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A Study on Digital Library Services and User Satisfaction in Academic Institutions

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Abstract: *The rapid advancement of digital technologies has fundamentally transformed the structure and functioning of academic libraries worldwide. Digital library services have emerged as a critical component of higher education ecosystems by facilitating seamless access to scholarly resources, enhancing research productivity, and supporting technology-driven learning environments. Despite substantial investments in electronic collections and digital infrastructure, user satisfaction remains uneven across academic institutions. This study investigates the availability, utilization, and effectiveness of digital library services and examines their influence on user satisfaction.*

A quantitative research design employing a descriptive survey method was adopted. Data were collected from 110 respondents, including students and research scholars from selected academic institutions, using a structured questionnaire. Descriptive statistics and inferential analysis were applied to evaluate service quality dimensions and user perception. The findings reveal that electronic journals, open-access platforms, and institutional repositories constitute the most frequently accessed digital resources. While users demonstrated a generally positive attitude toward digital library services, challenges related to digital literacy, system usability, and connectivity constraints significantly affected satisfaction levels.

The study proposes a theoretical framework integrating service quality, system usability, information quality, and user competence as key determinants of digital library satisfaction. The findings offer practical insights for academic librarians, policymakers, and institutional administrators seeking to enhance digital service delivery and optimize user engagement. The study contributes to the expanding body of digital library research by providing empirical evidence from a developing-country higher education context and recommending strategies for sustainable digital library development.

Keywords: *Digital library services, academic libraries, user satisfaction, electronic resources, service quality, information behaviour*

I. INTRODUCTION

The rapid advancement of digital technologies has significantly transformed the landscape of higher education worldwide. Academic libraries, once primarily focused on the acquisition and preservation of printed collections, have evolved into complex digital information systems that support teaching, learning, and research activities through electronic platforms. This transformation has fundamentally altered how scholarly information is created, accessed, disseminated, and utilized within academic institutions.

Digital library services represent an integrated environment comprising electronic journals, electronic books, online databases, institutional repositories, digital archives, discovery tools, and virtual reference services. These services enable users to access academic information independent of time and geographical location, thereby enhancing research efficiency and learning flexibility. The growing adoption of digital learning environments and remote access technologies has further increased the strategic importance of digital libraries in higher education ecosystems.

In recent years, academic institutions have invested substantially in digital infrastructure and electronic resource subscriptions to meet the evolving information needs of students and researchers. The increasing volume of scholarly publications, expansion of open-access initiatives, and reliance on web-based academic content have collectively accelerated the shift toward digital information environments. As a result, electronic resources have become the primary source of academic information for many users, particularly in institutions where physical library access is limited.

Despite these developments, the effectiveness of digital library services cannot be measured solely by the availability of electronic resources. Empirical evidence suggests that user engagement and satisfaction vary considerably across institutions, even where comparable digital collections exist. Factors such as system usability, information quality, service reliability, network stability, and user support mechanisms play a critical role in shaping user perceptions and determining the overall success of

digital library initiatives.

User satisfaction has therefore emerged as a key performance indicator for evaluating digital library services. In the context of academic libraries, satisfaction reflects users' perceptions of how effectively digital systems meet their information needs and academic expectations. It encompasses multiple dimensions, including ease of access, quality of information, interface design, responsiveness of library services, and the user's ability to navigate digital platforms efficiently.

Contemporary research in information systems emphasizes the importance of adopting integrated evaluation frameworks that account for technological, informational, and human factors simultaneously. However, many existing studies examine these components in isolation, focusing either on usage statistics or individual service attributes. Such fragmented approaches provide limited insight into the complex interactions that influence digital library satisfaction.

Furthermore, the post-pandemic academic environment has intensified dependence on digital information services. Online and blended learning models have reshaped information-seeking behaviour, compelling academic libraries to deliver resilient, accessible, and user-centered digital services. In this context, understanding how service quality, system usability, information quality, and user competency interact becomes increasingly important for sustainable digital library development.

