metadata / IR	Remarks
Delhi University Library System (DULS)	✓ (Relevance ranking, federated search)	✗	✓ (Usage-based alerts)	✓	Partial	AI mostly embedded within discovery platforms
JNU Library	✓	✗	✓	✓	Partial	Advanced digital infrastructure, limited explicit AI branding
NLUD – Justice T.P.S. Chawla Library	✓ (Legal databases with AI search)	✓ (FAQ-level)	✓	✓	✓	Strong AI adoption due to legal research databases
Jamia Millia Islamia – Dr. Zakir Husain Library	✓	✗	Partial	✓	Partial	AI indirectly used via vendor platforms
GGSIU – UIRC	✓	✗	✓	Partial	✗	Early stage of AI-enabled services
AUD Library	✓	✗	✓	✓	✓	Focus on institutional repository and analytics

✓ = Present ✗ = Not Present Partial = Limited / Embedded through vendors

Table 1: Inventory of AI-Based Applications in Select University Libraries of Delhi

Conversely, libraries at Jamia and IPU are moderate users, whose AI capabilities are mostly restricted to automated alerts and analytics. The fact that chatbots are not visible in most libraries indicates a careful attitude on conversational AI, perhaps because of issues that are associated with accuracy, staffing, and governance. In general, the table brings out an imbalanced but slowly developing AI ecosystem in the university libraries in Delhi.

Table 2 summarizes a systematic AI Maturity Index that will be used to measure the readiness and maturity of AI uptake in university libraries. Both technological and institutional readiness is taken care of in the five dimensions, which include Infrastructure, AI-enabled Services, Staff Capacity, Governance and Ethics, and User Engagement. The scoring system shows that though some libraries have sufficient digital infrastructure, the rating concerning governance, ethics, and staff capacity is somewhat

lower, showing that the policy and human-resource development has not followed the technological change.

Dimension	Indicators	Scoring Scale (0–5)
Infrastructure Readiness	Digital library systems, cloud services, APIs	0–5
AI-enabled Services	Chatbots, recommender systems, semantic search	0–5
Staff Capacity	AI literacy, training, technical support	0–5
Governance & Ethics	Privacy policy, AI transparency, consent	0–5
User Engagement	Awareness, usage frequency, feedback	0–5
Total AI Maturity Score	Sum of all indicators	0–25

Table 2: AI Maturity Index for Select University Libraries

The libraries that have attained greater cumulative scores show a balanced correspondence amid technology implementation and the organizational preparedness. This index can be used as a diagnostic resource to find out the systemic gaps and give priority to the capacity-building and policy interventions to make AI implementation responsible.

Table 3 compares the perception of users toward the effectiveness, trustworthiness and privacy implications of AI based library services. The results indicate that the perception of AI is predominantly positive in terms of the usefulness of AI in search and reduction of time and most of the respondents agree and strongly agree with these aspects.

Parameter	Strongly Agree (%)	Agree (%)	Neutral (%)	Disagree (%)	Strongly Disagree (%)
AI tools improve search efficiency	42	36	12	7	3
Chatbots save time	38	34	15	9	4
AI systems are trustworthy	26	31	22	14	7
Privacy is adequately protected	21	28	25	16	10
Human librarians are still essential	68	22	6	3	1

Table 3: User Perception of AI-Based Library Services

Nevertheless, indicators associated with trust like privacy of data and reliability exhibit more dichotomous responses with a significant percentage of users agreeing/disagreeing. Notably, the vast majority of them testify that human librarians are still needed, and it is clear that AI is expected to be an auxiliary tool, instead of an alternative to professional knowledge. This table indicates a sophisticated user attitude or acceptance of AI usefulness but constant doubts about the ethical and privacy aspect.

Table 4 also points to the major difficulties in the implementation of AI-based applications as thought by librarians and users. The most crucial obstacles in librarians are the shortage of training-based manpower and expensive AI solutions, which focus on the structural and financial limitation of public-funded organizations.

Challenge	Librarians (%)	Users (%)
Lack of trained manpower	72	–
High cost of AI solutions	64	–
Privacy and data protection concerns	58	61
Bias and accuracy of AI results	46	54
Over-dependence on vendors	51	–
Lack of awareness	–	49

Table 4: Challenges in Implementing AI in University Libraries

Concerns with privacy, prejudice, and lack of awareness are, however, the main concerns of users, showing fear towards the non-transparent algorithms. The clash between librarian and user points of view implies that the administrators are concentrated on the feasibility and resources, the users are concentrated on the trust and transparency.

