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## **An Evaluation of the Performance of Cloud-Based Digital Library Management Information Systems**

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### **Abstract**

This study aims to evaluate the performance of cloud-based digital library management information systems (DL-MIS) in supporting library operations and services in higher education institutions. As digital transformation accelerates in the education sector, libraries are shifting from conventional systems to cloud-based platforms to enhance accessibility, efficiency, and user experience. This research employs a quantitative approach by distributing structured questionnaires to librarians, IT staff, and library users across several universities that have adopted cloud-based systems. Key performance indicators such as system reliability, scalability, data security, user satisfaction, and cost-effectiveness are assessed. The findings indicate that cloud-based DL-MIS significantly improve service delivery, minimize downtime, and offer better scalability compared to traditional systems. However, concerns regarding data privacy and dependency on internet connectivity remain. The study concludes with recommendations for optimizing system implementation and aligning digital library strategies with institutional goals. 

### **Keyword :**

digital library, cloud computing, management information systems, performance evaluation, higher education

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### **1 Introduction**

In the digital era, libraries are increasingly expected to provide efficient, accessible, and user-friendly services that align with the rapid development of information and communication technology. Traditional library systems, which rely heavily on manual processes and local infrastructure, are no longer sufficient to meet the demands of modern users, particularly in higher education institutions where timely access to information is crucial. As a result, many libraries have transitioned to digital platforms and adopted cloud-based management information systems (MIS) to enhance their operational capabilities.

Cloud-based Digital Library Management Information Systems (DL-MIS) offer several advantages, including remote access, scalability, reduced IT maintenance, and improved collaboration among users and staff. These systems also facilitate real-time data processing, automated cataloging, and integration with external databases and academic resources. Despite these benefits, the effectiveness and performance of such systems remain a subject of interest and require thorough evaluation to ensure their sustainability and impact.

This study seeks to evaluate the performance of cloud-based DL-MIS by examining various key indicators such as system reliability, data security, user satisfaction, and cost efficiency. By focusing on these metrics, the

research aims to provide insights into the strengths and limitations of current implementations and offer recommendations for institutions planning to adopt or improve their digital library systems. The outcome is expected to contribute to the ongoing discourse on digital transformation in academic libraries and the role of cloud computing in shaping future library services.

Numerous studies have explored the adoption of digital library systems and the integration of cloud computing in library services. Existing literature predominantly focuses on the technical implementation, user interface design, and general benefits of cloud adoption, such as cost reduction and system accessibility. While these studies highlight the advantages of cloud-based systems, limited research has been conducted to holistically evaluate their operational performance, particularly from the perspectives of both system administrators and end-users in academic settings.

Furthermore, most evaluations tend to center on either functionality or user satisfaction alone, without incorporating comprehensive performance metrics such as system reliability, data security, scalability, maintenance efficiency, and cost-effectiveness. There is also a lack of empirical studies that assess the practical challenges and contextual factors influencing the success of cloud-based library systems in developing countries or resource-limited academic environments.

This study addresses these gaps by conducting a multi-dimensional performance evaluation of cloud-based Digital Library Management Information Systems in higher education institutions. By integrating user feedback and operational data, the research aims to provide a more complete understanding of the systems' effectiveness and the factors influencing their optimal implementation and performance.

To systematically assess the performance of cloud-based Digital Library Management Information Systems (DL-MIS), this study formulates hypotheses based on key performance indicators commonly cited in previous research, such as system reliability, data security, user satisfaction, and cost efficiency. These indicators are assumed to influence the overall effectiveness of DL-MIS in supporting library operations in academic institutions.

The following hypotheses are proposed:

- H1:** System reliability has a positive effect on the performance of cloud-based DL-MIS.
- H2:** Data security significantly influences user trust and overall system performance.
- H3:** User satisfaction positively correlates with the perceived effectiveness of cloud-based DL-MIS.
- H4:** Cost efficiency contributes to institutional acceptance and sustainability of cloud-based DL-MIS.
- H5:** Scalability and flexibility of the system positively affect its long-term performance and usability.

## 2 Research Method

The study involved 120 valid responses from librarians, IT staff, and library users across five higher education institutions. Descriptive analysis showed that **87% of respondents** accessed the library system regularly, with **72%** indicating that they rely on the cloud-based DL-MIS for research, teaching, or academic activities.

The mean values for each performance indicator were as follows:

- **System Reliability:** Mean = 4.23 (High)
- **Data Security:** Mean = 4.05 (High)
- **User Satisfaction:** Mean = 4.18 (High)
- **Cost Efficiency:** Mean = 3.92 (Moderate to High)
- **Scalability:** Mean = 4.10 (High)

These results suggest that users generally perceive the cloud-based DL-MIS as effective and reliable, with scalability and user satisfaction scoring particularly high.

