

IMPACT OF LIBRARY AUTOMATION AND SERVICES ON USERS OF ACADEMIC INSTITUTIONS OF NATIONAL IMPORTANCE OF BIHAR

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Abstract

The present study deals with the impact of library automation and services on users of academic institutions of national important institutions of Bihar. The study has used to stratified random technique in which structured questionnaire were distributed to collect the data from librarians and users of selected institute. The present study covers the eight (08) national important institutions under the jurisdiction of Bihar state. The study also evaluates the opinion of users and librarians of selected institutions under this study. The study reveals that all participating libraries have automated systems, offering cataloguing, circulation, e-resource access, and digital services. Challenges include funding (12.5%), lack of IT expertise (50%), poor internet connectivity (50%), and maintenance issues (37.5%). Maximum numbers of institutions (87.5%) are part of consortia like DELNET/INFLIBNET/NIC. User feedback indicates satisfaction with service quality and automation, although there is a need for awareness and training to enhance user engagement with advanced services.

Keywords: *Library Automation, Library Services, Institutions of National Importance (INIs)*

1.1 INTRODUCTION.

Institutions of National Importance (INIs) in India serve as cornerstones of academic excellence and research, empowering intellectual growth and innovation. Their libraries play a pivotal role by providing access to a vast information repository and fostering a scholarly environment. In the digital age, libraries are undergoing a metamorphosis, transitioning from traditional print collections to dynamic digital ecosystems. Library automation, the integration of technology into library operations, has emerged as a critical driver of this transformation. This thesis investigates the state of library automation and services in INIs located in Bihar, India. The research delves into the significance of library automation for INIs, highlighting its potential to streamline workflows, enhance information access through online catalogs and e-resources, and empower users with innovative services like mobile applications. Recognizing the unique challenges faced by Bihar, such as limited resources and infrastructure gaps, the research acknowledges the need for a nuanced understanding of the context. Motivated by the limited existing research on library automation in Bihar's INIs, this thesis aims to bridge this knowledge gap by providing a comprehensive investigation. The research objectives encompass assessing the extent of automation adoption, evaluating the effectiveness of existing systems and user satisfaction, identifying key challenges, exploring best practices from national and international case studies, and ultimately proposing recommendations for improvement. The findings hold value for librarians, policymakers, and funding agencies, offering insights into best practices, informing resource allocation, and contributing to the broader discourse on library automation in India. Employing a mixed-methods approach with surveys and interviews, the research delves into the specific realities of Bihar's INIs. Building upon a comprehensive literature review that explores library automation in the Indian context and examines international best practices.

The introduction of library automation and advanced library services has markedly influenced the academic landscape in institutions of national importance in Bihar. These institutions, integral to the region's educational framework, have undergone significant transformations by integrating technology into their library systems. Library automation involves the use of software and hardware systems to streamline operations such as cataloging, circulation, acquisition, and inventory management. This automation has revolutionized the way libraries function, making them more efficient and user-friendly. Additionally, the deployment of digital resources, including e-books, online journals, and databases, has significantly expanded the scope of available academic materials, providing users with unprecedented access to global knowledge repositories. The introduction of integrated library systems (ILS), RFID technology, and self-service kiosks has not only enhanced the speed and accuracy of information retrieval but also improved resource management and user satisfaction. For students, researchers, and faculty members, these advancements have meant more efficient access to necessary resources, fostering an environment conducive to learning and innovation. The digital transformation in these libraries has also played a critical role in ensuring equitable access to information, bridging gaps for users in remote or underserved areas. Moreover, the shift towards digital libraries and online resources has been particularly significant in the context of the COVID-19 pandemic, which necessitated remote access to educational materials. By facilitating remote access, these automated systems have maintained academic continuity and supported ongoing research activities despite physical restrictions. As a result, the impact of these technologies extends beyond mere operational efficiency, contributing to the academic rigor and competitiveness of Bihar's educational institutions on a national scale. As these libraries continue to evolve with technological advancements, they are expected to further empower users, enhance academic output, and align with global educational standards. Thus, the study of the impact of library automation and services on these institutions is crucial, providing insights into how technological advancements can be leveraged to enhance educational outcomes and foster a more inclusive academic environment.

1.2 Statement of the Problem

The need for a thorough investigation into the implementation and impact of library automation systems in Bihar's institutions of national importance. How these technologies affect access to academic resources, user satisfaction, and overall educational outcomes is critical. Identifying the specific challenges faced by libraries, such as technical limitations, funding constraints, and the need for skilled personnel, will provide valuable insights. This research aims to fill these knowledge gaps by evaluating the effectiveness of automated library services and digital resources, exploring their role in enhancing academic performance and research productivity, and assessing their contribution to educational equity, especially in reaching users in remote or underserved areas. Through this study, researcher seeks to provide a comprehensive analysis that can inform policy decisions and improve library services in these critical educational institutions.

1.3 Objectives of the Study

The researcher has been selected the following objectives for the present study.

- i. To find out services provided by selected institution libraries
- ii. To find out challenges faced by library after automation
- iii. To find out ICT skills of users in automated library system
- iv. To find out ICT skills of users for using automated library services
- v. To find out user satisfaction with library services provided by selected libraries
- vi. To find out challenges faced by users while using automated library services.

1.4 Hypotheses of the Study

To achieve the objectives of this study, a set of hypotheses have been developed to assess opinions and identify challenges related to library automation and services.

Hypothesis 1: The implementation of library automation systems in institutions of national importance in Bihar significantly enhances the accessibility and retrieval of academic resources for students, faculty, and researchers.

Hypothesis 2: Users in these institutions experience high satisfaction with automated library services, which positively influences their academic and research activities.

Hypothesis 3: The implementation of digital resources and library automation technologies contributes to improved educational equity, particularly with facilitating access to information for users in remote or underserved areas.

1.5 Scope of the Study

The scope of this study encompasses an in-depth examination of the implementation and impact of library automation systems in academic institutions of national importance in Bihar. It focuses on assessing the types and extent of automated services provided, user experiences and satisfaction levels, and the accessibility of digital resources, including e-books, online journals, and databases. The study also explores the challenges faced by these institutions in adopting and maintaining such systems, considering factors like technical infrastructure, funding, and staff expertise. Furthermore, the research investigates the broader implications of these technologies on academic performance, research output, and educational equity, particularly for users in remote or underserved areas. The findings aim to provide comprehensive insights that can inform policy and practice in library management within these key educational institutions.

