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Comparison of the library Information System Implementation based on Artificial Intelligence at the Universitas Pendidikan Indonesia (UPI) and UIN Syarif Hidayatullah Jakarta

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ABSTRACT

The rapid development of digital technology, especially artificial intelligence (AI), has fundamentally transformed higher education services, including the management of academic information through libraries in the Industry 4.0 era. Educational institutions are urged to be adaptive, innovative, and smart technology-based. This study aims to conduct an in-depth comparative analysis of AI-based library information system implementation at Universitas Pendidikan Indonesia (UPI) and Universitas Islam Negeri Syarif Hidayatullah Jakarta (UIN Jakarta). A descriptive qualitative approach was employed, collecting data through literature review, system documentation, and contextual observation to understand the phenomenon comprehensively. Research findings indicate that both institutions have implemented various AI features, including information service chatbots, user-preference-based collection recommendation systems, and automated document classification. UPI stands out with a strategic focus on personalization and user experience through digital innovation policies, while UIN Jakarta prioritizes operational efficiency and extended access via cross-unit collaboration and integration with popular communication applications. AI implementation demonstrably enhances service efficiency and responsiveness, simultaneously increasing user satisfaction. However, challenges such as uneven digital literacy and limited human resource capacity remain concerns. This research benefits by enriching the literature on higher education digitalization, providing practical recommendations for developing contextual AI library systems, and contributing to the adaptive smart campus vision.

Keywords: *Artificial Intelligence; Library Information System; Service Digitalization*

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1. PENDAHULUAN

Digital transformation has become one of the main agendas in the development of higher education in Indonesia (Bangsawan, 2023). The rapid development of information and communication technology (ICT), especially in the era of the Industrial Revolution 4.0, requires educational institutions to adapt various innovations in order to remain relevant and competitive in the global order (Voronkova et al., 2023). One of the areas affected by this transformation is libraries as centers of information and knowledge. Conventional libraries now face the challenge of transforming themselves into more dynamic, interactive, and technologically advanced entities, one of which is through the use of artificial intelligence (AI) (Mamedova, 2023).

However, the level of readiness of universities in implementing AI-based technology is not always the same. Variations in digital infrastructure, human resource competencies, internal policies, and institutional support also influence the success of implementing AI-based library information systems (Phakamach et al., 2025). Some institutions are able to move faster in adopting new technologies, while others still face obstacles such as budget constraints, lack of technology training, and resistance to change (Singun, 2025). Therefore, it is important to conduct a comparative analysis to determine the readiness and effectiveness of AI implementation in various university libraries, so that best practices and areas for improvement can be identified.

Artificial intelligence enables the development of library information systems that are not only automated but also intelligent in responding to user needs (Asemi et al., 2021). AI can be used to manage catalogs, provide personalized reading recommendations, optimize information searches, and provide chatbot-based information services (Fatouh & Hamam, 2024). This technology helps libraries operate more efficiently, provide faster and more relevant services, and increase user satisfaction (Panda & Chakravarty, 2022). Amidst the increasing demand for digital information services, the implementation of AI-based systems is very strategic in supporting academic and research processes in higher education.

The Indonesia University of Education (UPI) and the Syarif Hidayatullah State Islamic University Jakarta (UIN Jakarta) are two higher education institutions that have implemented library information systems with an AI-based approach. UPI is known as a progressive university in the development of educational technology, including in the management of its library. On the other hand, UIN Jakarta also shows a strong commitment to integrating technology with Islamic values in information management and academic services. Both have different institutional backgrounds, policy approaches, and user characteristics, making the application of AI technology in each institution interesting to analyze comparatively.

However, the implementation of AI-based library information systems is not without challenges (Narendra et al., 2025). Factors such as technological infrastructure readiness, human resource competencies, and cultural resistance to new technologies are determining factors for success. In addition, the effectiveness of the system's use also depends heavily on the extent to which the system can respond to user needs and directly support the learning process (Asemi et al., 2021). This study aims to conduct a comparative analysis of the implementation of AI-based library information systems at UPI and UIN Syarif Hidayatullah Jakarta. The focus of the study includes identifying the technological features used, implementation strategies, user responses to AI-based services, and evaluating the impact on library service quality.

With a qualitative approach and descriptive analysis, this study is expected to provide a comprehensive overview of the effectiveness and challenges of implementing AI technology in a university library environment. Furthermore, the results of this study are expected to serve as a reference for other educational institutions that wish to develop AI-based library information systems. By exploring best practices from each institution, this study can contribute to the development of a contextual, effective, and sustainable AI implementation model within the Indonesian academic ecosystem.

