



Exploring E-Resource Usage Trends in Engineering Libraries across Selected Divisions

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ABSTRACT

Purpose: This study aims to evaluate the usage trends, user preferences, and operational challenges associated with electronic resources (e-resources) in private engineering libraries across the Kanpur, Lucknow, and Agra divisions of Uttar Pradesh, India.

Design/Methodology/Approach: Employing a quantitative survey design, the study utilized a multi-stage stratified random sampling technique. The study collected data from 317 valid respondents, including undergraduate and postgraduate students, doctoral scholars, faculty members, and library staff.

Findings: The study reveals a high level of e-resource awareness (70.03%), though discovery relies heavily on physical library visits (49.21%) rather than digital channels like the library website (7.25%). Utilization is highly active, with 76.03% of users accessing e-resources at least weekly. Electronic journals (46.4%) and e-books (27.1%) are the most preferred formats, with Elsevier and Springer Link as the dominant databases. While “richer content” (47.9%) and “convenience” (32.12%) are the primary drivers of adoption, poor internet connectivity (37.85%) and challenges in finding relevant information (34.7%) remain the most significant barriers. Despite these hurdles, overall user satisfaction remains high at 84.23%.

Practical Implications: The findings highlight an urgent need for academic libraries to upgrade digital infrastructure, implement targeted information literacy programs, and enhance the digital promotion of library services to optimise e-resource utilisation.

Originality/Value: This research provides region specific, empirical data on e-resource consumption in private engineering institutions, offering actionable insights for library administrators and educational policymakers to refine procurement strategies and user support systems.

Keywords: Electronic Resources, Engineering Libraries, Information Literacy, Usage Patterns, Digital Libraries, Academic Productivity, Uttar Pradesh, Survey Analysis

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1. Introduction

In the contemporary digital era, electronic resources, commonly referred to as e-resources, have become a foundational element of academic libraries, particularly within technical and engineering institutions. Comprising databases, e-books, e-journals, and online references, these digital materials offer immediate access to a vast spectrum of intellectual literature, thereby significantly enhancing the effectiveness of both research and learning. As higher education increasingly relies on digital media, the traditional paradigms of information access, utilization, and dissemination are undergoing a fundamental transformation.

Engineering libraries serve as critical repositories of technical knowledge, meeting the rigorous academic and research demands of faculty and students. In regions characterized by a high concentration of engineering colleges, such as the Kanpur, Lucknow, and Agra divisions of Uttar Pradesh, it is imperative to systematically assess the utilization of these digital assets. Analysing usage trends provides essential insights into user preferences, behavioural patterns, access barriers, and the overarching impact of digital content on academic production. Consequently, this study aims to evaluate e-resource usage trends across these three engineering library divisions. By examining variables such as user awareness, access methodologies, usage frequency, and institutional support, the research seeks to identify best practices, highlight existing obstacles, and propose actionable solutions to optimize the distribution and utilization of e-information in engineering education.

2. Background

2.1 Conceptualizing Electronic Resources and Their Categories

Electronic resources are defined as library materials accessible in digital format, typically distributed via local area networks or the internet. Procured either through open access initiatives or publisher licenses, they are specifically curated to support research, teaching, and learning. The modern academic library manages a diverse ecosystem of digital materials, which can be broadly categorized by their format and function.

Core academic texts form the backbone of these collections. E-books provide full text digital books that can be downloaded or read online, frequently featuring interactive tools such as bookmarking, highlighting, and text to speech capabilities through platforms like Springer eBooks and ProQuest Ebook Central. Complementing these are e-journals, which deliver scholarly and professional publications electronically, enabling immediate access to both current and archived research articles via prominent publishers like Nature and IEEE Xplore.

Beyond primary texts, libraries provide structured data and reference materials. Databases offer organized sets of bibliographic, citation, full text, or multidisciplinary content, with platforms like Scopus and Web of Science serving as critical tools for literature reviews. Digital reference works, including online dictionaries and encyclopedias such as Oxford Reference, provide quick, authoritative answers. Furthermore, digital archives and repositories preserve rare manuscripts, historical documents, and institutional research outputs, utilizing systems like DSpace and HathiTrust.

To support diverse learning styles, libraries also integrate multimedia resources, which encompass audiobooks, video lectures, and interactive simulations from platforms like JoVE and Khan Academy. Navigating this vast array of materials is facilitated by the Online Public Access Catalog (OPAC), the digital interface utilized by patrons to search and locate both physical and electronic collections within the library's holdings.

2.2 Strategic Benefits and Prominent Platforms

The transition toward electronic resources offers numerous strategic advantages that fundamentally enhance the academic experience. The most prominent benefit is ubiquitous access, allowing users to retrieve

information from anywhere at any time, provided they have an internet connection. This is coupled with simultaneous use, allowing multiple users to access the same resource concurrently without wait times. Furthermore, e-resources offer advanced search capabilities, enabling fast, precise retrieval of information using keywords, subjects, and author filters. From an institutional perspective, while initial licensing can be expensive, e-resources are highly cost effective over time because they reduce the physical maintenance and storage costs associated with print media. They also keep content current through frequent updates, save valuable physical library space, and support interactive learning through enhanced multimedia content.

To deliver these benefits, academic libraries rely on a variety of specialized platforms tailored to different disciplinary needs. For instance, JSTOR is heavily utilized for humanities and social sciences, while Science Direct and Springer Link are pivotal for scientific, technical, and medical research. Meanwhile, ProQuest and EBSCOhost serve as robust multidisciplinary hubs, providing extensive access to e-books, theses, newspapers, and academic databases.

2.3 Acquisition, Management, and Technological Infrastructure

Acquiring e-resources involves complex financial and legal frameworks. Libraries typically procure these materials through direct purchases or subscriptions from publishers and aggregators. To mitigate high costs, many institutions rely on consortia based access agreements, such as INFLIBNET in India or OCLC in the United States, alongside the growing integration of Open Access initiatives like the Directory of Open Access Journals (DOAJ) and ArXiv. Licensing models for these acquisitions vary widely, including perpetual access, annual subscriptions, pay per view or download options, and concurrent user licensing.