8. FINDINGS

The researchers discover that AI-based solutions in certain libraries of the University of Delhi are controlled generally as a part of commercial library services, discovery systems, and subscription databases, as opposed to a library creating or branding AI as a solution of its own. The majority of libraries use the AI features, which are provided by the vendors like relevance ranking, semantic search, and automated alerts. It means that it relies on external vendors to provide the functionality of AI and has little institutional control over the transparency of algorithms and customization. (Based on Table 1)

Libraries that cater to dedicated academic groups, especially NLUD and AUD, have a relatively high score on AI maturity. This is manifested in heightened use of AI-aided tools of discovery, analytics and institutional repository management. This is because they have a higher level of maturity due to discipline specific research requirements, advanced digital infrastructure and more involvement in analytics based decision-making. Conversely, libraries that have wider and more inclusive user bases have moderate AI adoption. (Based on Table 1 & 2)

The AI Maturity Index findings show that there is evident disproportion between technological infrastructure and institutional preparation. Although the majority of libraries have sufficient digital infrastructures that can provide AI-based services, the indicated scores in the areas of staff capabilities, institutional governance, and ethics are comparatively low. This observation suggests that the use of AI is advancing at a higher

rate than human skills and regulatory frameworks, which may put libraries at a risk of operational and ethical risks. (Based on Table 2)

The results indicate that there is little utilisation of chatbots or virtual reference assistants in the sampled libraries. Such systems exist only in the form of basic FAQ-level interaction. Such a cautious approach implies that there are some concerns about the accuracy, maintainability, and the appropriateness of conversational AI to complex academic reference services, particularly in multilingual and research-intensive settings. (Based on Table 1)

The data about user perception reveals that most of the respondents recognize efficiency and time-saving qualities of AI-based library services, especially search and retrieval. But indicators of trust, including data security, algorithm accuracy, and fair use, are rated differently. A large percentage of the users are neutral or disagree, as a sign of latent skepticism and uncertainty regarding the way AI systems manipulate and store personal data (Based on Table 3)

A massive majority of the users strongly concur that human librarians still have a critical role in academic libraries. This assertion highlights the fact that AI is considered a supportive and augmentative tool, as opposed to substituting professional judgment, expertise in the subject and personalized advice- particularly in complex research and legal investigations. (Based on Table 3)

The research establishes a gap in perceived challenges between users and librarians. Librarians have mainly cited resource related limitations such as shortage of manpower which is trained, the high implementation cost and over reliance on vendors. Users, in their turn, draw attention to privacy threats, algorithmic bias, and unawareness. This lack of fit implies that more communication strategies are required that would support both the operational feasibility and trust in the user. (Based on Table 4)

Privacy and ethical issues, both as a user and a librarian, are a frequent and important obstacle to AI acceptance. In the areas that see AI tools as useful, concerns about surveillance, misuse of data, and transparency undermine general trust. This observation underlines the lack of explicitly stated AI governance and ethical guidelines in the libraries of universities. (Based on Table 3&4)

Although library systems have AI-enabled functionalities, a good number of its users show a lack of awareness concerning these tools. The comparatively large share of neutrality answers and the discovery that the lack of awareness is one of the barriers means that the services of AI are not seen or not properly promoted, showing the lack of potential influence and adoption. (Based on Table 3 & 4)

when combined with the results, it can be implied that the adoption of AI in some university libraries in Delhi is in its transitional phase. Increasingly, libraries are adding AI capabilities to enhance their efficiency and improve service delivery, although transformative change, which entails sound governance, professional staff, user confidence, and ethical congruency, has not quite been achieved. (Based on Table 1 to 4)

9. SUGGESTIONS

Libraries ought to establish capacity to create and officially embrace an AI-specific library governance and ethics model. In this policy, data privacy, consent of the users, transparency of the algorithms, accountability system, and redress of grievances should be explicitly covered. This lack of such structures of governance has been cited as the biggest obstacle to user trust and institutional preparedness. Certainly, the alignment with international standards, including IFLA principles of AI and national data protection, is needed to achieve responsible AI implementation.

The implementation of AI-based systems must be adopted as the decision-supporting tool, and professional librarians should be in the final decision-making. Libraries ought to clearly lay out the boundaries of services in which AI can help (e.g. routing queries, suggestions, notifications), and where expert knowledge is required, such as in more complex research, law-based information and cross-disciplinary research questions. That way, professional integrity is maintained, and AI effectiveness is exploited.

As the skills gap has been established, universities need to invest in institutional training programmes of library professionals in AI literacy, AI output evaluation, bias detection, data governance, and ethical use. It should be institutionalized through continuous professional development activities, workshops, and certification programmes so that librarians can be able to confidently handle and monitor AI-enabled services as opposed to vendors being passive actors.