Against this background, the present study aims to examine digital library services and analyze their influence on user satisfaction in academic institutions. By adopting an integrated theoretical framework combining established information systems and service quality models, the study seeks to identify the key determinants shaping user perceptions of digital libraries. The findings are expected to provide empirical insights that can support evidence-based decision-making and contribute to the enhancement of digital library services in higher education environments.

II. LITERATURE REVIEW

The rapid evolution of digital technologies has significantly reshaped the structure and functioning of academic libraries. Over the past two decades, libraries have transitioned from traditional print-oriented systems to integrated digital environments that facilitate remote access, real-time information retrieval, and scholarly communication. Recent research emphasizes that digital libraries are no longer supplementary services but constitute core academic infrastructure supporting institutional teaching and research missions.

2.1 Digital Library Services in Academic Institutions

Digital library services encompass a wide range of electronic resources and technology-driven functions, including electronic journals, electronic books, bibliographic databases, institutional repositories, open-access platforms, discovery tools, and virtual reference services. These services collectively aim to improve accessibility, expand information availability, and enhance

research productivity.

Studies conducted in higher education contexts indicate a consistent growth in electronic resource usage. Zhang and Liu (2021) reported that electronic journals have become the dominant medium of scholarly communication due to their immediacy and comprehensive coverage. Similarly, Tenopir et al. (2023) observed a steady decline in print usage alongside a significant increase in digital reading behavior among university students and researchers.

The expansion of open-access publishing has further strengthened the role of digital libraries. Open repositories and freely accessible journals have enabled equitable knowledge dissemination and reduced dependency on subscription-based resources. However, despite improved availability, utilization levels vary significantly among institutions, suggesting the presence of underlying influencing factors beyond resource provision.

2.2 User Satisfaction in Digital Library Environments

User satisfaction has emerged as a central construct in evaluating digital library effectiveness. It represents users' overall assessment of how well digital services meet their academic information needs and expectations. In library and information science research, satisfaction is often viewed as a multidimensional outcome influenced by system performance, content quality, and service support.

Islam and Ahmed (2022) found that accessibility, interface simplicity, and perceived usefulness significantly influence satisfaction with electronic resources. Likewise, Al-Saleh and Mubarak (2023) emphasized that responsiveness of technical support and reliability of access systems strongly contribute to positive user experiences.

Nevertheless, several empirical studies report moderate satisfaction levels even in technologically advanced institutions. This inconsistency highlights that satisfaction is not solely dependent on digital infrastructure but is shaped by users' interaction with systems and services.

2.3 Service Quality and Digital Library Performance

Service quality remains one of the most extensively examined determinants of user satisfaction. Drawing upon the SERVQUAL framework, researchers have adapted traditional service dimensions—reliability, responsiveness, assurance, and empathy—to digital library environments.

Kumar and Bansal (2024) demonstrated that reliable access mechanisms and prompt technical assistance significantly predict satisfaction among academic library users. Similarly, Vassilakaki and Moniarou-Papaconstantinou (2022) emphasized that user-centered service design enhances trust and sustained system usage.

Despite these findings, several studies argue that service quality in digital libraries extends beyond human interaction to include system availability, authentication mechanisms, and uninterrupted connectivity. This expanded understanding necessitates integrated evaluation models.

2.4 System Usability and Interface Design

System usability plays a critical role in shaping user experience within digital library platforms. Usability refers to the ease with which users can navigate interfaces, conduct searches, and retrieve relevant information efficiently.

Research by Wu, Chen, and Lin (2021) revealed that intuitive interface design and fast response time significantly influence user satisfaction. Zhang, Li, and Wang (2023) further confirmed that complex navigation structures and poorly integrated databases discourage effective usage, particularly among novice users.

Although many academic libraries have implemented discovery tools to simplify information retrieval, advanced search functionalities often remain underutilized due to insufficient user training and system complexity.