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2. RESEARCH METHOD

Research methods are specific procedures used in collecting, analyzing, interpreting data, and writing research reports (Creswell, 2014). Research is a scientific activity aimed at obtaining accurate and reliable information on a particular issue that is raised and discussed (Siroj, R. A., et al.). This study uses a qualitative descriptive approach with a systematic literature review technique using the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) tool. The purpose of this approach is to find, evaluate, and synthesize research on the use of artificial intelligence (AI) in higher education library information systems.

Thus, to support this research, two case study institutions, the Indonesia University of Education (UPI) and UIN Syarif Hidayatullah Jakarta, conducted online observations of library information systems. There are two main approaches used in the methodology of this research. The systematic literature review technique is a scientific literature review conducted systematically, structurally, and based on the PRISMA protocol. The second technique is online observation, with a direct review of web-based library systems, chatbots, service applications, and the official social media accounts of UPI and UIN Jakarta. Thus, the PRISMA (Flowchart) stages are as follows: first, identification, such as articles found in the DOAJ, Garuda, and ScienceDirect databases (n = 73). Then Screening, articles that are relevant to the topic and context of Indonesia (n = 35). So that the feasibility can be seen, articles with high relevance and concrete case studies (n = 22). Until Inclusion, articles that are analyzed in depth (n = 15).

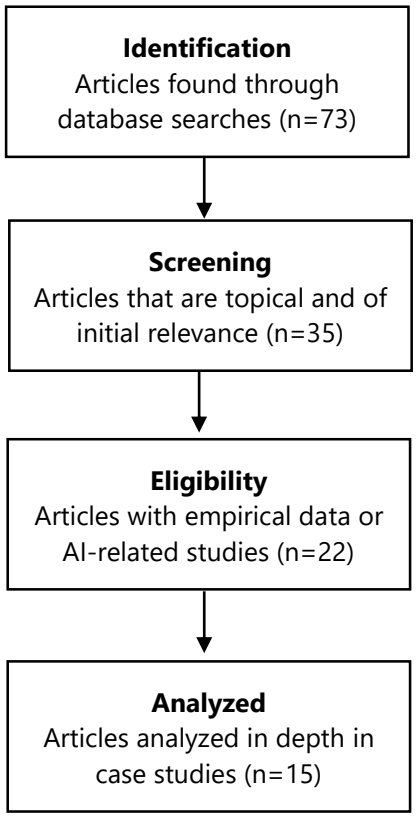

Figure 1. Systematic literature review technique

This systematic literature is used to analyze the overall picture of the effectiveness and challenges of AI technology implementation in university libraries and can contribute to the development of a contextual, effective, and sustainable AI implementation model in the Indonesian academic ecosystem.

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3. RESULTS AND DISCUSSION

A library information system is a digital platform designed to manage library collections, transactions, and services in a structured and efficient manner. This system includes modules for catalog processing, classification, circulation services, and providing access to electronic information sources (Kurniawan, 2019). Over time, this system has evolved from a local desktop model to a cloud-based system integrated with mobile devices and Learning Management Systems (LMS). In higher education, this system has become the main foundation in supporting academic literacy, open access to scientific information, and cross-institutional connectivity. In the context of developing this system, Artificial Intelligence (AI) has become an important component in the modernization of library services.

AI enables the system to perform tasks such as user pattern recognition, behavioral learning, natural language processing, and automated decision-making. In the library realm, AI applications include information service chatbots, reading recommendation systems, user behavior analysis, and automated document classification (Zhang & Yu, 2019; Tenopir et al., 2021). With the application of AI, libraries are able to provide more personalized and predictive services, marking a shift in the role of libraries to become intelligence-based information service providers. The digitization of libraries itself is a strategic response to the Industrial Revolution 4.0, which is characterized by the integration of advanced technology in all aspects of life, including education. The digitization process includes Digitization is supported by the availability of technology, both for the transfer process and for accessing or retrieving information (Juniati, J. et.al., 2021). Therefore, the digitization of information is expected to increase in line with advances in science and technology.