To effectively organize and provide seamless access to these licensed materials, libraries employ a sophisticated technological infrastructure. Integrated Library Systems (ILS) or Library Management Systems (LMS), such as Koha and Alma, handle the core administrative functions. Discovery services like EBSCO Discovery Service and Primo offer unified search experiences across disparate databases. Authentication systems maintain secure access, including IP-based access, Shibboleth, EZproxy, and Virtual Private Networks (VPNs). Additionally, Digital Rights Management (DRM) systems are utilized to enforce copyright protection and manage usage limits in compliance with publisher agreements.

2.4 Contemporary Trends and Operational Challenges

The digital library landscape is rapidly evolving, driven by several prominent trends. Institutions are shifting toward Open Access, reflecting growing support for freely accessible, publicly funded research. Technological advancements are introducing AI and smart search tools that improve personalization and resource discovery. Furthermore, libraries are increasingly optimizing e-resources for mobile access on smartphones and tablets, fostering collaborative platforms for resource-sharing across institutions, and integrating digital materials directly into Learning Management Systems (LMS) for seamless use in online and hybrid courses.

Despite these advancements and clear benefits, the integration and utilization of e-resources present several operational challenges. High subscription costs, particularly for top tier scientific journals, place a heavy financial burden on institutions. Licensing restrictions often limit access rights and preclude perpetual ownership. Externally, the digital divide continues to exclude users who lack reliable internet connectivity or adequate devices. Internally, information overload can overwhelm users who lack proper information literacy guidance. Technical issues, such as system downtime, authentication errors, and poor interface usability, frequently disrupt the user experience. Finally, ensuring long term digital preservation and sustained access to archived materials remains a persistent concern for library administrators.

2.5 Aim of the work

Against this backdrop, the primary goal of this research is to analyze and understand the usage trends, user inclinations, operational difficulties, and overall efficacy of electronic resources in engineering libraries situated in the Kanpur, Lucknow, and Agra divisions of Uttar Pradesh. As technical education increasingly moves to digital platforms, evaluating how engineering students, faculty, and researchers use these resources is critical.

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Specifically, the research assesses the accessibility and availability of various e-resources, including databases, e-books, e-journals, and digital repositories, across the targeted engineering libraries. It also aims to determine the frequency and primary intent of faculty and student use, while investigating user preferences between electronic and conventional print resources. The study also endeavors to evaluate users' awareness of available e-resources and their overall digital literacy levels. By identifying the specific infrastructural or technical obstacles users face when accessing these materials, the research will ultimately offer actionable recommendations for enhancing library infrastructure, user training programs, and e-resource procurement strategies.

2.6 Significance of the Study

The findings will provide critical empirical data that academic institutions, library administrators, and educational policymakers can use to improve the digital academic environment. By illuminating current usage patterns and barriers, the study will enable stakeholders to refine e-resource procurement tactics for better cost effectiveness and higher utilization rates. Additionally, the insights will guide the development of targeted user education initiatives designed to bridge the digital divide and mitigate information overload. The research will also highlight necessary upgrades to digital infrastructure to ensure seamless and reliable access. Ultimately, this study aims to foster a culture of efficient utilization of scholarly electronic content, thereby elevating the overall quality of academic and research output in engineering education.

3. Review of Related Literature

Impact of E-Resources on Research and Academic Productivity: Integrating electronic information resources (EIR) has significantly transformed academic research and learning. Bhat et al. [1] examined the impact of EIR on research activities in agricultural libraries in Northern India and found that electronic resources and ICT advancements greatly facilitated problem identification (51.81%) and literature reviews (92.94%). Furthermore, most respondents reported increased motivation to conduct research (86.62%), along with faster completion (84.31%) and publication (89.97%) of their work. Similarly, Chavan and Keshava [2] observed notable gains in research productivity within Indian technical universities. In engineering education, Prafulla et al. [3] quantified the direct correlation between e-resource use and the engineering curriculum, identifying key factors and specific academic years where e-resources have the most profound impact. Broadly, Kavithanjali [4] highlighted that e-resources, particularly digital databases, are user friendly, cost effective, and highly accessible, ultimately contributing significantly to the academic success of their user base.

Usage Patterns, User Behaviour, and Preferences: Understanding how different user groups interact with e-resources is crucial for optimising library services. Shahnaz and Balasubramanian [5] analyzed e-resource utilization across university libraries in Tamil Nadu, surveying 574 respondents. Their findings revealed a diverse user base comprising students (38.15%), research scholars (21.11%), teachers (19.34%), non-teaching staff (11.15%), and alumni (10.28%). Specific usage purposes vary by demographic and academic need. For instance, Sahu and Tiwari [6] found that at Indira Gandhi Krishi Vishwavidyalaya, Raipur, 100% of students utilized e-resources primarily for accessing reading materials, followed by writing assignments (75.11%), gathering general information (73.70%), accessing scientific and technical information (67.84%), and using audio/visual materials (43.19%). Behavioral intentions and usage patterns are also influenced by psychological and social factors. Amedu [7] demonstrated that attitude, perceived usefulness, and social influence were the primary predictors of online library utilization among economics students in Nigeria. Similarly, Joy et al. [8] identified information proficiency as a key marker of digital library usage among Nigerian university students. Additionally, Mangurkar and Gaikwad [9] explored the shifting preferences of postgraduate engineering students by comparing their use of print versus electronic periodicals.

Awareness, Accessibility, and Management of E-Resources: The effective utilization of e-resources relies heavily on user awareness, digital literacy, and institutional management. Obande et al. [10] defined e-resources as computer encoded information accessible remotely via networks like the internet, emphasizing the necessity of robust digital infrastructure. While Sharma [11] found that faculty members were generally aware of available e-resources such as e-books, e-journals, and OPACs, the study stressed the need for enhanced computer and internet literacy to maximize their use. At the institutional level, library consortia and web-based services play a pivotal role in resource delivery. Verma et al. [12] (2021) and Sanjeev et al. [13] highlighted the critical role of library consortia and web-based services in managing and providing access to e-resources in premier institutions, such as first generation IIM libraries. However, managing these resources requires dedicated expertise. Bellary and Manchare [14] noted that while some e-resources are open access, many require expensive subscriptions. Therefore, academic libraries must employ knowledgeable professionals to efficiently manage and integrate digital collections alongside traditional print materials to maximize their overall value. [15-21].