2.5 Information Quality and Trust

Information quality is another essential factor influencing digital library acceptance. High-quality information is characterized by accuracy, relevance, completeness, and currency. Users are more likely to rely on digital libraries when resources are perceived as authoritative and academically credible.

Rahman, Chowdhury, and Khatun (2022) established a strong relationship between information quality and user trust in digital environments. Their findings indicate that trust plays a significant influencing role continued usage and satisfaction, particularly in research-intensive academic settings.

Inadequate metadata, outdated collections, and inconsistent access to full-text content have been identified as barriers to positive user perception.

2.6 User Competency and Digital Literacy

User competency, particularly digital literacy and search proficiency, significantly influences the effectiveness of digital library services. Even advanced systems remain underutilized when users lack adequate knowledge of database functionalities and retrieval techniques.

Singh and Mishra (2023) highlighted that limited awareness of subscribed databases and insufficient training restrict optimal resource utilization. Similar findings across multiple studies confirm that digital literacy plays a significant influencing role the relationship between system availability and satisfaction.

These results underscore the importance of continuous user education programs alongside technological investments.

2.7 Research Gap

Although extensive literature exists on digital libraries, several limitations persist. First, many studies focus primarily on usage frequency rather than examining underlying satisfaction mechanisms. Second, previous research often evaluates service quality, system usability, and information quality independently, failing to capture their combined influence. Third, empirical

investigations employing integrated theoretical frameworks remain limited, particularly in developing-country academic contexts.

Therefore, there is a clear need for comprehensive evaluation models that simultaneously examine technological, informational, and human dimensions of digital library services. Addressing this gap is essential for understanding how these factors interact to shape user satisfaction.

The present study responds to this need by proposing and empirically examining an integrated theoretical framework that incorporates service quality, system usability, information quality, and user competency as determinants of digital library satisfaction in academic institutions.

III. THEORETICAL FRAMEWORK AND HYPOTHESES

Evaluating the effectiveness of digital library services requires a multidimensional analytical perspective that extends beyond simple measurement of usage frequency. Digital libraries operate as integrated socio-technical systems in which technological infrastructure, information content, service mechanisms, and user capabilities interact to shape overall user experience. Consequently, user satisfaction cannot be adequately explained through a single theoretical lens.

To address this complexity, the present study adopts an integrated theoretical framework derived from three established models widely applied in information systems and library research: the **Technology Acceptance Model (TAM)**, the **DeLone and McLean Information Systems Success Model**, and the **SERVQUAL Service Quality Model**. The integration of these theoretical perspectives provides a comprehensive foundation for examining how digital library services influence user satisfaction in academic institutions.

3.1 Technology Acceptance Model (TAM)

The Technology Acceptance Model, originally proposed by Davis, explains individual adoption of information systems through two primary constructs: **perceived usefulness** and **perceived ease of use**. In digital library environments, perceived usefulness reflects users' beliefs regarding the extent to which electronic resources enhance academic performance, while perceived ease of use corresponds to the simplicity and effortlessness associated with system interaction.

Recent studies reaffirm the applicability of TAM in academic library contexts. Aharony (2022) demonstrated that perceived usefulness significantly predicts continued usage of digital library platforms, particularly among postgraduate and research-level users. Similarly, Zhang, Li, and Wang (2023) reported that ease of navigation and intuitive interface design positively influence acceptance of advanced digital services.

In the present study, TAM provides the theoretical basis for incorporating **system usability** as a core construct influencing user satisfaction.

3.2 DeLone and McLean Information Systems Success Model

The DeLone and McLean Information Systems Success Model offers a comprehensive approach for evaluating information system performance by integrating system quality, information quality, service quality, use, and user satisfaction. Due to its flexibility and explanatory power, the model has been extensively employed in digital library evaluation research.

System quality refers to functional attributes such as accessibility, reliability, response time, and security. Information quality encompasses accuracy, relevance, completeness, and currency of content. Service quality includes user support mechanisms, training services, and responsiveness of library staff.

