



Development of an Integrated Web-Based Information System for Enhancing External Collaboration Management at UPN “Veteran” Yogyakarta

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Received : Sept 27, 2025

Revised : Sept 29, 2025

Accepted : Sept 29, 2025

Online : October 14, 2025

Abstract

Higher education institutions increasingly depend on external collaborations to expand their impact. At UPN “Veteran” Yogyakarta, however, the management of Memorandum of Agreement (MoA) within the Institute for Research and Community Service (LPPM) has long relied on manual procedures, leading to inefficiencies, communication delays, and difficulty in monitoring agreements. This study aims to design and implement an integrated web-based information system that streamlines collaboration management and enhances institutional governance. The research adopts a Research and Development (R&D) approach, combined with the Software Development Life Cycle (SDLC), utilizing the Waterfall model. Requirements were gathered through interviews, focus group discussions, and document analysis with key stakeholders. The system was designed using Unified Modeling Language (UML) and implemented with Node.js, Express, and MongoDB to provide flexibility in managing document-based data. Testing involved black-box verification and User Acceptance Testing (UAT), followed by pre- and post-implementation evaluation of processing time, error rates, and user satisfaction. Results show that the average verification time for MoA decreased from five to two working days, while administrative errors fell by 60%. Users rated the system highly for usability and particularly valued automated notifications for expiring agreements. The study contributes a practical tool that improves efficiency, accountability, and transparency in managing external collaborations. Although current limitations include the absence of integration with other campus systems and a lack of a mobile application, the system establishes a solid foundation for future enhancements.

Keywords: *Information System, Collaboration Management, Web-Based System, Research and Community Service, MoA*

INTRODUCTION

Collaboration is a cornerstone for higher education institutions in their efforts to develop and improve performance on both national and international scales. As an institution grows, so does the need for well-managed information systems to coordinate activities among its various elements. At the Institute for Research and Community Service (LPPM) of UPN “Veteran” Yogyakarta, the management of external collaborations, particularly Memorandum of Agreement, has primarily relied on manual processes. This traditional approach often results in administrative inefficiencies, communication gaps, and inadequate program monitoring, thereby hindering the effective implementation of collaborative research and community service activities.

The increasing number and complexity of collaborations add layers of difficulty. The university must track each Memorandum of Understanding (MoU) and ensure it translates into tangible activities as stipulated in the corresponding MoA. Without a proper information system, this management task becomes time-consuming, resource-intensive, and prone to data inconsistencies or missed deadlines, which can negatively impact the institution's performance and

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In the current era of digitalization, adopting information technology is crucial for effective administration. While some digital tools have been adopted, they are often partial and not fully integrated. Therefore, this study aims to address these challenges by developing an integrated, web-based information system. The primary objective is to design, implement, and evaluate a system that streamlines the entire lifecycle of external collaboration management at LPPM, from proposal submission to monitoring and evaluation. This system is expected to simplify administrative processes, enhance communication between the university and its partners, and improve data accuracy, ultimately fostering greater transparency and accountability.

LITERATURE REVIEW

The development of information systems to manage academic and administrative processes in higher education is a well-established field of research. Several universities have implemented systems to manage collaborations, though their scope and features vary.

[Ndjurumana and Mailoa \(2020\)](#) developed a partnership management information system at Universitas Kristen Satya Wacana, highlighting how centralized databases improve coordination and reduce redundancies. Similarly, [Putra and Santoso \(2022\)](#) emphasized the role of integrated management systems to support institutional governance in higher education.

[Evriza and Pramudibyanto \(2023\)](#) explored collaboration between students and external institutions, showing how structured systems enhance the effectiveness of practical work placement. [Ardiansyah et al. \(2025\)](#) further demonstrated the impact of teamwork-based learning models in strengthening collaboration among students, suggesting that similar approaches can be applied to institutional partnerships.

On the international front, [Odeh and Al-Ma'aitah \(2019\)](#) analyzed integrated information systems from both internal and external perspectives, emphasizing their role in ensuring service quality. [Nguyen \(2024\)](#) examined collaboration patterns in AI-assisted academic writing, showing how technology shapes new models of partnership in higher education. [Vuoriainen et al. \(2025\)](#) identified key success factors—summarized as the “six C’s”—for higher education–industry collaborations, while [Jenkins and Culhane \(2019\)](#) provided evidence from integrated data systems in the United States, proving how institutional partnerships benefit from robust data infrastructures.

This research builds upon these works by creating a web-based system tailored to UPN “Veteran” Yogyakarta’s workflows. It integrates the local lessons of Indonesian case studies with global best practices to design a holistic solution for collaboration management.

RESEARCH METHOD

This study employed a Research and Development (R&D) approach, combined with the Software Development Life Cycle (SDLC), utilizing the Waterfall model. The R&D design was selected to ensure systematic creation, testing, and refinement of the proposed system, while the Waterfall approach provided a clear structure from requirements analysis to evaluation. A mixed-methods strategy was employed, combining qualitative techniques for requirements gathering with quantitative measures for assessing effectiveness.