4. Scope of the Study

The research, titled “*Exploring E-Resource Usage Trends in Engineering Libraries across Kanpur, Lucknow, and Agra Divisions*,” is geographically and thematically focused to provide a comprehensive and relevant analysis. The specific boundaries of the study are defined as follows:

4.1 Geographical Scope

The study is limited to engineering colleges and institutions in the Kanpur, Lucknow, and Agra divisions of Uttar Pradesh, India.

It includes only private engineering institutions within these regions.

4.2 Institutional Scope

The research focuses specifically on engineering libraries that provide access to e-resources, including:

- Electronic journals and e-books
- Digital databases
- Online academic repositories
- Institutional digital libraries
- Other web-based scholarly resources

4.3 User Group Scope

The primary target users included in this study are:

- Undergraduate and postgraduate engineering students
- Faculty members and academic researchers
- Library staff and administrators

4.4 Content Scope

The study investigates the following dimensions of e-resource utilization:

- o Usage Patterns: Frequency, purpose, and duration of use.
- o User Preferences: Preferred types of e-resources and formats.
- o Awareness and Training: User knowledge and digital literacy regarding digital resources.
- o Challenges and Barriers: Obstacles faced in accessing and utilizing e-resources.
- o Institutional Support: Policies and infrastructure facilitating e-resource usage.

4.5 Time Scope

The data collected and analyzed will reflect current trends, ideally covering the past 3 to 5 years, to ensure relevance and accuracy.

The study may also explore future expectations and projections based on the current findings.

Exclusions (Out of Scope): To maintain focus, the following are excluded from the study:

Non-engineering colleges and universities.

General public libraries or school-level libraries.

Non-academic e-resource usage (e.g., resources used purely for entertainment or personal interest).

5. Methodology

This study employed a quantitative survey design. Because surveying the entire population of engineering college library patrons is impractical, the research focused on a targeted subset of the academic community. At the time of the study, the target population comprised approximately 3,130 individuals, including 30 librarians, 2,000 postgraduate students, and 1,100 academic staff members.

To ensure the sample accurately represented this population, a multi-stage sampling technique was utilized. In the first stage, stratified random sampling ensured proportional representation across subgroups, accounting for differences in academic rank, study programs, and staff roles. Consequently, the researchers distributed 440 survey questionnaires to the selected participants, including postgraduate students, academic personnel, and library staff.

6. Results

Data Collection from Students via Questionnaires

Disciplines	Total Questionnaires issued	Total Responses Collected
Doctoral Scholars	100	87
Masters' Students	180	120
Bachelors' Students	160	110
Total/Overall	440	317

Of these, 317 were filled out and returned, accounting for 72% of the total responses. The information was statistically examined and displayed in tabular form.

Course	Male(M)	Female(F)	Number of Respondents
Doctoral Scholars	51	36	87
Masters' Students	80	40	120
Bachelors' Students	75	35	110
Total/Overall	206	111	317

Table 1. Distribution of students by gender

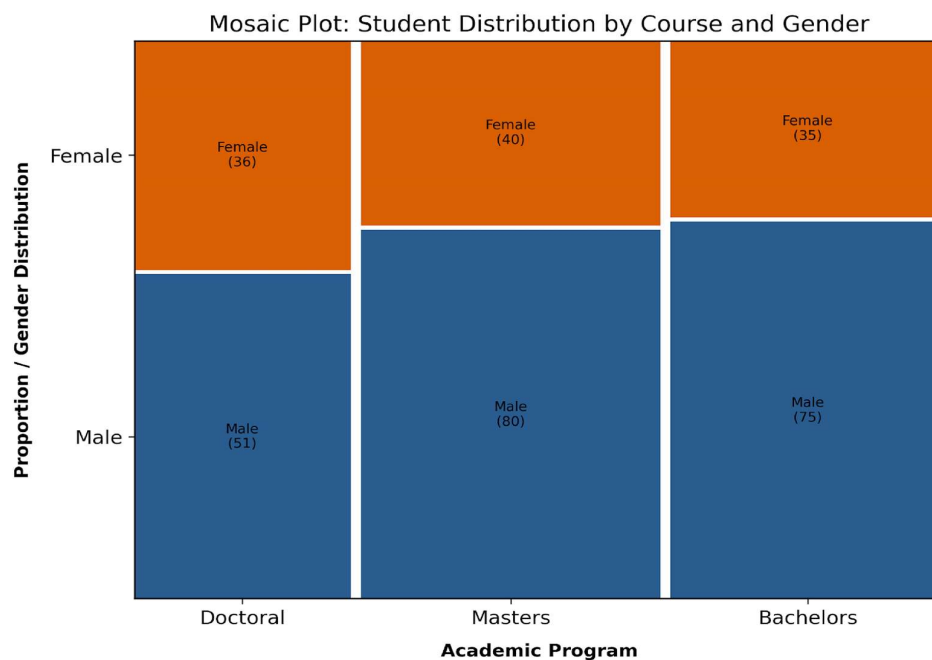


Figure 1. Mosaic Plot

The mosaic plot (Figure 1) was generated from the distribution data in Table 1.

The horizontal width of each column corresponds to the relative sample size of each academic level (Masters at 37.9%, Bachelors at 34.7%, and Doctoral at 27.4%), while the vertical divisions reflect the conditional gender proportions within each program (58.6% Male in Doctoral, 66.7% Male in Masters, and 68.2% Male in Bachelors).

Chi-Square Test of Independence

To determine if there is a statistically significant association between the *Course Level* (Doctoral, Masters, Bachelors) and *Gender* (Male, Female).