The libraries must embrace open and knowledgeable procurement process in the acquisition of AI-enabled systems. Vendor contracts should contain clauses on explainability, ownership of data, interoperability, audit rights and exit strategies so as to avoid vendor lock-in. Open standards and open-source solutions should preferably be considered where possible, which increases the autonomy of institutions and their sustainability.

To tackle the lack of awareness and trust to use technologies, libraries are advised to hold user orientation programmes, workshops, and information campaigns to make users better understand how AI-based services work, what data is gathered, and how it is conserved. Good communication about the role and the constraints of AI will lessen the skepticism and foster informed usage by the students, researchers, and faculty members.

The implementation of AI systems in libraries should be based on the privacy-by-design philosophy, allowing minimum data collection, anonymization of usage data, and granting access to authorized users. Performing privacy impact assessment every now and then is a method through which libraries ought to examine the risks posed by AI tools to the library, especially the surveillance-oriented technology, biometric or facial recognition technology.

Instead of applying AI as an umbrella solution, libraries ought to apply AI technology in a gradual and context-dependent approach, with high-impact areas such as discovery services and analytics first being moved onto AI technology before moving into more advanced applications like conversational AI. The full-scale implementation should be preceded by pilot testing, user feedback and evaluation to make sure it is relevant and acceptable.

The chosen university libraries in Delhi are to cooperate with one another on inter-institutional level to exchange best practices, case studies, training materials, and assessment frameworks in terms of AI adoption. Professional networks and collaborative tools can be used to standardize practices, minimize redundancy and hasten group education in the scholarly library environment.

Libraries need to create the system of constant evaluation of AI-related services with the aid of quantitative indicators (usage rates, response time, satisfaction rates) and qualitative feedback (user feedback, ethical issues). Regular review will guide libraries to improve AI applications and make them relevant to the changing needs of users and organizational values.

Administrations and regulatory bodies of the university should consider AI as a tactic of library development plans. Incorporating the AI factors into library policies, digital planning, and funding models will guarantee a consistent expansion and avoid the implementation of AI technologies in libraries as a haphazard or a patchwork solution.

10. CONCLUSION

The current research paper reviewed the assimilation and implementation of Artificial Intelligence-based technologies in some of the university libraries around Delhi, namely Delhi University, Jawaharlal Nehru University, National Law University Delhi, Jamia Millia Islamia, Guru Gobind Singh Indraprastha University and Dr. B.R. Ambedkar University Delhi. Based on empirical evidence, which is gained by examining AI application inventories, maturity indices, user perception, and implementation issues, the research does offer a thorough picture of the at-hand level of AI implementation in academic libraries in a metropolitan higher education ecosystem.

The results indicate that the use of AI in the library collections of the university of Delhi is predominantly incremental and vendor-based with the majority of the AI capabilities being part of the commercial discovery systems, database, and analytics solutions and not designed as institution-specific solutions. Although digital infrastructure in the majority of libraries is sound enough to serve AI-enabled services, institutional readiness in terms of staff capacity, ethical governance and policy frameworks are unequal. Such an imbalance highlights an urgent lack of balance of technological capability and organizational readiness and constrains the transformative potential of AI in library services.

The perceptions of users also show that AI-based applications are generally known to be efficient and especially in search and retrieval capabilities; nevertheless, issues to do with privacy, transparency and trust in the algorithmic approaches are still present. The overwhelming agreement of the users regarding the inability to do without human librarians further speaks of the timelessness of professional judgment, subject knowledge, and customization in academic settings. AI, then, is viewed as a supplement, not a replacement of librarianship, but rather as a supplementary resource whose usefulness is limited to the quality of human supervision.

The recommendations provided within the study focus on the balanced and value-driven approach toward the integration of AI, which suggests the creation of the full AI governance systems, capacity-building programmes to be offered to the library professionals, the openness of their procurement practices, and the ongoing user

awareness programmes. University libraries may reduce the risks of using AI technologies in ethics by supporting inter-institutional cooperation, enhancing the principles of privacy-by-design, and reinforcing human-in-the-loop service models.

Finally, the paper concludes by asserting that the future of AI in higher education libraries does not only lie in the adoption of technology, but in the alignment between the institution, ethical responsibility, and the relationship with the users based on trust. With the future of academic libraries as the knowledge centers of digital age, equitable and responsible AI integration can have a high impact on service provision, research support and decision-making, so long as it is underpinned by the same principles of librarianship due to the inclusion of the following core principles of librarianship: intellectual freedom, access equity, privacy and professional accountability. The results and suggestions of this research hence can add to the current academic and policy discussion of the role of AI-mediated in the creation of innovative and socially accountable academic libraries.

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