1.6 Limitation of the Study

The study is limited to the following points:

- The geographical area is limited to Bihar only.
- The study will cover all the following Institutions Libraries of National Importance Institutions of Bihar including:
 1. Indian Institute of Technology (IIT), Patna
 2. National Institute of Technology (NIT), Patna
 3. All India Institute of Medical Sciences, Patna
 4. Indian Institute of Management (IIM), Bodh Gaya
 5. National Institute of Pharmaceutical Education and Research, Hajipur
 6. Indian Institute of Information Technology (IIIT), Bhagalpur
 7. Rajendra Central Agricultural University, Samastipur
 8. Nalanda University, Rajgir

1.7 Research Methodology

The study is descriptive and analytical in nature. It aims to explore the extent of library automation, evaluate the effectiveness of automated library services, and their impact on the users of academic institutions of national importance in Bihar. The study combines both qualitative and quantitative research methods to provide a comprehensive understanding of the subject. To conduct Stratified Random sampling technique has used to collect data from the users and Staffs. The collected data has been analysed and interpreted as per the objectives of the study from various sources appropriate statistical analysis tools i.e. SPSS and Excel software. For the present study researcher identified eight national important institutions under the jurisdiction of Bihar state. Total eight (08) questionnaire were distributed among the eight librarian of national important institution of Bihar and (08) received from the librarian and 2500 questionnaire were distributed among the library users of these institutions and 2390 has responded. The sample has been taken as per the Morgan table sample size.

1.8 LITERATURE REVIEW

Adewusi, et al. (2024) this study explores students' perspectives on the library's use of Augmented Reality (AR) technology. There has been a growing trend in the adoption of new technologies in academic institutions worldwide in recent years. AR is one such emerging technology, and there is increasing interest in its potential to enhance students' reading and learning experiences. The primary objective of this study was to investigate students' perceptions of AR in a library setting and its possible implications for library services. The study employed a mixed-methods design, combining surveys and interviews. Participants responded to demographic questions and a series of Likert-scale questions regarding their perceptions of AR before and after experiencing it in a library context. Descriptive statistics were used to analyze the data. The findings revealed that most students viewed the use of AR in the library positively. They were enthusiastic about the potential benefits of AR, such as increased engagement, improved search and discovery, and more interactive learning and reading experiences. However, some students expressed concerns about the potential distractions caused by AR interfaces, and it was found that unfamiliarity with AR technology made some students hesitant to use it. Overall, the study suggests that students perceive the integration of AR in libraries as a positive trend and generally support the concept. The insights gained from this research can guide future studies and help inform the development of AR-based library services. The study recommends that libraries consider incorporating AR technologies into their services and provide training and resources to bridge the gap between students' unfamiliarity with AR and their willingness to use it. Librarians should consider developing AR-based services that align with students' preferences and needs, such as interactive resource guides, 3D representations of library materials, and search tutorials. Properly implemented AR services could help bridge the gap between user expectations and the library's resources and capabilities.

Farag, et al. (2024) discusses the functional and technological characteristics of the new generation of office service platforms, identifying the features needed in future systems. The study includes an analysis of several service platforms and a comparison among them, followed by a discussion on the future of library systems in light of this technology. Using a descriptive analytical method, the research addressed its objectives and concluded with several findings. Key among these is the need for libraries to be involved in the development of new platforms and to identify essential standards for future versions. These standards relate to activities such as demand-based acquisition, electronic resource management (ERM), automated processing technologies (APT), and the definition of standards for application programming interfaces (APIs). The research recommends that libraries swiftly adopt library service platforms to meet the challenges of digital transformation. It emphasizes the importance of identifying the actual and evolving needs of beneficiaries and making optimal use of these new platforms to enhance service quality and avoid the pitfalls of information hoarding.

Kannaujia and Patel (2023) investigate the library automation of the Sayajirao Gaekwad Central Library at Banaras Hindu University (BHU). With an extensive collection available for users, the study aims to gauge user satisfaction with the library's automation software. Using questionnaires, the study explores users' experiences with the Online Public Access Catalogue (OPAC) service provided by the BHU library automation software. It assesses the Information Communication Technology (ICT) knowledge among university students and their satisfaction with the services provided by the central library. The study analyzes difficulties users face with the library automation software and highlights that most users visit the library primarily for borrowing and returning books, while some use the library for study and accessing its collection.

Marke and Waziri (2023) considered to explore the picture of library automated reference service in some two (2) selected Polytechnic libraries in North East Nigeria. A quantitative research design using a descriptive survey method was used and a five (5) point liker-type questionnaire was employed. Evidence was also gathered through semi-structured interviews with reference librarians in the selected Polytechnics. Data presented were analyzed using descriptive statistics, frequencies counts, percentages and the tables. The findings revealed that the level of library automation system in terms of reference service in the two (2) selected Polytechnics involved were not implemented. Based on the findings, upgrading of library technology tools and partial implementation of library automation of reference service were recommended.

Matonkar and Kumar (2021) Matonkar and Kumar investigated the role of computers in enhancing library services through automation and digital preservation. The study highlighted various software applications used in libraries to meet user demands for knowledge. It focused on the skills of library professionals in handling technology, their educational backgrounds, and the tools and technologies implemented in libraries in Goa, India. The study identified key factors driving change and challenges in automation and skill development, emphasizing the need for continuous technological updates and training for library staff.

Mukherjee & Khare, (2021) this study conducts a comparative analysis of ICT utilization in libraries of government and private teacher training colleges in South Bengal, revealing significant disparities between the two sectors. Private colleges exhibit better ICT infrastructure, services, and utilization rates, whereas government colleges struggle with budgetary constraints and outdated technology. The analysis of user perception and usage patterns underscores the need to address these differences. The study offers recommendations for policy improvements, institutional strategies, and staff training initiatives aimed at enhancing ICT integration and bridging the digital divide in teacher training college libraries.

Karna, et al. (2019) the study focused on addressing the challenges of RFID-based self-service systems for library automation at Telkom University. With an increasing student population, office automation, including library services like self-loan, self-return, and self-pickup, has become essential. The study highlighted problems such as verifying the identity of patrons using the self-service system and ensuring the accuracy of borrowed collections in the Library Management System (LMS). To mitigate these issues, the researchers proposed a business process design for a self-loan system that incorporates image capture of the patron and the borrowed collection, reducing the need for librarian oversight during circulation.