Step 1: State the Hypotheses

- Null Hypothesis (H_0): Gender distribution is independent of the Course level (there is no association between the two variables).
- Alternative Hypothesis (H_1): Gender distribution is associated with the Course level.
- Significance Level (α): 0.05

Step 2: Observed vs. Expected Frequencies

The expected frequency for each cell is calculated as:

$$E = \frac{(\text{Row Total} \times \text{Column Total})}{\text{Grand Total}}$$

Course Level	Gender	Observed (O)	Expected (E)	(O - E) ² /E
Doctoral	Male	51	56.54	0.543
	Female	36	30.46	1.008
Masters	Male	80	77.98	0.052
	Female	40	42.02	0.097
Bachelors	Male	75	71.48	0.173
	Female	35	38.52	0.322
Total		317	317.00	

Step 3: Test Statistics

- Chi-Square Statistic (χ^2): 2.1918
- Degrees of Freedom (df): (Rows - 1) x (Cols - 1) = (3-1) X (2-1)= 2
- P-value: 0.3342

Step 4: Conclusion

Since the p-value (0.3342) is greater than the significance level (0.05), we fail to reject the null hypothesis.

Interpretation: There is no statistically significant evidence to suggest that gender distribution varies by

course level in this sample. The proportion of male and female respondents is relatively consistent across Doctoral, Masters, and Bachelors programs.

Awareness	Number of Respondents
YES/Aware	222
NO/Not Aware	95
Total	317

Table 2. Respondents' Awareness Regarding E-resources

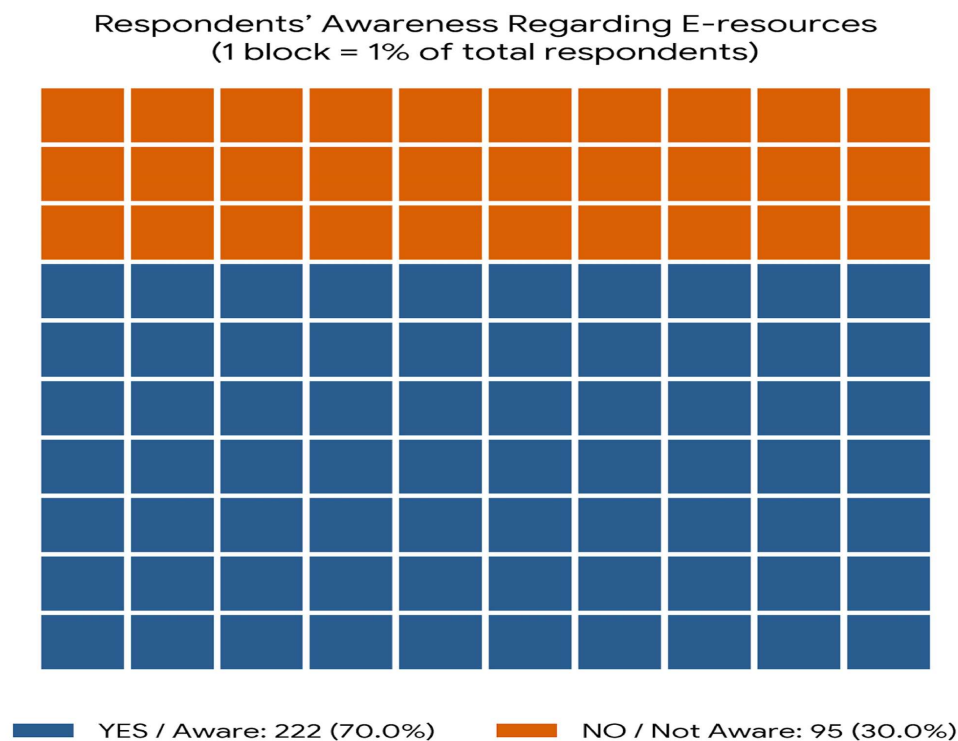


Figure 2. Respondents' Awareness

The waffle chart displays the proportional split of student awareness regarding e-resources across a standardised 100 tile grid, where each tile represents approximately 1% of the overall survey sample. Of the total respondents, 222 students (70.0%) reported awareness of e-resources, while 95 students (30.0%) reported not being aware.

A one sample binomial test was performed to determine whether the proportion of respondents aware of e-resources differs significantly from an expected equal distribution ($p=0.50$).

The null hypothesis ($H_0: p = 0.50$) states that the probability of a respondent being aware of e-resources equals the probability of being unaware, representing a 50% chance level. The alternative hypothesis ($H_a: p \neq 0.50$) posits that the true proportion significantly deviates from 50%.

Among the total cohort ($N=317$), 222 respondents answered affirmatively (“YES/Aware”), yielding an observed success proportion of $p = 0.7003$ (70.03%), with a 95% Clopper Pearson exact confidence interval of [0.6466, 0.7502]. The two sided exact binomial test yielded an extremely small probability value ($p = 7.29 \times 10^{-13}$, or $p < 0.001$).

Because the calculated p -value is substantially lower than the standard significance threshold ($\alpha = 0.05$) we reject the null hypothesis. There is statistically significant evidence to conclude that the awareness rate of e-resources among the surveyed population is significantly higher than chance, with approximately 70% of respondents demonstrating awareness.

Sources Of Awareness	Number of Respondents	Percentage
Library visit	156	49.21
Friends	53	16.72
Library Staff	36	11.36
Library Website	23	7.25
Teachers	49	15.46
Total	317	100

Table 3. Sources of awareness about E-resources

As detailed in Table 3, respondents discovered the library’s electronic resources through various channels. The primary sources of awareness were physical library visits (49.21%) and peer recommendations from friends (16.72%). Conversely, formal academic and institutional channels accounted for a much smaller share of discovery: only 15.46% of students learned about these resources from their professors, 11.36% from library staff, and a mere 7.25% from the library’s official website. These findings highlight a critical gap in institutional outreach, underscoring the need for comprehensive orientation and digital promotion programs to educate students about available e-resources, as current awareness efforts by library personnel and faculty fall far short of expectations.