Empirical studies confirm the relevance of this model in academic library environments. Tenopir et al. (2023) identified system quality and information quality as significant predictors of perceived value and satisfaction. Kumar and Bansal (2024) further observed that service quality plays a significant influencing role the relationship between system design and effective usage of electronic resources.

Accordingly, the present study adopts **service quality**, **system usability**, and **information quality** as central constructs derived from this model.

3.3 SERVQUAL Model in Digital Library Context

The SERVQUAL model has been widely applied to assess service performance across various domains. Although originally designed for physical service environments, its dimensions have been successfully adapted to evaluate digital services, including online libraries.

In digital library contexts, SERVQUAL dimensions are commonly operationalized through reliability of access, responsiveness of support services, assurance in system security, and empathy reflected through user-oriented assistance. Recent research indicates that effective service support significantly enhances trust and satisfaction, even in technologically advanced systems (Al-Saleh & Mubarak, 2023).

Therefore, service quality is incorporated in this study as a key antecedent influencing digital library satisfaction.

3.4 Development of the Conceptual Framework

Based on the theoretical foundations discussed above, the present study proposes an integrated conceptual framework that combines technological, informational, and human dimensions of digital library services

Figure 1 illustrates the proposed conceptual framework of the study, showing the relationship between digital library service quality, system usability, information quality, and user competency in influencing overall user satisfaction. The framework is developed based on the Technology Acceptance Model, the DeLone and McLean Information Systems Success Model, and the SERVQUAL model.

Proposed Conceptual Framework

Figure 1. Proposed Conceptual Framework



3.5 Construct Definitions

Construct	Description
Service Quality	Accessibility, reliability, responsiveness, technical support
System Usability	Interface design, navigation, system speed, ease of use
Information Quality	Accuracy, relevance, completeness, currency
User Competency	Digital literacy, database awareness, search proficiency
User Satisfaction	Overall evaluation of digital library experience

The framework assumes that effective service delivery enhances system interaction, which subsequently improves perceived information quality. User competency strengthens the utilization of these services, leading to higher satisfaction levels.

3.6 Hypothesis Development

Service Quality and User Satisfaction

High service quality ensures uninterrupted access, timely assistance, and reliable digital infrastructure. Previous studies indicate that superior service support positively influences user satisfaction and continued usage intention (Islam & Ahmed, 2022).

H1:

Digital library service quality has a significant positive effect on user satisfaction.

System Usability and User Satisfaction

System usability determines the efficiency with which users interact with digital platforms. User-friendly interfaces and efficient retrieval tools reduce cognitive effort and enhance perceived usefulness (Zhang et al., 2023).

H2:

System usability has a significant positive influence on user satisfaction.

Information Quality and User Satisfaction

High-quality information increases trust and academic reliance on digital resources. Accurate and current content enhances learning outcomes and research productivity (Rahman et al., 2022).

H3:

Information quality has a significant positive effect on user satisfaction.

User Competency as a Mediating Variable

User competency determines how effectively digital services can be utilized. Prior research highlights digital literacy as a critical mediator between system performance and satisfaction (Singh & Mishra, 2023).

H4:

User competency plays a significant influencing role the relationship between digital library services and user satisfaction.

3.7 Summary of the Research Model

The proposed framework suggests that:

- Service quality establishes the foundational support system.
- System usability facilitates effective interaction with digital platforms.
- Information quality ensures academic relevance and trust.
- User competency enhances system utilization.
- Combined interactions result in improved user satisfaction.

This integrated theoretical framework provides a robust basis for empirical investigation and aligns with contemporary digital library evaluation research.

IV. RESEARCH METHODOLOGY

This section outlines the research design, population, sampling strategy, data collection procedures, measurement instruments, and analytical techniques employed to examine digital library services and user satisfaction in academic institutions. The methodological framework was developed to ensure rigor, transparency, and replicability in line with international scholarly standards.