However, in Indonesia, the implementation of digitization faces common obstacles such as technological infrastructure inequality, limited funds, and low digital literacy. The success of digitization greatly depends on institutional readiness, human resource development policies, and innovation in information services. To understand the process of adopting this technology, the theory states that if AI technology is considered useful and beneficial during the implementation process, then users will tend to use it. Similarly, compatibility helps us measure how innovations will fit into new structures, involving user needs, existing technological values, and user beliefs. It has been suggested that the higher the compatibility, the better (Almaiah, M. A et al., 2022). In the context of libraries, the success of AI implementation is largely determined by the perceptions of staff and users regarding the benefits of the system.

Additionally, digital literacy is an individual's ability to understand, evaluate, and use information through digital technology effectively. Digital literacy involves interacting with information, and interacting with information is about assessing truth (or validity), credibility, reliability, and so on (Lankshear, C., & Knobel, M. 2015). In AI-based library services, digital literacy is a key element for users to make optimal use of smart features. Low levels of digital literacy will hinder system adoption, so strengthening digital literacy through orientation and training programs is very important. Lessons from Global Benchmarks or International Libraries, such as the world's leading university libraries, namely the Massachusetts Institute of Technology (MIT), National University of Singapore (NUS), and the University of Oxford, show the widespread application of AI to improve efficiency and user experience. According to a report by Zhang and Yu (2019), the MIT library uses AI to recommend reading sources based on user behavior data, while NUS utilizes multilingual chatbots. These lessons are important for libraries in Indonesia to adapt to global standards and adopt best practices in accordance with local conditions.

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As the use of AI increases, concerns about user privacy and data security have also arisen. AI systems in libraries often collect and process users' personal data. Therefore, libraries must adopt strong data governance principles, including compliance with personal data protection regulations such as the Personal Data Protection Law (PDP Law) in Indonesia. The development of library information systems needs to be accompanied by data security policies, transparency in the use of user data, and internal oversight to ensure that the use of AI remains within the bounds of academic and professional ethics. The implementation of the concepts described above can be observed in various institutions that demonstrate how such information systems are successfully run. The following is an overview of the application of library information systems at the Universitas Pendidikan Indonesia(UPI) Library and the UIN Syarif Hidayatullah Jakarta Library:

1. Universitas Pendidikan Indonesia (UPI) Library

   Has implemented structured service digitization through the development of the UPI Library Information System (SIPUS UPI), which integrates various digital technologies and artificial intelligence (AI). One of the advantages of this system is an interactive chatbot called "UPI SmartLib Assistant," which functions as the front line of information services. This chatbot allows users to access information related to collections, loan status, service procedures, and guidelines for using digital resources without the direct involvement of librarians. In addition to the chatbot, SIPUS UPI also has an automatic recommendation system that uses machine learning algorithms to suggest reading materials to users based on their preferences and search history. The application of this technology provides added value to the library in terms of service efficiency and personalization, which are key demands in today's digital era. System usage data also shows an increase in user interaction with the digital catalog and AI-based search features.

2. UIN Syarif Hidayatullah Library

   Has developed i-SMART Library, a web-based library information system that is directly connected to various digital services such as self-service borrowing, access to institutional repositories, and chatbot features based on instant messaging applications such as WhatsApp and Telegram. One of the unique aspects of UIN's approach is the integration of AI services with popular communication media, which aims to increase reach and ease of access for users. This system also supports the automation of classification and metadata recording for digital collections, which significantly reduces the technical workload of librarians. The implementation of this technology was carried out through collaboration between the library management unit and the campus information technology division, accompanied by intensive training for library staff so that they could understand the system's operations and adapt to the rapidly changing technological developments.

   Thus, it is clear that the development of AI-based library information systems, as implemented at UPI and UIN Jakarta, is not only a response to technological developments but also a strategy to improve efficiency, personalize services, and enhance the relevance of libraries in the digital age. The success of implementation is largely determined by institutional readiness, the digital literacy of users and staff, and a commitment to innovation and data management ethics.

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3. Comparative Analysis of Implementation Strategies and Approaches

A comparison between UPI and UIN Jakarta shows that although both institutions have adopted AI technology, their approaches have different focuses and orientations:

Figure 1. Comparative Analysis

Aspects	Indonesia University of Education (UPI)	UIN Syarif Hidayatullah Jakarta
System Name	SIPUS UPI	i-SMART Library
Key AI Features	Chatbots, reading recommendation systems, user behavior analysis	Chatbot, automatic metadata classification, WA/Telegram integration
Development Approach	Improved user convenience and digital experience	Expanding access to digital services through popular communication
Special Innovations	Machine learning algorithm-based recommendations	Automation of digital collection classification and metadata
Dominant Challenge	Uneven digital literacy and system integration constraints	Limitations of human resources and complexity of coordination between units

UPI prioritizes interactivity and personalization of services, making user experience the main focus of innovation. In contrast, UIN Jakarta strives to maximize operational efficiency and expand service coverage, especially for users who are accustomed to interacting through mobile applications and online communication.