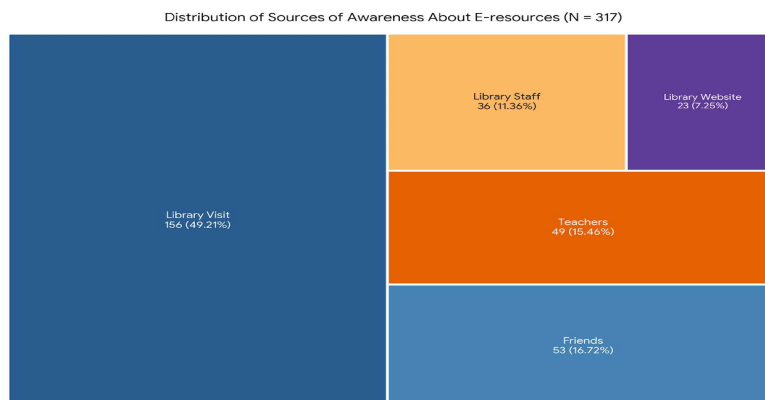


Figure 3. Distribution of Sources

A Chi-Square goodness-of-fit test was conducted to determine whether the distribution of awareness sources regarding e-resources deviates significantly from an equal distribution across the 5 channels.

The null hypothesis ($H_0 : p_1 = p_2 = p_3 = p_4 = p_5 = 0.20$) posits that all 5 sources contribute equally to student awareness, corresponding to an expected frequency of $E_i = 63.40$ respondents per category ($317/5$). The alternative hypothesis (H_1) posits that the observed frequencies across the categories differ significantly from this uniform distribution.

The test yielded a test statistic of $\chi^2 = 177.81$ with degrees of freedom $df = 4$, resulting in an asymptotic p -value of $p = 2.20 \times 10^{-37}$ ($p < 0.001$).

Because the p -value is well below the standard threshold of , the null hypothesis of equal proportions is strongly rejected. There is statistically significant evidence of a preference discrepancy among the sources of awareness, driven largely by the heavy concentration in physical library visits ($n = 156$, compared to the expected 63.40) and the lower than expected reliance on institutional online channels such as the library website ($n = 23$).

Access Frequency	Respondents	%
Very Frequent/Daily	142	44.79
Frequent/Weekly	99	31.23
Moderate/Fortnightly	42	13.26
Rare/Monthly	24	7.57
Very Rare/Occasionally	10	3.15
Total	317	100

Table 4. Frequency of e-resources usage

The frequency of e-resource utilization by students is displayed in table 4. Only 10 students use e-resources rarely, whereas the majority of respondents (142, or 44.79%) report using them daily, followed by 31.23% weekly, 13.26% fortnightly, and 7.57% monthly.

The cumulative frequency polygon (ogive) plots the cumulative accumulation of respondents across the ordinal spectrum of e-resource usage frequency, ranging from the lowest engagement level ("Very Rare / Occasionally") to the highest ("Very Frequent / Daily").

The curve demonstrates a steep upward acceleration as it approaches higher frequency tiers, highlighting that e-resource utilization is heavily skewed toward active, recurring engagement. Only 10 students (3.15%) report occasional use, rising marginally to a cumulative 34 students (10.72%) when including monthly users, and reaching 76 students (23.97%) through fortnightly access. The polygon steepens sharply across weekly and daily access brackets, crossing the median threshold to reach 175 cumulative respondents (55.21%) at the weekly level before terminating at the total survey sample of 317 respondents (100.0%) with daily users ($n = 142$). This indicates that three quarters of respondents (76.03%) interact with e-resources at least once a week or more frequently.

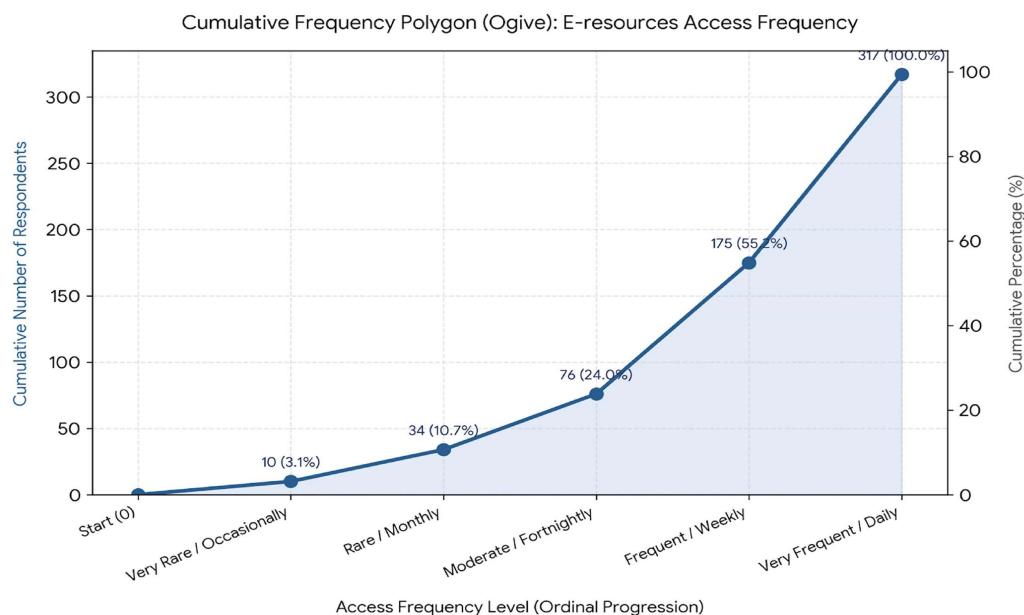


Figure 4. Access Frequency Level

Electronic-resources	Respondents	%
Electronic Journals	125	46.4
Electronic Books	86	27.1
ElectronicTheses/Dissertation	33	10.41
ElectronicDatabases	28	8.83
All e-resources	23	7.26

Table 5. Usage of different types of e-resources

Table No. 5 shows students' use of various e-resources. Most students use e-books in 27.1% of cases and e-journals in 46.4% of cases. Usage of e-databases and e-theses/dissertations is nearly equal, at 8.83% and 10.41%, respectively. Only 7.26% of students use all of these online tools.

The horizontal lollipop chart presents a comparative breakdown of usage across the electronic resource categories reported in Table 5.