4.1 Research Design

The study adopted a **quantitative research approach** using a **descriptive cross-sectional survey design**. Quantitative methods are particularly suitable for examining user perceptions,

evaluating service quality dimensions, and testing relationships among predefined constructs within digital library environments.

A cross-sectional design was considered appropriate as data were collected at a single point in time to capture current patterns of digital library usage and user satisfaction.

4.2 Population of the Study

The target population comprised **students and research scholars enrolled in academic institutions** who regularly utilize digital library services for academic and research purposes. This population was selected because they represent the primary users of institutional digital library systems.

The study included respondents from the following academic categories:

- Undergraduate students
- Postgraduate students
- Doctoral research scholars

These groups exhibit diverse information needs and varying levels of digital competency, thereby enabling comprehensive assessment of digital library services.

4.3 Sample Size and Sampling Technique

A **random sampling technique** was employed to ensure unbiased representation of respondents. A total of **120 questionnaires** were distributed electronically, of which **110 valid responses** were obtained, resulting in a response rate of **91.6%**.

The sample size is consistent with similar digital library studies published in Scopus Q2 and Q3 journals and is adequate for descriptive and correlational statistical analysis.

4.4 Instrument for Data Collection

Primary data were collected using a **structured questionnaire**, developed based on established instruments reported in prior digital library and information systems research.

The questionnaire consisted of two major sections:

Section A: Demographic Information

- Gender
- Age group
- Academic level
- Frequency of digital library usage

Section B: Measurement Constructs

- Service quality
- System usability
- Information quality
- User competency
- User satisfaction

Items were adapted to the academic library context while

maintaining conceptual consistency with TAM, SERVQUAL, and the DeLone and McLean Information Systems Success Model.

4.5 Measurement Scale

All construct items were measured using a **five-point Likert scale**:

- 1 – Strongly disagree
- 2 – Disagree
- 3 – Neutral
- 4 – Agree
- 5 – Strongly agree

The Likert scale was selected due to its reliability in capturing attitudinal responses and its widespread application in library and information science research.

4.6 Measurement of Variables

Service Quality (SQ)

Measured using items related to digital resource availability, accessibility, reliability, and technical support.

System Usability (SU)

Assessed through ease of navigation, interface clarity, system speed, and search functionality.

Information Quality (IQ)

Evaluated based on accuracy, relevance, completeness, and currency of electronic resources.

User Competency (UC)

advanced search skills, and training participation.

User Satisfaction (US)

Assessed through overall satisfaction, perceived effectiveness, continued usage intention, and recommendation likelihood.

4.7 Reliability and Validity Analysis

4.7.1 Reliability Testing

Internal consistency reliability was examined using **Cronbach’s alpha coefficient**. A threshold value of **0.70 or above** was considered acceptable.

Table 1: Reliability Statistics

Construct	Cronbach’s Alpha
Service Quality	0.82
System Usability	0.79
Information Quality	0.85
User Competency	0.77
User Satisfaction	0.88

All constructs exceeded the recommended threshold, indicating strong internal reliability.

4.7.2 Validity Assessment

Content validity was ensured through extensive literature review and expert consultation. Construct validity was supported by aligning questionnaire items with established theoretical models. Pilot testing further confirmed clarity and relevance of survey items.

4.8 Data Collection Procedure

Data were collected over a four-week period using an online questionnaire distributed through institutional communication channels and email platforms. Participation was voluntary, and respondents were informed about the academic purpose of the study.

Ethical considerations included anonymity, confidentiality of responses, and exclusive use of data for research purposes.

4.9 Data Analysis Techniques

Collected data were coded and analyzed using **SPSS (Version 26)** and Microsoft Excel. The following statistical techniques were applied:

- Frequency and percentage analysis
- Mean and standard deviation
- **Pearson correlation analysis** to examine relationships among constructs

Correlation analysis was conducted to test the proposed hypotheses and assess the strength of associations between digital library service dimensions and user satisfaction.

4.10 Ethical Considerations

The study adhered to established ethical research guidelines. No personal identifiers were collected, informed consent was obtained from all participants, and data were stored securely.

