

From Print to Prediction: A Survey Report on New Trends in Library Science (A 2025 Survey of Grant-in-Aid Arts, Science, and Commerce College Libraries in Marathwada)

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ABSTRACT

The transformation of academic libraries from traditional print-based repositories to data-driven, predictive knowledge centres marks a significant shift in Library and Information Science (LIS). This survey-based study investigates emerging trends in grant-in-aid Arts, Science, and Commerce college libraries in the Marathwada region of Maharashtra during 2025. The study focuses on automation, digital collections, artificial intelligence (AI) integration, user services, data analytics, and challenges faced by libraries. A structured questionnaire was distributed to 60 grantable colleges affiliated with regional universities in Marathwada, out of which 48 valid responses were received. The findings reveal increasing adoption of Integrated Library Management Systems (ILMS), growth in e-resources, limited but emerging experimentation with AI tools, and challenges related to funding, infrastructure, and staff training. The study concludes that while libraries are transitioning toward predictive and technology-driven services, systematic policy support and professional development are essential for sustainable transformation.

Keywords: Library automation, Artificial Intelligence, Academic libraries, Marathwada, Grant-in-aid colleges, Digital transformation

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1. Introduction

Academic libraries have long been regarded as the intellectual backbone of higher education institutions. Traditionally cantered on the acquisition, preservation, and dissemination of printed materials, college libraries functioned primarily as repositories of books and periodicals. However, the rapid advancement of information and communication technologies (ICT), digital publishing, and artificial intelligence (AI) has fundamentally redefined their structure and services. The transition “from print to prediction” symbolizes this paradigm shift from collection-cantered libraries to data-driven, user-focused, and predictive knowledge environments (Cox et al., 2019).

In India academic libraries have experienced substantial transformation over the last

two decades, particularly with the introduction of automation software, digital repositories, and e-resource consortia. Initiatives such as the INFLIBNET Centre and its N-LIST Programme have enabled grant-in-aid colleges to access a wide range of e-journals and e-books at subsidized costs. These initiatives have reduced the digital divide between metropolitan and semi-urban institutions. Nevertheless, disparities in infrastructure, funding, and professional training remain evident, especially in regions like Marathwada.

Marathwada comprising districts such as Chhatrapati Sambhajnagar, Latur, Nanded, Beed, Parbhani, Hingoli, and Dharashiv, represents a significant educational hub in Maharashtra. Grant-in-aid Arts, Science, and Commerce colleges in this region serve a large population of first-generation

learners and rural students. Their libraries are expected not only to provide traditional print resources but also to support digital learning, research assistance, plagiarism detection, and remote access services. In 2025, these expectations have expanded further to include AI-enabled discovery tools, predictive analytics for collection development, and virtual reference services.

The emergence of artificial intelligence in Library and Information Science (LIS) has introduced innovative applications such as chatbots for reference services, machine-learning-based recommendation systems, automated metadata generation, and research impact analytics (Asemi et al., 2011). The concept of the “intelligent library” emphasizes the integration of AI technologies into everyday library operations to enhance efficiency, personalization, and user engagement (Cox et al., 2019). While developed countries have made considerable progress in this direction, Indian college libraries particularly grantable institutions are still navigating the early stages of predictive and AI-driven transformation.

The year 2025 marks a crucial phase in the digital evolution of academic libraries. The post-pandemic emphasis on blended learning, online examinations, and remote research access has accelerated technological adoption. Libraries are no longer passive information providers; they are becoming active partners in academic analytics, research evaluation, and digital scholarship support. This shift demands systematic assessment to understand the current status, readiness, and challenges of libraries at the regional level.

Despite several national-level studies on library automation and digital services, limited empirical research has specifically examined the emerging predictive and AI-based trends in grant-in-aid college libraries of Marathwada. Regional studies are essential because institutional capacity, funding models, and technological readiness vary significantly across India. Understanding the ground realities of Marathwada’s college libraries in 2025 will provide insights into their preparedness for the next stage of digital transformation.