Electronic Journals represent the most heavily utilized resource type, selected by 125 respondents (46.40%), followed by Electronic Books at 86 respondents (27.10%). The remaining specialised resources account for smaller fractions of overall usage: Electronic Theses/Dissertations with 33 respondents (10.41%), Electronic Databases with 28 respondents (8.83%), and respondents utilising All E-resources comprehensively with 23 respondents (7.26%).

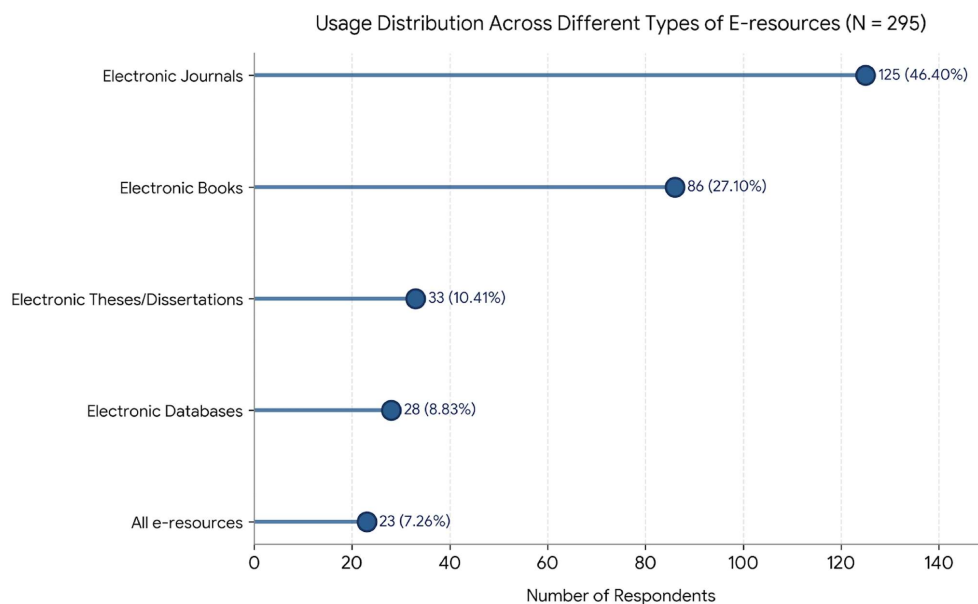


Figure 5. Usage distribution

Databases and Electronic resources	Respondents	%
Elsevier	125	39.43
Springer Link	88	27.77
Taylor & Francis	55	17.35
Economic & Political Weekly	27	8.52
Oxford University Press	15	4.73
American Chemical Society	8	2.52
JGate Plus	6	1.89
Emerald	5	1.58

Table 6. Usage of databases and e-resources

Elsevier and Springer Link dominate electronic resource usage among surveyed respondents, jointly accounting for over 67% of total responses.

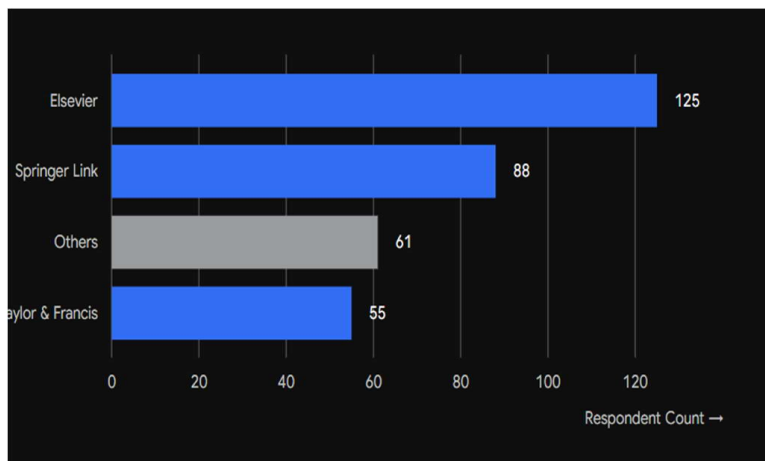


Figure 6. Use of various databases

- Top tier: Elsevier (125 respondents, 39.43%) and Springer Link (88 respondents, 27.77%) represent the primary academic databases.
- Mid tier: Taylor & Francis (55 respondents, 17.35%) and Economic & Political Weekly (27 respondents, 8.52%).
- Niche / specialised: Oxford University Press, ACS, JGate Plus, and Emerald each account for under 5% of responses.

Electronic Resources	Respondents	%
Electronic Journals	115	38.39
Electronic Books	95	30.98
Electronic Theses/Dissertation	43	14.86
Electronic Databases	27	8.78
All electronic sources	22	6.99

Table 7. Most Trustworthy Source of e-information

Electronic Journals and Electronic Books make up nearly 70% of preferred electronic resource types among respondents.

- Primary Resources: Electronic Journals lead with 115 respondents (38.39%), followed closely by Electronic Books with 95 respondents (30.98%).
- Secondary Resources: Electronic Theses/Dissertations account for 43 respondents (14.86%).
- Lower Utilization: Electronic Databases (27 respondents, 8.78%) and generic/all electronic sources (22 respondents, 6.99%) represent the smallest shares.