1.9 Research Gaps: While existing literature extensively discusses library automation, modern technologies, and their impact on library services, there is a lack of focused research on the specific experiences of users in academic institutions of national importance in Bihar. Most studies explore general automation trends, but few examine how students, researchers, and faculty in Bihar's premier institutions interact with automated services such as RFID-based self-service systems, OPACs, digital repositories, and AI-driven tools. As well, there is a limited comparative analysis of different automation software and their effectiveness in enhancing library accessibility and user satisfaction. The challenges faced by users such as technical difficulties, lack of awareness, inadequate training, and digital literacy barriers are underexplored, making it difficult to assess the true impact of automation on learning and research. Moreover, while many libraries worldwide have integrated Web 2.0 technologies, AI-based cataloguing, and interactive digital platforms, their adoption in Bihar's academic institutions remains unclear. Conveying these gaps will help identify best practices, challenges, and strategic improvements needed for optimizing automated library services, ensuring better access to knowledge resources, and enhancing the overall research and academic experience.

1.10 DATA ANALYSIS AND INTERPRETATION

EXPERIENCE OF LIBRARIAN: 1.10.1 LIBRARY WORKING HOUR

Table1: Library Working Hour

Working Hour Range	No. of the Institution	Percentage
12-24 Hour	6	75%
8-12 Hour	2	25%
Below 8 Hour	0	0

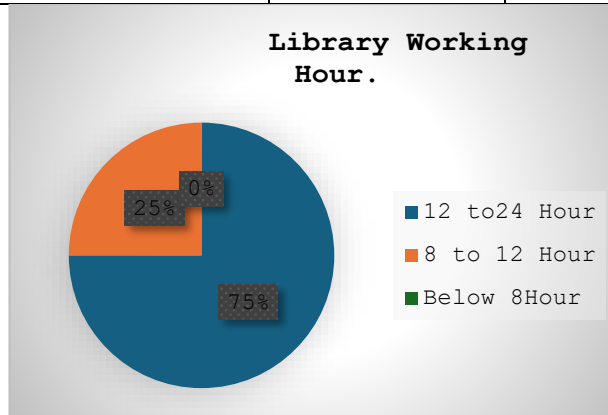


Figure:1 Library Working Hour

The Table 1 and figure 9 clearly shows that 6 institutions have 12–24-hour library working period while only 2 institutions have 8–12-hour library working period and there is no institute has below 8-hour library working period.

1.10.2 SERVICE PROVIDED IN THE LIBRARY

Table:2 Services Provided in The Library

Name of The Services	No of libraries provided	Percentage
Reference Service	8	100%
Reprography Service	6	75%
Interlibrary Loan Service	2	25%
Digital Library Service	8	100%
E-Resource Access	8	100%
Remote Access to Digital Collection	8	100%
Plagiarism Checking Service	8	100%
User Orientation Programme	7	87.5%



Figure:2 Service Provided in the Library

Table 2 and Figure 10 represent the services provided in the library. It is shows that 100 percent library under this study provided Cataloguing services, Circulation Services, E-Resource access and Digital Services while 75 percent library provided reprography service, 25 percent interlibrary loan service and 87.5 library provided user orientation programme service.

1.10.3 TYPE E-RESOURCES AVAILABLE

Table 03: Type of E-Resource Available

Name of the E-Resource	No. of Institution	Percentage
E-Journal	8	100%
E-Books	8	100%
Online Database	8	100%
Institutional Repository	5	62.5%
Others	2	25%

The above table indicate that eight institution (100%) responded that they have e-journal, e-books and online database while only fives (62.5%) responded that they have institutional repository and only 25% responded others.

1.10.4 HAS LIBRARY AUTOMATION IMPROVED OVERALL SERVICE DELIVERY?

Table: 4 Has Library Automation Improved Overall Service Delivery

Responses	No of Institution	Percentage
Agree	1	12.5%
Strongly Agree	7	87.5%
Disagree	0	0%
Strongly Disagree	0	0%

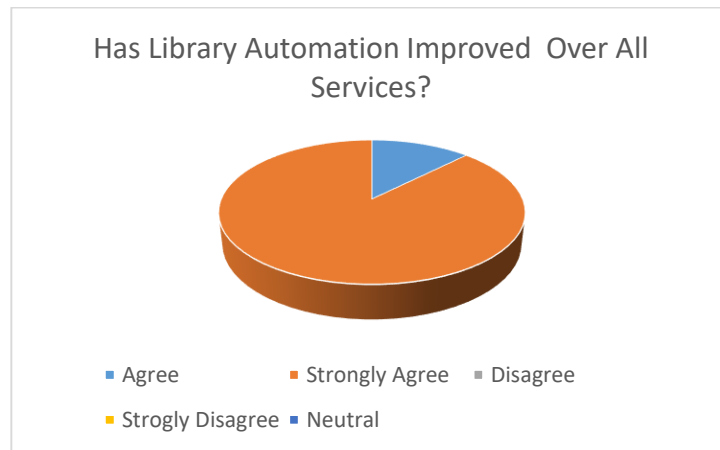


Figure 3: Has Library Automation Improved Overall Service Delivery

The above table shows that only 1 (12.5%) institution responded 'agree' that library automation improved overall service delivery, while 7 (87.5%) institutions responded strongly agree that that library automation improved overall service delivery.

1.10.5 MEMBERSHIP OF CONSORTIA LIKE INFLIBNET/DELNET/NIC

Table: 04 Membership of Consortia like DELNET/INFLIBNET/NIC

Response	No. of Institution	Percentage
Yes	7	87.5
No	1	12.5

87.5 % institution responded that they are the member consortia like DELNET/INFLIBNET/NIC etc. while only 12.5% institution responded no.