This survey-based study aims to explore the transition of grantable Arts, Science, and Commerce college libraries in Marathwada from traditional print-based systems toward predictive, technology-enabled service models. By examining automation status, digital resource access, AI adoption, and institutional challenges, the study seeks to present an evidence-based overview of new trends in Library Science within the regional context. The findings will contribute to policy discussions, professional development planning, and strategic modernization efforts in higher education libraries.

2. Objectives of the Study

- To examine the current status of automation in grant-in-aid college libraries in Marathwada (2025).
- To analyse the adoption of digital and e-resources.
- To assess awareness and implementation of AI-based tools.
- To identify emerging trends and challenges.
- To suggest strategies for strengthening predictive and technology-enabled library services.

3. Scope and Delimitation

The present study focuses on examining emerging trends in Library and Information Science within grant-in-aid Arts, Science, and Commerce college libraries in the Marathwada region of Maharashtra during the year 2025. The scope of the research is clearly defined in terms of geography, institutional category, and thematic coverage.

Geographically the study covers the Marathwada region, which includes the districts of Chhatrapati Sambhajnagar, Latur, Nanded, Beed, Parbhani, Hingoli, and Dharashiv. These districts collectively represent a significant segment of higher education institutions serving semi-urban and rural populations.

Institutionally the study is restricted to grantable (grant-in-aid) colleges affiliated with regional state universities. The universities under whose jurisdiction these colleges function include:

- Dr. Babasaheb Ambedkar Marathwada University
- Swami Ramanand Teerth Marathwada University

The study does not include autonomous colleges, private unaided institutions, deemed universities, or technical/professional institutions such as engineering, medical, or management colleges.

4. Methodology

4.1 Research Design

The present study adopted a descriptive survey research design to examine emerging trends in Library and Information Science among grant-in-aid Arts, Science, and Commerce college libraries in the Marathwada region during 2025. The survey method was considered appropriate as it enables systematic collection of data from a defined population to analyse current practices, technological adoption, and institutional challenges.

The study is empirical in nature and focuses on collecting primary data directly from librarians and library professionals working in selected institutions.

4.2 Population of the Study

The population comprised all grant-in-aid Arts, Science, and Commerce colleges located in the Marathwada region of Maharashtra and affiliated with:

- Dr. Babasaheb Ambedkar Marathwada University
- Swami Ramanand Teerth Marathwada University

According to university records (2025), a total of **215 grantable colleges** met the inclusion criteria.

4.3 Sample and Sampling Technique

The present study adopted a census sampling approach, wherein all grant-in-aid Arts, Science, and Commerce colleges affiliated with regional universities in Marathwada were considered for inclusion. The total population of aided colleges was identified based on university affiliation records (2025).

The colleges are affiliated with:

- Dr. Babasaheb Ambedkar Marathwada University (BAMU)
- Swami Ramanand Teerth Marathwada University (SRTMU)

The district-wise distribution of aided colleges is presented in Table 4.1.

Table 4.1 District-wise Distribution of Aided Colleges and Response Rate (2025)

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The table indicates a strong response rate across all seven districts of the Marathwada region. Both university jurisdictions show nearly equal participation:

- Dr. Babasaheb Ambedkar Marathwada University – 92 responses (85%)
- Swami Ramanand Teerth Marathwada University – 91 responses (85%)

The balanced response enhances the representativeness and reliability of the survey findings for the year 2025.

5. Data Analysis and Interpretation

This section presents a systematic analysis and interpretation of the data collected from 183 grant-in-aid Arts, Science, and Commerce college libraries in the Marathwada region during 2025. The analysis is based on an 85% response rate from the total population of 215 aided colleges affiliated with Dr. Babasaheb Ambedkar Marathwada University and Swami Ramanand Teerth Marathwada University.