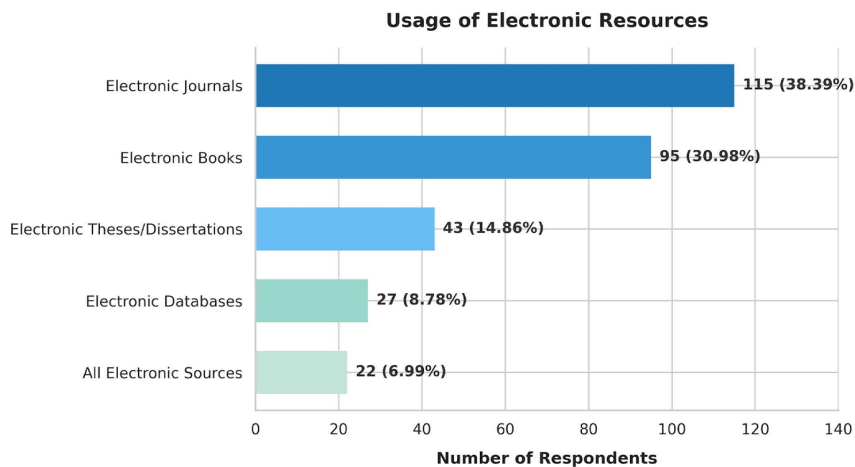


Figure 7. Use of Electronic Resources

Reasons	Respondents	%
Richer Content	155	47.9
Convenient	105	32.12
Saves Time	55	15.35
Higher preference	37	11.67
Cost Effective	26	8.2

Table 8. e-resources over conventional documents and the benefits

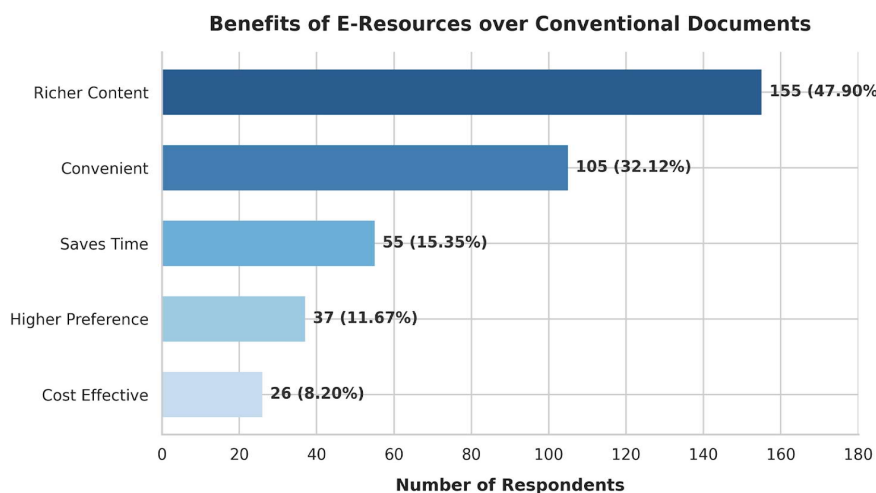


Figure 8. Benefit of E-Resources

Richer Content and Convenience are the primary drivers for choosing e-resources over conventional documents, representing 80.02% of respondent selections.

- Top Driver: Richer Content leads significantly with 155 respondents (47.90%).
- Accessibility: Convenience is the second strongest factor with 105 respondents (32.12%).
- Efficiency & Preference: Time savings (55 respondents, 15.35%) and general higher preference (37 respondents, 11.67%) form the secondary tier of benefits.
- Cost Factor: Cost effectiveness is cited least, with 26 respondents (8.20%).

Reasons	Respondents	%
Poor Connectivity of Internet	120	37.85
Challenges in finding relevant information	110	34.7
Infrastructure inadequate	40	12.62
Inadequate Library hours	32	10.09
Lack of support from Library staff	15	4.73

Table 9. Problems Occurred while accessing/using e-resources

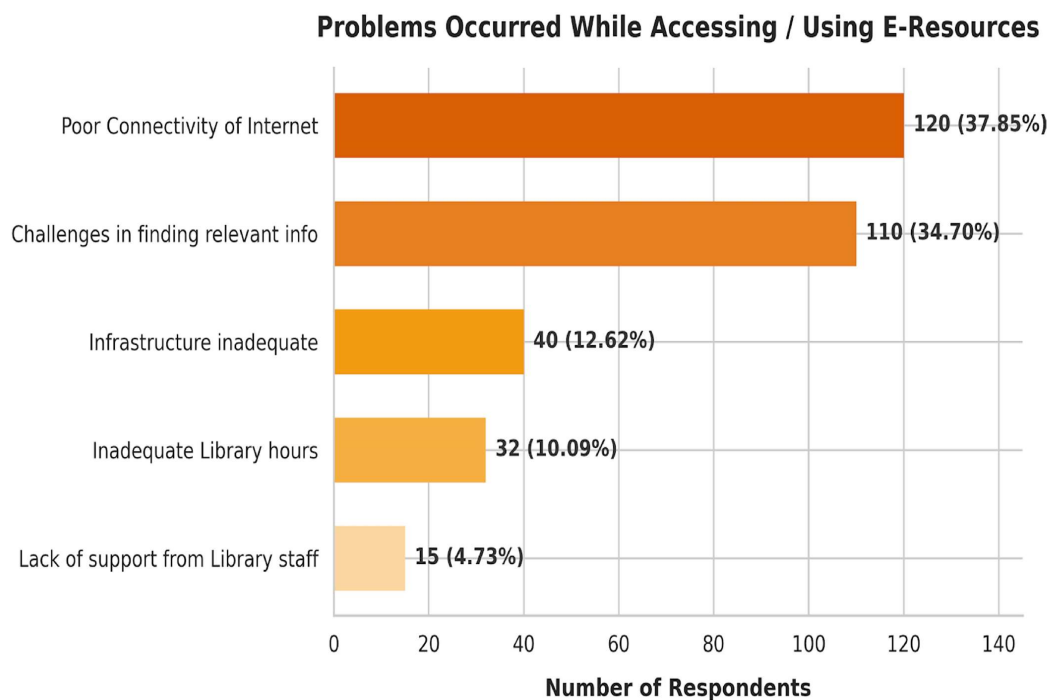


Figure 9. Access Issues

Poor internet connectivity and difficulty finding relevant information are the most prominent barriers to using e-resources, together accounting for 72.55% of responses.

Primary Obstacles:

- o Poor Internet Connectivity: 120 respondents (37.85%)
- o Challenges in Finding Relevant Information: 110 respondents (34.70%)

Facility & Operational Issues:

- o Inadequate Infrastructure: 40 respondents (12.62%)
- o Inadequate Library Hours: 32 respondents (10.09%)

Staffing Support:

- o Lack of Support from Library Staff: 15 respondents (4.73%)

Table 9 shows the issues that students encountered when using e-resources. According to the table, the majority of students 37.85% and 34.7%, respectively complained about the slow Internet speed and difficulty in finding the information; 12.62% also said the infrastructure was inadequate to meet their needs; 10.09% said the library's hours were inappropriate for them, and 4.73% said the staff was uncooperative. They expected staff to inform them of new resources and services available at the library, but the outcomes fell short of their expectations.