1.10.6 CHALLENGES FACED AFTER HAVING AUTOMATION

Table 5: Challenges Faced After Having Automation

Challenges	No. of Institution	Percentage
Insufficient Fund	1	12.5%
Lack of IT Expertise Among Staff	4	50%
Poor Internet Connectivity	4	50%
Resistance to Change Among Users	0	0%
Maintenance Issues	3	37.5%

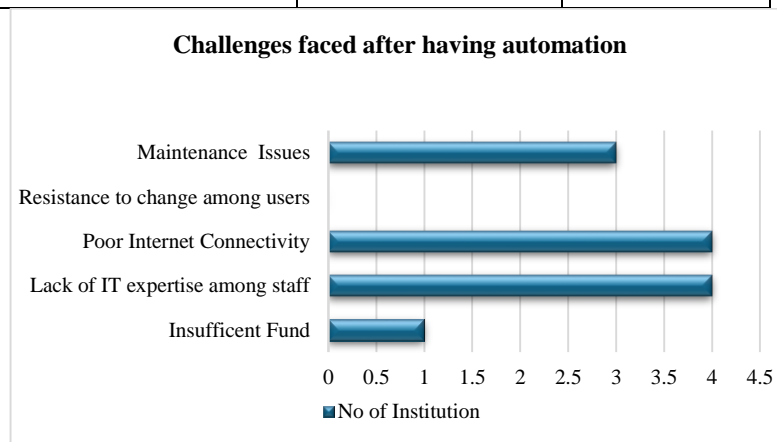


Figure 4 Challenges faced after having automation

Table 17 and figure 16 represents the challenges face after having automation in the library. It is shows that 12.5% institution responded lack of fund, 50% responded lack of IT expertise among the staff, 50% responded Poor Internet Connectivity and only 37.5% responded Maintenance Issues.

1.11 ANALYSIS OF DATA COLLECTED FROM FROM USERS

1.11.1 FREQUENCY OF LIBRARY VISIT

Frequency	No of Library Users							
	AIIMS Patna N=315	NIT Patna N=360	IIT Patna N=345	IIM Bodh N=310	NIP-ER N=170	RPCAU N=320	Nalanda Uni. N=170	IIT BGP. N=300
Daily	80 (25.3%)	95 (26.38%)	85 (24.6%)	70 (22.5%)	40 (28.5%)	90 (28.1%)	46 (27%)	72 (24%)
Weekly	150 (47.6%)	170 (47.2%)	165 (47.8%)	180 (58%)	70 (41.1%)	155 (48.4%)	65 (38.2%)	145 (48.3%)
Twice a Week	50 (15.87%)	46 (12.7%)	50 (14.4%)	35 (11.2%)	40 (28.5%)	43 (13.4%)	47 (27.6%)	32 (10.6%)
Monthly	25 (7.9%)	39 (10.8%)	25 (7.2%)	20 (6.4%)	15 (8.2%)	22 (6.8%)	8 (4.7%)	45 (15%)
Occasionally	10 (3.17)	10 (2.7%)	20 (5.7%)	5 (1.6%)	5 (2.9%)	10 (3.1%)	4 (2.3%)	6 (2%)
Mean	63	72	69	62	34	64	34	60
SD	55.41	56.11	53.24	62.84	22.68	53.06	23.87	47.52

Table: 06 FREQUENCY OF LIBRARY VISIT

Table 06 show the frequency of library visits of the users. In AIIMS Patna Library 25.3% users visit daily basis, 47.6% weekly basis, 15.87% twice a week, 7.9% monthly Basis, while 3.17 % occasionally basis visits library. In NIT Patna 26.38% visit daily basis, 47.2% weekly basis, 12.7% twice a week, 7.9% monthly basis and only 2.7% occasionally basis. In IIT Patna, 24.6% visit on a daily basis, 47.8% weekly basis, 14.4% twice a week, 7.2% monthly basis and only 5.7% occasional basis visit the library. In IIM Bodhgaya 22.5% daily basis, 58% weekly basis, 11.2% twice a week basis, 6.4% monthly basis and only 1.6% occasional basis visit library. In NIPER Hajipur 28.5% visit daily basis, 41.4% visit weekly basis, 28.5% twice a week, 8.2% monthly basis, while 2.9% an occasional basis. In RPCAU 28.1 daily basis, 48.4% weekly basis, 13.4% twice a week basis, 6.8% monthly basis and only on 3.1 % an occasional basis. In Nalanda University 28.1% visit daily basis, 48.4% visit weekly basis, 13.4% visit twice a week basis, 6.8% visit monthly basis and only 3.1% user visit occasionally. In IIIT Bhagalpur 24% visit daily basis, 48.3% visit weekly, 10.6% visit twice a week, 15% visit monthly basis, 2% visit occasionally.

1.11.2 RATE YOUR ICT SKILLS FOR USING AUTOMATED LIBRARY SYSTEM

Response	AIIMS Patna N=315	NIT Patna N=360	IIT Patna N=345	IIMBDG N=310	NIPER N=170	RPCAU N=320	Nalada Univ. N=170	IIIT BGP . N=300
Excellent	45 (14.2%)	67 (18.6%)	98 (28.4%)	50 (16.1%)	56 (32.9%)	62 (19.3%)	51 (30%)	89 (29.6%)
Good	168 (53.3%)	189 (52.5%)	215 (62.3%)	185 (59.6%)	74 (43.5%)	175 (54.6%)	76 (44.7%)	176 (58.6%)
Average	73 (23.1%)	96 (26.6%)	30 (8.6%)	68 (21.9%)	32 (18.8%)	73 (22.8%)	39 (22.9%)	29 (9.6%)
Below Average	29 (9.2%)	8 (2.2%)	2 (0.5%)	7 (2.2%)	8 (4.7%)	10 (3.1%)	4 (2.3%)	6 (2%)
Mean	78.75	90	86.25	77.05	42.5	80	42.5	75
SD	62.23	75.49	94.83	76.32	28.72	69.29	29.93	76.12

Table: 7 RATE YOUR ICT SKILLS FOR USING AUTOMATED LIBRARY SYSTEM

At AIIMS Patna (N=315), the majority of respondents (53.3%) rated the performance as Good, followed by 23.1% rating it Average, 14.2% as Excellent, and 9.2% as Below Average. Similarly, NIT Patna (N=360) also received a predominantly Good response (52.5%), with 18.6% marking Excellent, 26.6% as Average, and only 2.2% as Below Average. IIT Patna (N=345) had the highest proportion of Excellent ratings (28.4%) and Good ratings (62.3%), indicating overall very positive feedback, with minimal Below Average responses (0.5%). For IIM Bodh Gaya (N=310), Good (59.6%) and Excellent (16.1%) ratings dominated, while only 2.2% rated it Below Average. NIPER (N=170) received relatively strong feedback with 32.9% Excellent and 43.5% Good responses. Similarly, RPCAU (N=320) showed a majority of Good responses (54.6%), followed by 19.3% Excellent. Nalanda University (N=170) had 30% Excellent and 44.7% Good feedback, while IIIT Bhagalpur (N=300) also performed well with 29.6% Excellent and 58.6% Good. Across all institutions, the Good category consistently had the highest percentage, indicating a generally favorable perception, while Below Average responses remained low, suggesting overall satisfaction with institutional performance.