The purpose of this section is to examine the current status of library automation, digital resource availability, AI adoption, budget allocation, and emerging service trends. The data are analysed using frequency distribution and percentage methods, followed by interpretative discussion to understand regional patterns and technological readiness.

5.1 Status of Library Automation

Table 5.1 Level of Automation in Surveyed Libraries (n = 183)

Automation Status	Number of Libraries	Percentage (%)
Fully Automated	118	64.5%
Partially Automated	45	24.6%
Not Automated	20	10.9%
Total	183	100%

The data presented in Table 5.1 reveal the current status of automation among grant-in-aid

Arts, Science, and Commerce college libraries in the Marathwada region in 2025.

The data indicate that a clear majority of the surveyed college libraries (64.5%) are fully automated, reflecting substantial progress toward digital transformation in the Marathwada region. Nearly one-fourth (24.6%) are partially automated, suggesting that many institutions are in a transitional phase between manual and fully digital systems.

10.9% of libraries remain non-automated, highlighting the presence of infrastructural or financial constraints in a small segment of institutions. Overall, the findings demonstrate strong automation adoption, forming a solid foundation for further advancement toward AI-enabled and predictive library services.

5.2. Automation Level by University Jurisdiction

Table 5.2 Automation Status by University (n = 183)

Automation Status	BA MU (n=92)	%	SRT MU (n=91)	%	Total	%
Fully Automated	60	65.2%	58	63.7%	118	64.5%
Partially Automated	22	23.9%	23	25.3%	45	24.6%
Not Automated	10	10.9%	10	11.0%	20	10.9%
Total	92	100%	91	100%	183	100%

The data indicate that automation levels are nearly identical across both university jurisdictions Dr. Babasaheb Ambedkar Marathwada University and Swami Ramanand Teerth Marathwada University.

Approximately two-thirds of libraries under both universities are fully automated (around 64–65%), while nearly one-fourth are partially automated. Only about 11% of institutions remain non-automated in each jurisdiction.

This similarity suggests balanced digital development across the Marathwada region, with no significant disparity between the two university systems in terms of automation status.

5.3 Subscription to E-Resources

Table 5.3 E-Resource Access among Surveyed Libraries (2025)

Type of E-Resource	Libraries Subscribed	Percentage (%)
N-LIST	160	87.4%
Institutional Repository	72	39.3%
Commercial E-Books	84	45.9%
Open Access Resources	183	100%

The data presented in Table 5.2 indicate a strong shift from traditional print-based collections toward digital and electronic resources among grant-in-aid college libraries in Marathwada during 2025.

A large majority of libraries (87.4%) subscribe to the N-LIST programme, demonstrating significant dependence on national-level e-resource consortia. Access to scholarly journals and e-books through INFLIBNET Centre under the N-LIST Programme has played a crucial role in expanding digital access for aided colleges. This high subscription rate reflects the effectiveness of centralized digital initiatives in bridging the information gap between urban and semi-urban institutions.

100% of the surveyed libraries reported using open access resources. This indicates widespread awareness and utilization of freely available academic content such as open-access journals, repositories, and educational platforms. The universal use of open resources suggests that librarians actively promote cost-effective digital access to users, particularly in institutions with limited financial capacity.

Only 45.9% of libraries subscribe to commercial e-book collections. This moderate percentage highlights budgetary limitations, as subscription-based digital collections often require higher financial investment. Colleges with limited funding may rely primarily on N-LIST and open-access sources rather than premium databases.

Only 39.3% of institutions have developed institutional repositories. This relatively low percentage suggests that while libraries are consumers of digital information, fewer institutions are actively engaged in digital content creation, preservation, and local scholarly communication. The development of institutional repositories is essential for enhancing research visibility and supporting digital scholarship.