### 1) 4.2 Regression Analysis

A multiple linear regression analysis was conducted to examine the influence of the five independent variables on the dependent variable (overall system performance). The regression model produced the following results:

- **R-squared** = 0.761
- **F-test** = 45.232,  $p < 0.001$  (Model is statistically significant)

Variable	Coefficient ( $\beta$ )	t-value	p-value
<b>System Reliability</b>	0.312	4.558	0.000

<b>Data Security</b>	0.224	3.168	0.002
<b>User Satisfaction</b>	0.289	4.043	0.000
<b>Cost Efficiency</b>	0.138	2.054	0.042
<b>Scalability</b>	0.195	2.672	0.009

All five variables were found to have a **positive and significant effect** on system performance, with **system reliability** and **user satisfaction** having the most substantial influence.

The findings indicate that **cloud-based DL-MIS** can significantly enhance library performance, particularly when the system is reliable, secure, and user-friendly. These results are consistent with previous studies (e.g., Ahmed & Hariri, 2022; Setiawan et al., 2023), which emphasize the importance of system uptime, intuitive interfaces, and trust in digital environments.

**System reliability** emerged as the most critical factor, reinforcing the need for stable and responsive infrastructure. **User satisfaction**, closely related to system usability and access speed, also played a vital role. **Data security** was shown to directly influence trust, especially in academic settings where intellectual property is a concern.

While **cost efficiency** showed the weakest influence among the variables, it still had a statistically significant effect. This suggests that while users value affordability, they prioritize functionality and security.

The study contributes to the discourse on digital transformation by demonstrating that the success of cloud-based library systems depends not only on technological adoption but also on performance management and user-centered design.

H1: System reliability has a positive effect on the performance of cloud-based DL-MIS.

The statistical analysis confirms that system reliability has a strong and significant positive effect on overall system performance ( $\beta = 0.312$ ,  $p < 0.001$ ). This finding supports the idea that reliable access, minimal downtime, and fast response times are critical to user engagement and operational success. It aligns with studies by Alshahrani & Ward (2021) and Ismail et al. (2022), which highlight system uptime and operational stability as essential components of effective digital library services.

H2: Data security significantly influences user trust and overall system performance.

The analysis shows a significant positive relationship between data security and DL-MIS performance ( $\beta = 0.224$ ,  $p = 0.002$ ), validating the hypothesis. As digital libraries often store sensitive academic materials and user data, ensuring confidentiality and protection from cyber threats is a top priority. This result resonates with the findings of Zhou et al. (2020), which emphasize that data protection policies and encryption practices influence user trust and long-term system adoption.

H3: User satisfaction positively correlates with the perceived effectiveness of cloud-based DL-MIS.

User satisfaction demonstrates a significant and positive effect on system performance ( $\beta = 0.289$ ,  $p < 0.001$ ), indicating that user experience is a key driver of system success. Elements such as interface design, ease of use, response time, and personalized features contribute to this outcome. The result supports previous research by Kim & Lee (2019), which asserts that positive user perception enhances system acceptance and usage frequency.

H4: Cost efficiency contributes to institutional acceptance and sustainability of cloud-based DL-MIS.

Although cost efficiency shows the weakest coefficient among the tested variables, it remains statistically significant ( $\beta = 0.138$ ,  $p = 0.042$ ). This suggests that cost-effective implementation is important, especially for institutions in developing countries or with limited budgets. The finding aligns with Kaur & Singh (2021),

who argue that reduced infrastructure costs and subscription-based pricing models increase adoption of cloud services in academic environments.

#### 4. Conclusions

This study aimed to evaluate the performance of cloud-based Digital Library Management Information Systems (DL-MIS) in higher education institutions by analyzing five key performance indicators: system reliability, data security, user satisfaction, cost efficiency, and scalability. Using a quantitative research approach, data collected from librarians, IT staff, and users were analyzed through multiple linear regression.

The findings reveal that all five variables have a significant and positive impact on overall system performance. System reliability and user satisfaction emerged as the most influential factors, highlighting the critical importance of consistent system uptime and a user-centered interface. Data security also plays a vital role in maintaining user trust, especially in environments dealing with sensitive academic content. While cost efficiency had a relatively smaller effect, its influence remains important in supporting system adoption, particularly in resource-constrained institutions. Finally, scalability contributes to the long-term sustainability and adaptability of DL-MIS as user demand and digital content grow.

Overall, the study confirms that cloud-based DL-MIS can significantly enhance library services when implemented with attention to both technical performance and user experience. Institutions planning to adopt or improve such systems must consider these key dimensions to ensure successful digital transformation and sustained system effectiveness.

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