1.11.3 IS YOUR INSTITUTION'S LIBRARY AUTOMATED?

Table: 8 IS YOUR INSTITUTION'S LIBRARY AUTOMATED

Response	AIIMS Patna N=315	NIT Patna N=360	IIT Patna N=345	IIM BDG N=310	NIP- ER N=170	RPCAU N=320	Nalada Univ. N=170	IIIT BGP N=300
Yes	271 86.0%	275 76.3%	289 83.7%	269 86.7%	79 46.4%	176 55%	125 73.5%	205 68.3%
No	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%
Partially	44 13.9%	85 23.6%	56 16.2%	41 13.2%	91 53.5%	144 45%	15 8.8%	95 31.6%
Not Sure	0 0%	0 0%	0 0%	0 %	0 0%	0 0%	0 0%	0 0%
Mean	78.75	90	86.25	77.5	42.5	80	35	75
SD	112.55	112.34	119.45	111.87	42.72	80.87	52.32	84.49

The level of library automation varied notably across the higher education institutions surveyed in Bihar. The data indicate that a substantial majority of institutions have implemented automated library systems, reflecting a growing trend toward digitalization and modernization of library services. The highest levels of automation were reported at AIIMS Patna (86%), IIM Bodh Gaya (86.7%), and IIT Patna (83.7%), demonstrating strong institutional commitment to technology-enabled resource management. Similarly, NIT Patna (76.3%) and IIIT Bhagalpur (68.3%) also reported high levels of automation, indicating significant progress in integrating digital systems within their library infrastructures. However, partial automation was evident in several institutions, suggesting that while automation efforts are underway, full implementation has yet to be achieved. Notably, NIPER (53.5%), RPCAU (45%), and Nalanda University (8.8%) reported partial automation, reflecting disparities in technological advancement and resource allocation among institutions. Importantly, none of the institutions reported having libraries that were entirely non-automated or uncertain about their automation status, indicating widespread awareness and adoption of digital library systems.

1.11.4 RATE YOUR ICT SKILLS FOR USING LIBRARY AUTOMATED SERVICES

Table: 09 Rate Your ICT Skills for Using Library Automated Service

Rate	Number of Users							
	AIIMS Patna N=315	NIT Patna N=360	IIT Patna N=345	IIM BDG N=310	NIP- ER N=170	RPCAU N=320	Nalada Univ. N=170	IIIT BGP N=300
Excellent	53 16.8%	65 18.0%	75 21.7%	45 14.5%	57 33.5%	65 20.3%	48 28.2%	75 25%
Good	189 60%	155 43.0%	175 50.7%	135 43.5%	76 44.7%	158 49.3%	87 51.1%	145 48.3%
Average	62 19.6%	125 34.7%	90 26.0%	125 40.3%	26 15.2%	82 25.6%	21 12.3%	65 21.6%
Poor	11 3.4%	15 4.1%	5 1.4%	5 1.6%	11 6.4%	15 4.6%	14 8.2%	15 5%
Mean	78.75	90	86.25	77.05	42.05	80	42.05	75
SD	66.49	54.08	60.46	54.49	25.48	51.33	28.67	46.38

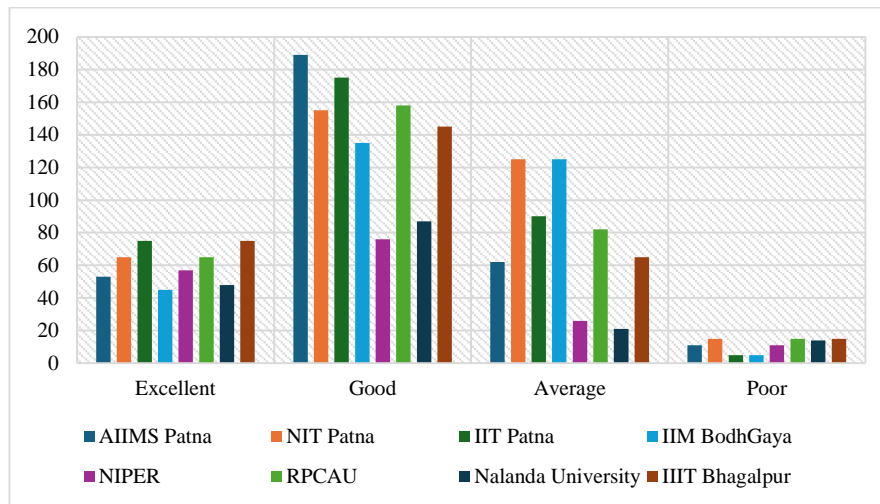


Figure: 5 Rate Your ICT Skills for Using Library Automated Services

The above table indicates that a substantial number of users from various institutions exhibit a commendable level of ICT proficiency, allowing them to efficiently access and make use of automated library resources. At AIIMS Patna, 60% of participants rated their ICT skills as good, followed by 43% at NIT Patna, 50.7% at IIT Patna, and 43.5% at IIM Bodh Gaya. Likewise, 44.7% of respondents at NIPER, 49.3% at RPCAU, 51.1% at Nalanda University, and 48.3% at IIIT Bhagalpur also considered their skills to be good. A notable number of users assessed their skills as excellent, with the highest figures noted at NIPER (33.5%), Nalanda University (28.2%), and IIT Patna (21.7%). Nevertheless, a moderate number of users indicated that they possessed only average ICT skills, especially at NIT Patna (34.7%) and IIM Bodh Gaya (40.3%). A small percentage of respondents across all institutions classified their ICT skills as poor, varying from 1.4% at IIT Patna to 8.2% at Nalanda University. Overall, the findings suggest that the majority of users have satisfactory to high ICT abilities, signifying a positive inclination to engage with automated library services.