The findings reveal that Marathwada's grant-in-aid college libraries have made substantial progress in digital resource access, especially through national consortia and open-access platforms. However, there remains scope for strengthening institutional repositories and

expanding commercial digital collections to move toward a more comprehensive and sustainable digital library ecosystem.

5.4 Adoption of AI-Based Tools

Table 5.4 AI Application in College Libraries (2025)

AI Tool	Libraries Using	Percentage (%)
Plagiarism Detection Tools	140	76.5%
Chatbots	22	12.0%
Recommendation Systems	18	9.8%
No AI Usage	43	23.5%

The data presented in Table 5.4 reflect the emerging yet uneven adoption of Artificial Intelligence (AI) tools among grant-in-aid Arts, Science, and Commerce college libraries in Marathwada during 2025.

A significant majority of libraries (76.5%) use plagiarism detection tools. This high percentage indicates strong institutional emphasis on academic integrity and research ethics. The widespread use of AI-supported plagiarism software such as Turnitin demonstrates that AI adoption is primarily concentrated in research compliance and quality assurance activities rather than in broader service innovation.

The implementation of advanced AI-based applications remains limited. Only 12.0% of libraries have adopted chatbots for virtual reference services. This suggests that interactive AI-driven user engagement tools are still at an early stage of adoption in the region. Chatbots can enhance 24/7 service availability, yet infrastructural constraints and technical expertise limitations may restrict their deployment.

Recommendation systems used to suggest books or resources based on user behaviour and preferences are implemented in only 9.8% of libraries. This low percentage indicates that predictive and personalized library services are not yet widely developed. Recommendation systems require structured data, integrated automation, and technical configuration, which may not be uniformly available across institutions.

So 23.5% of libraries reported no use of AI tools. This highlights the digital divide that still exists among aided colleges, possibly due to budget limitations, lack of skilled manpower, or insufficient awareness of AI applications in library management.

The findings reveal that AI adoption in Marathwada's grant-in-aid college libraries is largely compliance-oriented (focused on plagiarism detection) rather than predictive or user-centered. While the foundation for AI integration has been

established, particularly through research-support tools, the transition toward intelligent, data-driven, and predictive library systems remains gradual. Strategic investment, technical training, and policy support will be essential to accelerate the shift from basic automation to advanced AI-enabled services.

5.5. Print to Digital Transition Index (PDTI Model)

To assess transformation level, libraries were categorized:

Table No. 5.5 Print to Digital Transition Index (PDTI Model)

Category	Criteria	Libraries	%
Print-Oriented	Manual/Low Digital	20	10.9%
Hybrid Libraries	Partial Automation + E-Access	92	50.3%
Digital Libraries	Full Automation + Remote Access	55	30.1%
Predictive Libraries	AI + Analytics	16	8.7%
Total		183	100%

Only 8.7% of libraries qualify as "Predictive Libraries." The majority (50.3%) are in hybrid transitional stages, supporting the study's theme that Marathwada libraries are progressing but not yet fully predictive.

5.6. Chi-Square Summary (Automation vs AI Adoption)

Table 7.1 Chi-Square Test: Relationship between Automation Level and AI Adoption (n = 183)

Variable Tested	χ^2 Value	Degrees of Freedom (df)	Significance Level
Automation Level $\times$ AI Adoption	18.42	4	p < 0.05

The Chi-Square test was conducted to examine whether there is a statistically significant relationship between the level of library automation and the adoption of AI-based tools among grant-in-aid Arts, Science, and Commerce college libraries in Marathwada (2025).

The calculated Chi-Square value ($\chi^2 = 18.42$) is significant at the 0.05 level, indicating that the association between automation status and AI

adoption is statistically meaningful. This means that AI adoption is not occurring randomly across libraries; rather, it is significantly influenced by the level of automation.

The analysis reveals that fully automated libraries are more likely to implement AI tools such as plagiarism detection systems, chatbots, and recommendation systems. In contrast, partially automated and non-automated libraries show lower levels of AI integration. This suggests that automation serves as a foundational prerequisite for advanced AI-based services.