4. Impact, Challenges, and Prospects of AI Implementation in Libraries

The application of AI-based information systems has various direct and indirect impacts on library services, both in terms of internal operations and external user satisfaction. Operational efficiency and service responsiveness have increased significantly; 24/7 chatbots reduce the workload of librarians on basic questions, allowing them to focus on strategic tasks. Self-service features like book status checks and collection searches are now easily accessible. At UPI, the recommendation feature speeds up the search for teaching materials, while the WhatsApp chatbot at UIN Jakarta shows a surge in daily interactions, proving the effectiveness of direct outreach to students. Regarding user satisfaction and participation, AI integration enriches the experience through fast, easy, and adaptive services, with chatbots providing a personal touch and increasing user comfort. The use of AI also increases participation in online services, making libraries more "present" in students' digital lives. In addition, AI strengthens Data-Based Decision Making; integrated dashboards allow librarians to see borrowing trends and sought-after collections, strengthening the library's function as an information manager and policy maker.

Despite significant progress, AI implementation is not without strategic obstacles. Challenges include a lack of digital literacy among some users, which prevents AI features from being optimized; the need to improve human resource

capacity in system management and technical understanding of AI through training; system interoperability as a common obstacle in connecting libraries with academic systems or campus repositories; challenging funding and system sustainability given the costs of development and maintenance; and user data protection and privacy as important issues given the increasing amount of data processed by AI systems.

User responses and perceptions of AI-based services are generally positive. The majority of students and lecturers welcome the presence of AI features due to the ease and efficiency of accessing academic information. At UPI, the automatic recommendation system is highly relevant for graduate students. At UIN Jakarta, the integration of WhatsApp/Telegram chatbots is in line with users' digital communication habits, although the quality of responses to complex questions still needs to be improved. Both institutions recognize that user satisfaction is determined by a combination of technology and a proactive and responsive service approach, making the user experience the key to long-term success.

Beyond technical and operational factors, managerial strategies and institutional commitment significantly influence AI system implementation. UPI is supported by campus policies that prioritize technology as a core pillar and active leadership involvement in digital transformation. UIN Jakarta emphasizes cross-departmental collaboration with the Center for Information Technology and Academic Services (PTIPD), demonstrating that internal coordination and adaptive approaches can create relevant systems even with limited funding. This confirms that institutional support and organizational flexibility are key determinants of successful AI implementation, ensuring continuous innovation and evolving services.

The application of AI in libraries will continue to evolve alongside technological advances and user demands. The results of this study indicate that higher education institutions must make AI an integral part of their campus information service strategy. Future development opportunities include integrating AI with academic systems (LMS) for reading recommendations based on syllabi; applying AI to detect plagiarism in scientific papers; developing AI-based librarian dashboards for real-time monitoring and prediction of literature needs; and personalizing services based on user profiles for customized displays and information tailored to academic interests.

4. CONCLUSION

Based on the results of research conducted on the implementation of an Artificial Intelligence (AI)-based library information system at the Univeristas Pendidikan Indonesia (UPI) and UIN Syarif Hidayatullah Jakarta, it can be concluded that the implementation of AI at both institutions has been active and adaptive, with different approaches and orientations. UPI developed the SIPUS UPI system, which focuses on user experience through the implementation of chatbots and an algorithm-based reading recommendation system. Conversely, UIN Jakarta, through i-SMART Library, places more emphasis on the integration of extensive digital services and the use of AI for automatic classification and collection management. Artificial intelligence has a real impact on improving library service efficiency, in terms of service speed, information availability, and collection management. Users can access information independently without time restrictions, while librarians are assisted in carrying out more complex technical and managerial tasks.

The application of AI contributes to data-driven decision making. This system not only functions as a service tool, but also provides insights through analysis of collection usage, user preferences, and trends in academic information requests. However, challenges remain, including limited

digital literacy, a lack of trained human resources, imperfect cross-system integration, and the need for infrastructure strengthening and sustainable funding. Institutional context and digital culture greatly influence the form of AI implementation. Both universities show that the success of system implementation depends not only on the technology itself, but also on organizational readiness, managerial commitment, and active user involvement.

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