1.11.5 USER'S SATISFACTION WITH LIBRARY SERVICES

Table: 10 USER'S SATISFACTION WITH LIBRARY SERVICES

Services	Level of Satisfaction				
	Very Satisfied	Satisfied	Neutral	Very Dissatisfied	Dissatisfied
Ease of accessing library resources	455 (19.86%)	1552 (67.7%)	256 (11.17%)	12 (0.52%)	15 (0.65%)
Availability of e-resources	257 (11.22%)	1645 (71.83%)	352 (15.37%)	11 (0.48%)	25 (1.09%)
Timeliness of Book Borrowing/Return	156 (6.81%)	1715 (74.89%)	220 (9.60%)	42 (1.83%)	157 (6.85%)
Support from library staff	27 (1.17%)	1860 (81.22%)	223 (9.73%)	22 (0.96%)	158 (6.89%)
Accessibility of online database	45 (1.96%)	1911 (83.44%)	157 (6.85%)	12 (0.52%)	165 (7.20%)
Usefulness of social media for updates	55 (2.40%)	2046 (89.34%)	152 (6.63%)	10 (0.43%)	27 (1.17%)
Overall satisfaction with automation	352 (15.37%)	1438 (62.79%)	355 (15.50%)	35 (1.52%)	110 (4.80%)

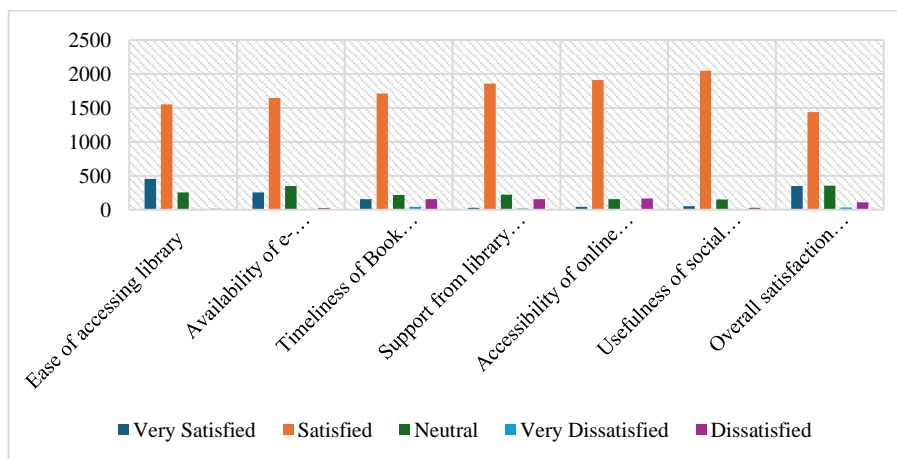


Figure: 06 Users Satisfaction with Library Services

The information on ****user satisfaction with library services**** indicates a predominantly high level of contentment among participants regarding all aspects of library automation and service delivery. Most users indicated they were either ***satisfied*** or ***very satisfied*** with different facets of the library's operations. The most significant satisfaction ratings were found in the ****effectiveness of social media for updates**** (89.34% satisfied), followed by ****availability of online databases**** (83.44%) and ****assistance from library staff**** (81.22%). Likewise, ****ease of accessing library resources**** (67.7%) and ****access to e-resources**** (71.83%) received favorable feedback, demonstrating successful access and management of digital materials. Conversely, there were notably lower satisfaction levels regarding ****promptness of book borrowing/return**** (74.89%) and ****overall satisfaction with automation**** (62.79%), indicating potential areas for enhancement to improve user experience. A small number of respondents expressed neutrality or dissatisfaction, particularly concerning service timeliness and system efficiency. In summary, the results imply that users are generally pleased with the quality, accessibility, and automation of library services, appreciating the effective support and communication via digital channels. Ongoing efforts to refine automation systems and improve turnaround times could further boost overall user satisfaction.

1.11.6 MAJOR CHALLENGES FACING WHILE USING AUTOMATED LIBRARY SERVICES

Table 11 Major Challenges Facing While Using Automated Library Services

Challenges	Number of Users								
	AIIMS Patna N=315	NIT Patna N=360	IIT Patna N=345	IIM BDG N=310	NIP- ER N=170	RPCAU N=320	Nalanda Univ. N=170	IIT BGP N=300	
Limited access to e-resources	65 20.6%	75 23.8%	47 13.6%	51 16.4%	68 40%	72 22.5%	55 32.3%	88 29.3%	
Lack of ICT Infrastructure	188 59.6%	199 55.2%	125 36.2%	121 39.0%	110 64.7%	127 39.6%	63 37%	101 33.6%	
Lack of Knowledge about automated library services	125 39.6%	206 57.2%	189 54.7%	89 28.7%	92 54.1%	153 47.8%	63 37%	73 24.3%	
Lack of support from library staff	69 21.9%	58 16.1%	52 15%	76 24.5%	79 46.4%	105 32.8%	55 32.3%	39 13%	
Inefficient Library system	65 20.6%	45 12.5%	40 11.5%	62 20%	56 32.9%	68 21.2%	61 35.8%	76 25.3%	
Any Others	75 23.8%	25 6.9%	28 8.1%	23 7.4%	29 17%	39 12.1%	18 10.5%	48 16%	
Mean	97.83	101.33	80.17	70.33	72.33	94	52.5	70.83	
SD	45.41	73.10	57.87	30.63	25.86	38.49	15.78	21.47	