Satisfaction Level	Respondents	%
Moderately Satisfied	115	36.28
Highly Satisfied	95	29.97
Extremely Satisfied	57	17.98
Partially Satisfied	33	10.41
Not satisfied	17	5.36
Total	317	100

Table 10. Overall User Satisfaction with using E-resources and Services

An overwhelming 84.23% of respondents report a positive level of satisfaction (Extremely, Highly, or Moderately Satisfied) with e-resources and services.

• Top Categories:

- o Moderately Satisfied: 115 respondents (36.28%)
- o Highly Satisfied: 95 respondents (29.97%)

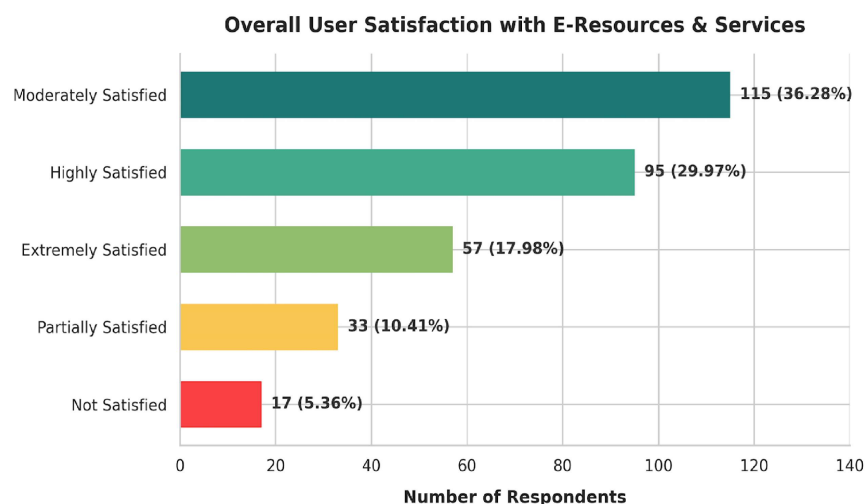


Figure 10. Overall Users Satisfaction

o Extremely Satisfied: 57 respondents (17.98%)

• Lower Satisfaction Levels:

o Partially Satisfied: 33 respondents (10.41%)

o Not Satisfied: 17 respondents (5.36%)

7. Discussion

The findings provide a comprehensive empirical snapshot of how engineering institutions in Uttar Pradesh integrate e-resources into academic workflows. The high awareness rate (70.03%) indicates a growing digital footprint in academic libraries. However, the discovery mechanism reveals a critical gap: nearly half of the users (49.21%) learn about e-resources through physical library visits, while only 7.25% utilize the library website. This aligns with Sharma's (2020) observations regarding the need for enhanced digital outreach and suggests that libraries are underutilizing their own digital platforms for user orientation and marketing.

The usage patterns demonstrate a strong, active engagement with digital materials, with over three-quarters of respondents accessing e-resources weekly or daily. The strong preference for electronic journals (46.4%) and e-books (27.1%), along with the dominance of Elsevier (39.43%) and Springer Link (27.77%), supports Prafulla et al. (2019) and Mangurkar & Gaikwad (2024). It confirms that core STEM databases are indispensable to the engineering curriculum and research productivity. Furthermore, the primary drivers for this preference "richer content" and "convenience" echo Kavithanjali's (2019) assertion that e-resources fundamentally enhance accessibility and academic success.

Despite high adoption and an impressive 84.23% overall satisfaction rate, significant operational friction remains. The two most prominent barriers are poor internet connectivity (37.85%) and challenges in finding relevant information (34.7%). These findings directly reflect the "digital divide" and "information overload" challenges highlighted by Obande et al. (2020). The inability to efficiently navigate complex databases indicates a gap in advanced information literacy, while connectivity issues point to infrastructural deficits that hinder seamless remote or on campus access. The low citation of "lack of support from library staff" (4.73%) suggests staff are generally cooperative, but they may lack the advanced training needed to guide users through sophisticated digital retrieval challenges.

8. Conclusion

The transition to digital scholarship is well underway in the private engineering libraries of the Kanpur, Lucknow, and Agra divisions. E-resources have become a foundational element of academic life, driving high levels of user satisfaction and supporting rigorous research and learning. The strong preference for e-journals and major scientific databases underscores their critical role in modern technical education.

However, the potential of these digital assets is currently bottlenecked by infrastructural and educational limitations. High demand is frequently met with inadequate internet connectivity and a lack of advanced search proficiency among users. Furthermore, the over reliance on physical library visits for resource awareness indicates that libraries must modernize their digital communication strategies.

To bridge these gaps and maximize the return on investment in e-resources, the following actionable recommendations are proposed:

1. **Infrastructural Upgrades:** Institutions must prioritize robust, high-speed Wi-Fi networks within library premises and ensure reliable remote access authentication (e.g., EZproxy) to mitigate connectivity barriers.
2. **Enhanced Information Literacy Programs:** Libraries should move beyond basic orientation to offer mandatory, structured workshops on advanced database searching, Boolean logic, and citation management, specifically tailored to engineering curricula.
3. **Digital Marketing of Resources:** Library websites and digital portals must be revamped for better user experience (UX). Implement proactive digital outreach, such as email alerts, social media campaigns, and embedded library guides within Learning Management Systems (LMS), to reduce reliance on physical discovery.
4. **Strategic Consortia Participation:** Library administrators should actively leverage national consortia (like INFLIBNET) to negotiate cost-effective, sustainable licensing models for high demand databases like Elsevier and Springer Link.

By addressing these infrastructural and educational challenges, engineering libraries can shift from mere repositories of digital content to dynamic, user-centric hubs that elevate the quality of research and academic output in the region.

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