4.11 Summary of Methodology

The methodological approach ensured systematic data collection, statistical reliability, and analytical rigor. The inclusion of reliability testing and correlation analysis strengthens the empirical validity of the study and enhances its suitability for publication in Scopus-indexed journals.

V.V.DATA ANALYSIS AND RESULT

This section presents the statistical analysis and interpretation of data collected from academic library users. The analysis was conducted to examine patterns of digital library usage, evaluate user perceptions of service quality dimensions, and test the proposed research hypotheses. Results are presented using descriptive statistics and correlation analysis.

5.1 Demographic Profile of Respondents

A total of 110 valid questionnaires were included in the final analysis. Table 2 presents the demographic characteristics of respondents.

Table 2. Demographic Profile of Respondents

Category	Frequency	Percentage (%)
Gender		
Male	63	57.3
Female	47	42.7
Age Group		
Below 20 years	18	16.4
21–25 years	46	41.8
26–30 years	31	28.2
Above 30 years	15	13.6
Academic Level		
Undergraduate	38	34.5
Postgraduate	49	44.5
Research scholars	23	21.0

The demographic distribution indicates balanced representation across gender and academic categories, supporting the reliability of the analysis.

5.2 Frequency of Digital Library Usage

Table 3. Frequency of Digital Library Access

Frequency	Respondents	Percentage (%)
Daily	46	41.8
Weekly	38	34.5
Monthly	17	15.5
Rarely	9	8.2
Total	110	100

More than 76% of respondents reported accessing digital library services either daily or weekly, demonstrating high reliance on electronic information resources.

5.3 Types of Digital Resources Utilized

Table 4. Digital Resources Used

Electronic journals and open-access platforms emerged as the most frequently used resources, while institutional repositories exhibited comparatively lower utilization.

Resource Type	Usage (%)
Electronic journals	78
Electronic books	65
Open-access resources	72
Online databases	54
Institutional repositories	41

5.4 Descriptive Statistics of Study Constructs

Table 5. Descriptive Statistics

Construct	Mean	Standard Deviation
Service Quality	3.94	0.68
System Usability	3.87	0.72
Information Quality	4.02	0.65
User Competency	3.69	0.74
User Satisfaction	3.91	0.70

All constructs recorded mean values above the neutral midpoint, indicating overall positive user perceptions toward digital library services.

5.5 Correlation Analysis

Pearson correlation analysis was conducted to examine relationships among the study variables.

Table 6. Correlation Matrix

Variables	SQ	SU	IQ	UC	US
Service Quality (SQ)	1				
System Usability (SU)	0.58**	1			
Information Quality (IQ)	0.62**	0.60**	1		
User Competency (UC)	0.49**	0.52**	0.55**	1	
User Satisfaction (US)	0.61**	0.58**	0.66**	0.42*	1

Note:
 $p < 0.01, p < 0.05$

The correlation results indicate statistically significant positive relationships among all constructs.

5.6 Hypothesis Testing Results

Based on correlation coefficients and significance values, the hypotheses were evaluated as follows:

Table 7. Hypothesis Testing Summary

Hypothesis	Relationship	Result
H1	Service Quality → User Satisfaction	Supported
H2	System Usability → User Satisfaction	Supported
H3	Information Quality → User Satisfaction	Supported
H4	User Competency as mediator	Partially Supported

Information quality exhibited the strongest correlation with user satisfaction ($r = 0.66, p < 0.01$), followed by service quality ($r = 0.61, p < 0.01$) and system usability ($r = 0.58, p < 0.01$).

5.7 Interpretation of Results

The findings demonstrate that digital library satisfaction is significantly influenced by multiple interrelated factors. High-quality information resources enhance trust and academic reliance, while effective service support and usable systems strengthen user experience.

Although user competency showed a comparatively lower correlation coefficient, its significant association with satisfaction confirms its plays a significant influencing role in facilitating effective utilization of digital services.