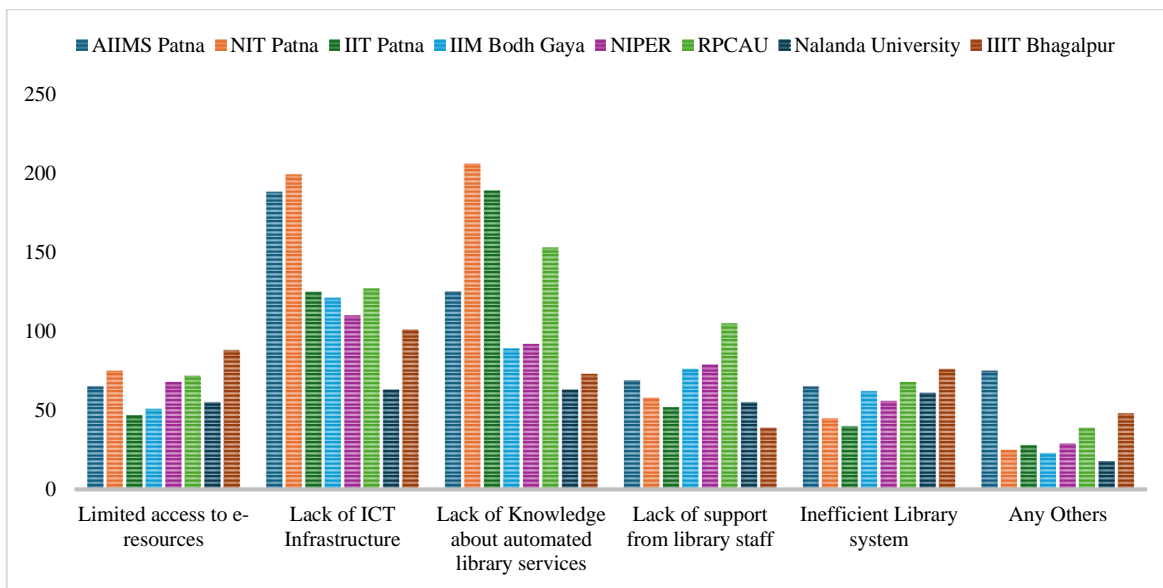


Figure: 06 Major Challenges Faces While Using Automated Library Services

The table and figure above indicate that users face various difficulties, with the primary issue being the ****lack of ICT infrastructure****. This problem was noted most often across different institutions, especially at AIIMS Patna (59.6%), NIT Patna (55.2%), NIPER (64.7%), and IIM Bodh Gaya (39%), suggesting that a lack of adequate technological infrastructure continues to impede smooth access and functioning of automated systems. Another significant issue highlighted by users is the ****lack of understanding of automated library services****, with notable responses from NIT Patna (57.2%), IIT Patna (54.7%), NIPER (54.1%), and AIIMS Patna (39.6%). This underscores the necessity for ongoing training and awareness initiatives to bolster users' familiarity and confidence in effectively leveraging automated tools. The concern of ****restricted access to e-resources**** was also prominent, particularly in NIPER (40%) and IIIT Bhagalpur (32.3%), revealing deficiencies in subscription coverage or access limitations that impact user experience. Likewise, ****insufficient support from library personnel**** and ****subpar library systems**** were cited as moderate challenges, especially in NIPER (46.4% and 32.9%, respectively) and Nalanda University (32.8% and 35.8%), indicating that user assistance and system reliability necessitate further enhancement. A smaller percentage of respondents referred to ****additional challenges****, such as network problems or software glitches, but these were less frequently mentioned. In summary, the results reveal that despite the widespread adoption of library automation, ongoing challenges—particularly inadequate ICT infrastructure, limited user knowledge, and inconsistent system performance—continue to influence optimal use. Tackling these issues through upgrading infrastructure, enhancing staff support, and providing user training would greatly improve the effectiveness of automated library services.

1.12 TENABILITY OF HYPOTHESIS

H1: The implementation of library automation systems in institutions of national importance in Bihar significantly enhances the accessibility and retrieval of academic resources for students, faculty, and researchers. Ordinary least squares (OLS) regression analysis was undertaken to discuss the impact of library automation system on accessibility and retrieval of the academic resources in the institutions of national importance in the state of Bihar. There was a strong statistically significant relationship observed in the two constructs in the model. The correlation coefficient ($R=0.702$) depicts a strong positive relationship whereas the coefficient of determination ($R^2=0.492$) reveals that about 49.2% of the variance in accessibility and retrieval of library services is attributed by the adoption of library automation systems. This level of explained variance is large considering the scope of research in social sciences; it is a significant factor that determines the availability of resources. The ANOVA results are also an affirmation that the model is robust. The regression model was found to be significant $F(1, 2288) = 2218.21, p < .001$, which revealed that the predictor variable, library automation, significantly enhances the predictive capacity of the model in relation to accessibility and retrieval outcomes as compared to a model that does not contain any predictors. This gives a good empirical evidence to the relationship which has been hypothesized. Table 1 indicated that access to and the retrieval of academic resources are positively related to library automation with Table 1 showing a significant positive regression coefficient of $B = 0.573, t = 47.10, p = .001$. This means that a one unit increment in automation system implementation results into increment of 0.573 units in accessibility and retrieval scores at a constant of other factors. Not only is the effect size statistically significant but also practically significant, indicating real benefits of user experience, efficiency, and resource discoverability under the condition of adopting automation systems. Hence the proposed hypothesis H1 is accepted.

Table 1: OLS results for Accessibility and Retrieval of library resources

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	5.490	.027		204.180	.000
	Library Automation	.573	.012	.702	47.098	.000

a. Dependent Variable: Accessibility and Retrieval of library resources

H2: Users in these institutions experience high satisfaction with automated library services, which positively influences their academic and research activities.

In the study, the ordinary least squares (OLS) regression analysis was used to determine the influence of satisfaction by the users of automated library services on academic and research activities of their institutions of national significance in Bihar. The findings reveal that there is a very strong and significant correlation between the user satisfaction and academic and research engagement. The correlation coefficient ($R = 0.817$) provides a strong positive relationship whereas, the coefficient of determination ($R^2 = 0.667$) indicates that user satisfaction with automated library services accounts 66.7 percent of the variation in academic and research activities. This value of explained variance is quite high, which means that the user satisfaction is an important predictor of the academic and research outcomes in such institutions.

The findings of ANOVA prove that the regression model is statistically significant $F(1, 2288) = 4584.81, p < .001$, showing that user satisfaction has a strong positive effect on predictive power of the model in relation to the model without predictors. This confirms the positive effect of automated services satisfaction on the academic and research activities of the users as hypothesised.

The coefficients also indicate that user satisfaction has a positive and significant impact on academic and research activities ($B = 0.344, t = 67.71, p = .001$). It means that a one-unit increment in the satisfaction with automated library services contributes to a 0.344-unit increment in the reported academic and research engagement. The standardized beta coefficient is 0.817, which proves the presence of a large effect size that is user satisfaction is a strong predictor. These results emphasize that highly satisfied users with automated systems including online catalogues, databases, online repositories as well as online self-service functions were more likely to report an increase in their productivity, enhanced access to scholarly materials and increased participation in research and learning in their work. Hence the proposed hypothesis H2 is accepted.

Table 2: OLS results for Academic and Research Activities

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1	(Constant)	1.290	.011	114.819	.000
	User Satisfaction	.344	.005	67.711	.000

a. Dependent Variable: Academic and Research Activities

H3: The implementation of digital resources and library automation technologies contributes to improved educational equity, particularly with facilitating access to information for users in remote or underserved areas.