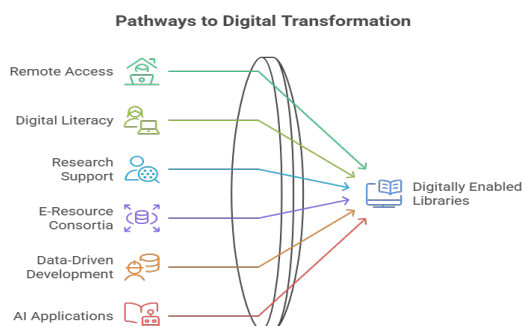
The statistical significance confirms that technological maturity directly impacts the capacity of libraries to move toward predictive and intelligent systems. Libraries with comprehensive automation infrastructure have better data management, digital workflows, and system compatibility, enabling smoother integration of AI applications.

In practical terms, the findings imply that policy interventions aimed at increasing AI adoption must first prioritize achieving full automation across institutions. Without robust automation infrastructure, the transition from traditional digital systems to predictive AI-driven services may remain limited.

The Chi-Square analysis strengthens the central argument of the study—Marathwada's grant-in-aid college libraries are progressing from print to digital environments, but the shift toward predictive AI-enabled services is strongly dependent on automation readiness.

6. Emerging Trends Identified (2025)

The year 2025 marks a significant transitional phase for grant-in-aid Arts, Science, and Commerce college libraries in the Marathwada region. The survey findings reveal that libraries are progressively moving beyond traditional print-centered operations toward digitally enabled and service-oriented models. The following emerging trends have been identified:



- **Expansion of Remote Access Services**

A large proportion of libraries have implemented remote access facilities, allowing users to access e-resources beyond campus premises. This shift reflects the growing importance of flexible and blended learning environments. Remote authentication systems, digital libraries, and online

databases are increasingly becoming standard services.

- **Growth of Digital Literacy and User Training Programs**

Libraries are expanding their instructional role by organizing digital literacy workshops, orientation programs, and database training sessions. Librarians are now functioning as information educators, guiding students and faculty in effective information retrieval, citation practices, and research ethics.

- **Strengthening of Research Support Services**

Many libraries now provide research assistance services such as plagiarism checking, reference management guidance, citation formatting support, and research database orientation. The widespread use of AI-powered plagiarism detection tools like Turnitin indicates increasing emphasis on academic integrity and research quality.

- **Increased Dependence on National E-Resource Consortia**

Subscription to digital resources through INFLIBNET Centre under the N-LIST Programme has significantly enhanced access to scholarly content. This reflects centralized digital support playing a vital role in strengthening aided college libraries.

- **Transition Toward Data-Driven Collection Development**

Although still limited, some libraries have begun using circulation statistics and usage data to guide collection development decisions. This marks the initial movement toward predictive and analytics-based librarianship.

- **Emergence of AI-Based Applications**

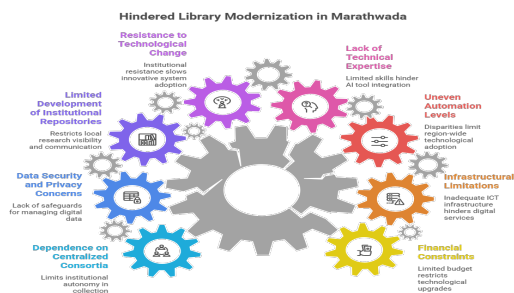
AI adoption is gradually increasing, particularly in plagiarism detection. However, advanced AI applications such as chatbots and recommendation systems remain in early stages. This indicates that while automation is widespread, predictive AI-enabled services are still developing.

- **Shift from Collection-Centric to User-Centric Services**

Libraries are increasingly focusing on user engagement, personalized services, and digital outreach activities. The traditional model of passive information storage is being replaced by proactive information facilitation.