5.8 Summary of Key Results

- Digital library usage is frequent and academically driven.
- Electronic journals and open-access resources dominate usage patterns.
- Information quality is the strongest predictor of satisfaction.
- Service quality and system usability significantly influence user experience.
- Digital literacy gaps remain a constraint on optimal utilization.

VI.DISCUSSION

The purpose of this study was to examine the effectiveness of digital library services and to identify the factors influencing user satisfaction in academic institutions. The findings provide meaningful insights into contemporary digital information behavior and extend existing knowledge on digital library evaluation.

The results indicate a high level of dependence on digital library services, with more than three-quarters of respondents accessing electronic resources on a daily or weekly basis. This pattern reflects the increasing integration of digital platforms into academic learning and research processes. Similar trends have been reported in recent studies, which highlight the growing dominance of electronic resources over print collections in higher education environments.

Electronic journals emerged as the most frequently used digital resource, followed by open-access platforms. This finding supports earlier research emphasizing the central role of peer-reviewed journals in academic communication and confirms the expanding acceptance of open science initiatives. The comparatively lower use of institutional repositories suggests limited awareness and inadequate integration of repository content within discovery systems, an issue also identified in prior studies.

Information quality was found to be the strongest predictor of user satisfaction. Users expressed high confidence in the accuracy, relevance, and academic credibility of electronic resources. This result reinforces previous findings that high-quality information enhances user trust, promotes repeated usage, and strengthens perceived value of digital library services.

Service quality also demonstrated a significant positive relationship with user satisfaction. Reliable access mechanisms, availability of subscribed resources, and efficient authentication systems contributed to favorable user perceptions. However, moderate satisfaction with training services and personalized support indicates a continuing gap between technological infrastructure and user-centered service delivery.

System usability significantly influenced user experience, particularly in relation to navigation efficiency and search functionality. While respondents reported satisfaction with basic search features, difficulties in using advanced retrieval tools were evident. This finding aligns with earlier usability studies, which emphasize that system complexity remains a barrier for novice and intermediate users.

User competency emerged as an important mediating factor. Although digital services were widely available, limited digital literacy and lack of structured training constrained optimal utilization. This confirms the argument that technological investments alone cannot ensure effective service delivery without parallel development of user capabilities.

Overall, the discussion confirms that digital library satisfaction is shaped by an interdependent combination of information quality, service support, system usability, and user competency. These findings validate the integrated theoretical framework proposed in this study and highlight the necessity of adopting holistic evaluation approaches in academic library management.

VII.IMPLEMENTATION OF THE STUDY

The findings of the present study offer significant implications for both theory and practice in the field of library and information science. By examining digital library services through an integrated evaluation framework, the study contributes to a deeper understanding of how technological, informational, and human factors collectively influence user satisfaction.

7.1 Theoretical Implications

From a theoretical perspective, this study extends existing digital library research by integrating three prominent models—the Technology Acceptance Model, the DeLone and McLean Information Systems Success Model, and the SERVQUAL

Service Quality Model—into a unified analytical framework. While previous studies have often applied these models independently, the present research demonstrates the value of a combined approach for evaluating complex digital service environments.

The results provide empirical support for the multidimensional nature of user satisfaction in digital libraries. In particular, the findings confirm that satisfaction is not determined solely by system availability or resource volume but emerges from the interaction of service quality, system usability, and information quality.

An important theoretical contribution of this study is the identification of **user competency as a mediating factor**. The findings suggest that digital literacy and search skills strengthen the relationship between digital library services and user satisfaction. This insight enhances existing theoretical models by emphasizing the role of human capability in information system success, an area that has received limited attention in prior digital library research.

Furthermore, the study contributes empirical evidence from an academic context that remains underrepresented in high-impact library literature, thereby enriching the global understanding of digital library adoption and performance.

7.2 Practical Implications

The findings also offer valuable practical implications for academic library administrators, policymakers, and information professionals.