The ordinary least squares (OLS) regression analysis was conducted to investigate the degree to which the application of the digital resources and library automation technologies have a positive impact on the equity of education by enhancing access of information to the users in under-served or remote regions. The model has a very close relationship between the automation of libraries and access to the information. The correlation coefficient ($R = 0.944$) reveals that it is very strong with a positive relationship, whereas the coefficient of determination ($R^2 = 0.891$) shows that library automation explains access to information in underserved areas to the tune of 89.1 percent only. This is an incredibly huge effect size and indicates that automation and the use of digital resources explain the enormous percentage of the improvement in access to information. The obtained results of ANOVA also prove the soundness of the model, where the regression is very strong, $F(1, 2288) = 18749.33, p = .001$. This proves that the library automation technologies serve a great role in enhancing the capacity of the model to anticipate access to information relative to a model that lacks predictors, thus, giving a good empirical evidence to the postulated relationship.

The analysis of regression coefficients shows that library automation positively impacts access to information in underserved areas ($B = 0.395, t = 136.93, p = .001$). This means that one unit of the application of automation and digital resources will result in a 0.395 unit of increase in the perceived access to information among users in disadvantaged or remote environments. The standardized beta coefficient (0.944) also highlights the significance of the relationship, and this value shows that library automation is a highly strong predictor of enhanced access. Hence the proposed hypothesis H3 is accepted.

Table 3: OLS results for Academic and Research Activities

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1	(Constant)	.398	.006	62.412	.000
	Library Automation	.395	.003	136.928	.000

a. Dependent Variable: Access of information in underserved areas

Findings

- Among all the institutions 6 institutions have 12–24-hour library working period while only 2 institutions have 8–12-hour library working period and there is no institute has below 8-hour library working period.
- The study found that 100 percent library under this study provided Cataloguing services, Circulation Services, E-Resource access and Digital Services while 75 percent library provided reprography service 25 percent interlibrary loan service and 87.5 library provided user orientation programme service.
- The study found that eight (8) institutions (100%) responded that they have e-journal, e-books and online database while only five (5) (62.5%) responded that they have institutional repository and only 25% responded others.
- All the institution has automated library systems.
- The information on user satisfaction with library services indicates a predominantly high level of contentment among participants regarding all aspects of library automation and service delivery. Most users indicated they were either satisfied or very satisfied* with different facets of the library's operations. The most significant satisfaction ratings were found in the effectiveness of social media for updates (89.34% satisfied), followed by availability of online databases (83.44%) and assistance from library staff (81.22%). Likewise, ease of accessing library resources (67.7%) and access to e-resources (71.83%) received favorable feedback, demonstrating successful access and management of digital materials.
- The table and figure above indicate that users face various difficulties, with the primary issue being the lack of ICT infrastructure. This problem was noted most often across different institutions, especially at AIIMS Patna (59.6%), NIT Patna (55.2%), NIPER (64.7%), and IIM Bodh Gaya (39%), suggesting that a lack of adequate technological infrastructure continues to impede smooth access and functioning of automated systems. Another significant issue highlighted by users is the lack of understanding of automated library services, with notable responses from NIT Patna (57.2%), IIT Patna (54.7%), NIPER (54.1%), and AIIMS Patna (39.6%).
- The data shows that across all institutions, the majority of users visit the library on a weekly basis, with percentages generally around 47–58%. A substantial portion also visits daily (about 22–28%), indicating regular engagement with library resources. Visits on a twice-a-week basis are moderate (around 10–28%), while monthly visits are relatively low (about 6–15%). Only a small percentage of users visit occasionally (around 1.6–5.7%), showing that infrequent use of the library is uncommon. Overall, the findings suggest that library usage is consistent and frequent, with most users relying on the library either weekly or daily across all institutions.
- Across all institutions, respondents generally reported a positive level of ICT skills for using automated library systems. The majority in each institution rated their skills as "Good," making it the most dominant category, followed by "Excellent" and "Average." Institutions like IIT Patna, Nalanda University, and IIT Bhagalpur recorded comparatively higher "Excellent" ratings, reflecting stronger user competence. Meanwhile, "Below Average" responses were consistently minimal across all institutions. Overall, the findings indicate that users possess adequate to strong ICT skills, contributing to a favorable perception and effective use of automated library systems.
- The findings indicate that ICT skills for using automated library systems are generally rated positively across all institutions. In every case, the majority of respondents categorized their skills as "Good," followed by "Excellent" and "Average." Institutions such as IIT Patna, Nalanda University, and IIT Bhagalpur reported relatively higher proportions of "Excellent" ratings, reflecting stronger competency levels among users. Meanwhile, the percentage of "Below Average" responses remains consistently low across all institutions. Overall, the results suggest that users possess a satisfactory to high level of ICT skills, contributing to a favorable perception of automated library systems.

Suggestions

- More ICT Infrastructure in the institutional library should be enhanced to enable all the routine work of work of the library through computers so that staff and library users become accommodated with the latest ICT trends in an automated environment.
- Library staff should increase the awareness programmes about library resources and services among the students and faculty. More number of user orientation or workshop should be conducted so that user can maximum utilize the library resources and services. A special training programme can be organised for the users on use and utilizes of e-resources.
- Many academic libraries in higher educational institutions in Bihar are still partially automated; full automation of the library should be done to save the time of library users and staff.
- An inter-institutional higher educational institution library network should be established so, that all the institutions can share their resources and give better services.
- eight institutions (100%) responded that they have e-journals, e-books and online database, while only five (62.5%) responded that they have an institutional repository and only 25% responded others.

➤ Regarding challenges facing after having automation, it is responded that 12.5% institutions responded lack of fund, 50% responded lack of IT expertise among the staff, 50% responded Poor Internet Connectivity, and only 37.5% responded Maintenance Issues.

Conclusion

From the study it has to be observed that that maximum number of libraries are well-equipped with automated systems and provide essential services such as circulation, e-resources access and many more. The study shows libraries also offering long working hours, making them easily accessible to users. Maximum number of patron visit their institutional libraries regularly either daily or weekly, indicating its continued importance. Users of libraries generally have good ICT skills and are satisfied with library services, especially online resources, staff support, and social media updates. However, some challenges remain, including lack of proper ICT infrastructure, limited awareness of library services, and issues such as poor internet connectivity, lack of funds, and insufficient technical expertise. Despite all this several critical challenges persist, Lack of ICT infrastructure, insufficient understanding of automated services among users, limited interlibrary loan services are most prominent issues

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