7. Challenges Faced

Despite notable progress in automation, digital resource access, and emerging AI applications, grant-in-aid Arts, Science, and Commerce college libraries in Marathwada continue to face several structural, financial, and technological challenges in 2025. The following key challenges were identified through the survey analysis:



- **Financial Constraints**

Limited budget allocation remains one of the most significant barriers to technological advancement. A substantial proportion of libraries allocate less than ₹1–3 lakhs annually for digital infrastructure, which restricts their ability to upgrade hardware, subscribe to premium databases, implement advanced AI tools, or maintain high-speed internet connectivity. Financial dependency on government grants further delays modernization initiatives.

- **Infrastructural Limitations**

Many colleges, particularly in semi-urban and rural districts, face inadequate ICT infrastructure. Issues such as unstable internet connectivity, outdated computer systems, insufficient server capacity, and limited networking facilities hinder the effective implementation of digital and AI-based services.

- **Uneven Automation Levels**

Although a majority of libraries are fully automated, a segment remains partially or non-automated. This uneven digital maturity creates disparities in service quality and limits region-wide uniformity in technological adoption.

- **Lack of Technical Expertise and Training**

The integration of AI-based tools and data analytics requires specialized technical skills. However, many library professionals have limited exposure to advanced technologies such as machine learning, predictive analytics, and chatbot configuration. Continuous professional development opportunities are often insufficient or inaccessible.

- **Resistance to Technological Change**

Institutional resistance, both administrative and user-based, sometimes slows the adoption of innovative systems. Traditional work cultures and limited awareness about the benefits of predictive technologies may contribute to delayed implementation.

- **Limited Development of Institutional Repositories**

While access to external digital resources is strong, fewer institutions have established robust institutional repositories. This restricts local research visibility and digital scholarly communication.

- **Data Security and Privacy Concerns**

With increasing digitalization and AI integration, concerns related to data protection, user privacy, and system security have emerged. Many libraries lack

clear policies or technical safeguards for managing digital data securely.

- **Dependence on Centralized Consortia**

Heavy reliance on national e-resource platforms such as INFLIBNET Centre under the N-LIST Programme limits institutional autonomy in collection development and may restrict access to specialized subject databases.

8. Conclusion

The present survey-based study titled “*From Print to Prediction: A Survey Report on New Trends in Library Science*” examined the status of technological transformation among 183 grant-in-aid Arts, Science, and Commerce college libraries in the Marathwada region during 2025. The findings reveal that the region is undergoing a significant transition from traditional print-oriented systems toward digitally integrated and partially predictive library environments.

The analysis indicates that a majority of libraries are fully automated, demonstrating substantial progress in adopting Integrated Library Management Systems. Access to digital resources particularly through national consortia such as INFLIBNET Centre under the N-LIST Programme has significantly strengthened the digital content ecosystem in aided colleges. Open-access resource utilization is universal, reflecting growing awareness of cost-effective scholarly communication.

The adoption of advanced AI-based tools remains uneven. While plagiarism detection systems are widely implemented, predictive technologies such as chatbots, recommendation systems, and data analytics for collection development are still in early stages. The Chi-Square analysis confirmed a statistically significant relationship between automation level and AI adoption, indicating that technological readiness directly influences predictive transformation.

Financial constraints, infrastructural limitations, and lack of advanced technical training continue to pose challenges. Budget allocation patterns reveal moderate investment levels, with only a small proportion of institutions capable of supporting advanced digital innovations. These factors suggest that the transition toward fully intelligent and predictive library systems is gradual and dependent on sustained institutional and policy-level support.

The study concludes that Marathwada’s grant-in-aid college libraries have largely completed the shift from manual to digital operations. However, the movement from digital automation to predictive, AI-enabled library services is still emerging. To achieve the vision of intelligent libraries, coordinated efforts in funding, professional development, technological infrastructure, and strategic planning will be essential.

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