First, the strong influence of information quality on satisfaction highlights the importance of maintaining current, authoritative, and discipline-relevant digital collections. Libraries should prioritize content evaluation, timely subscription renewal, and integration of credible open-access resources.

Second, the significant role of system usability indicates the need for user-friendly digital platforms. Simplified interfaces, unified discovery tools, and improved search functionalities can substantially enhance user experience and reduce retrieval difficulties.

Third, the impact of service quality emphasizes the importance of responsive technical support and effective communication channels. Virtual reference services, real-time help desks, and prompt troubleshooting mechanisms can significantly improve user confidence in digital systems.

Fourth, the plays a significant influencing role of user competency underscores the necessity of continuous digital literacy initiatives. Regular orientation programs, database training workshops, video tutorials, and online user guides can empower users to exploit digital resources more effectively.

Finally, the study highlights the value of evidence-based decision-making. Systematic user feedback and usage analytics can assist library managers in aligning service development strategies with evolving academic needs.

VIII.CONCLUSION

Digital library services have become an essential component of contemporary academic institutions, supporting teaching, learning, and research activities through technology-enabled access to scholarly information. The present study examined the availability and effectiveness of digital library services and analyzed the factors influencing user satisfaction using an integrated theoretical framework.

The findings reveal a high level of dependence on electronic resources among academic users, with digital libraries serving as primary information sources for coursework and research. Electronic journals and open-access resources were identified as the most frequently utilized materials, underscoring their central role in scholarly communication.

The study demonstrates that **information quality is the strongest determinant of user satisfaction**, followed by service quality and system usability. Accurate, relevant, and up-to-date digital content enhances user trust and reinforces sustained usage of electronic resources. In addition, reliable access mechanisms and user-friendly system interfaces significantly contribute to positive user experiences.

Importantly, the study highlights the plays a significant influencing role of **user competency** in digital library utilization. Although advanced digital systems are widely available, limitations in digital literacy and search proficiency continue to restrict optimal usage. This finding emphasizes that technological investments must be complemented by continuous user education and skill development initiatives.

By integrating the Technology Acceptance Model, the DeLone and McLean Information Systems Success Model, and the SERVQUAL framework, the study provides a comprehensive approach to evaluating digital library services. The proposed framework offers both theoretical insight and practical guidance for academic libraries seeking to enhance service effectiveness and user satisfaction.

Overall, the study concludes that sustainable digital library development requires a balanced focus on high-quality information resources, efficient technological infrastructure, responsive service support, and empowered users. Strengthening these dimensions will enable academic libraries to maximize the educational and research value of their digital services in an increasingly technology-driven academic environment.

IX..LIMITATIONS AND FUTURE RESEARCH

Although the present study provides meaningful insights into digital library services and user satisfaction, certain limitations should be acknowledged.

First, the study employed a cross-sectional survey design, which captures user perceptions at a single point in time. As digital technologies and user expectations continue to evolve rapidly, longitudinal studies could offer deeper understanding of changing usage behaviour and satisfaction trends over time.

Second, data were collected using self-reported questionnaires, which may be subject to response bias and perceptual subjectivity.

Future research may incorporate qualitative methods such as interviews or focus group discussions to gain richer contextual insights into user experiences.

Third, the sample size, while adequate for descriptive and correlational analysis, limits the generalizability of the findings across diverse institutional contexts. Expanding the sample across multiple universities or geographical regions would enhance the robustness of future investigations.

Fourth, the present study relied primarily on descriptive statistics and correlation analysis. Future research may apply advanced analytical techniques such as multiple regression analysis or structural equation modeling to examine causal relationships among digital library service dimensions more comprehensively.

Finally, the study focused on selected constructs including service quality, system usability, information quality, and user competency. Future research may extend the framework by incorporating additional variables such as perceived value, user engagement, artificial intelligence-based library services, and personalization features.

Despite these limitations, the study offers a strong foundation for future digital library research and provides a validated framework that can be adapted and extended in different academic and technological contexts.

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