Preliminary Study and Requirements Analysis

In-depth interviews and Focus Group Discussions (FGDs) were conducted with LPPM administrators, faculty leaders, program heads, and researchers. This process mirrors the participatory approaches emphasized by [Evriza and Pramudibyanto \(2023\)](#) in aligning system design with stakeholder needs. Existing MoA records were also examined to identify inefficiencies

and gaps, following the documentary analysis practice suggested by [Jenkins and Culhane \(2019\)](#).

System Design

Unified Modeling Language (UML) was used to visualize workflows, user interactions, and data structures. Entity-Relationship Diagrams (ERDs) were created to design a flexible MongoDB schema, reflecting practices similar to those described by [Ndjurumana and Mailoa \(2020\)](#) in developing academic cooperation systems.

System Implementation

The system was developed as a web-based application. Node.js with the Express framework served as the backend, MongoDB was selected for data management, and a responsive web interface was created to ensure usability. The emphasis on integration and efficiency aligns with recommendations from [Odeh and Al-ma'aitah \(2019\)](#) regarding the importance of internal-external system cohesion.

Testing and Evaluation

Testing included black-box testing to confirm functional accuracy and User Acceptance Testing (UAT) with lecturers and administrators to gather usability feedback. Effectiveness was measured through pre- and post-implementation comparisons of MoA processing time, error rates, and user satisfaction, adopting the evaluative approach noted by [Ardiansyah et al. \(2025\)](#) in measuring collaborative learning outcomes.

This methodology ensured that the system was both technically reliable and contextually relevant, directly addressing local needs while building on insights from prior literature.

FINDINGS AND DISCUSSION

According to the progress report, the research activities have completed several crucial stages. The system design phase has been successfully concluded, as evidenced by the completion of all model diagrams, including Use Case, Activity Diagram, Class Diagram, Sequence Diagram, and ERD. Subsequently, the implementation phase has produced a functional web-based information system prototype. Core features, including online MoA submission, automated verification workflows, a monitoring dashboard, and reminder notifications, have been successfully implemented. The system has also undergone preliminary testing, including black-box testing and a User Acceptance Test (UAT) involving stakeholders, which has shown positive user reception. The current stage involves finalizing the evaluation of the system's effectiveness and preparing the research outputs, one of which is this proceeding paper, in line with the targets set in the proposal.

Integrated System Flow Design

In line with the research objective to build an integrated system, the application's workflow is designed to connect various stakeholders on a single, centralized platform. This integration ensures that the collaboration management process, from submission to monitoring, runs transparently and efficiently across work units. The system's workflow scheme (see Figure 1) visually represents how lecturers, external partners, and administrators at the Program Study, Faculty, and LPPM levels interact through interconnected functions. Lecturers and Partners act as proposers, while three levels of administrators hierarchically perform verification and monitoring. This integrated architecture fundamentally transforms the fragmented manual process into a cohesive digital workflow, where each stage is recorded and traceable, consistent with the proposed integrated system concept.

Figure 1. Use Case diagram illustrating the integrated workflow, showing how various actors such as Lecturers, Partners, Program Study Admins, Faculty Admins, and LPPM Admins interact with a centralized system to manage MoA or PKS (*Perjanjian Kerja Sama*).

The research successfully resulted in a fully functional web-based information system for managing external collaborations at LPPM. The findings from the implementation and evaluation phases are presented below.

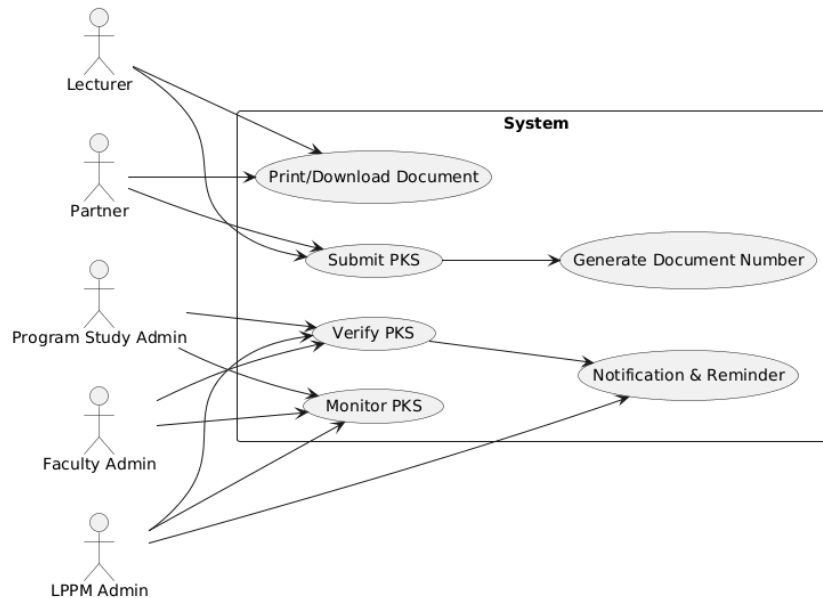


Figure 1. Use Case Diagram PKS UPN Veteran Yogyakarta

System Functionality and Implementation

The developed system digitalizes the entire MoA management lifecycle. Its core features include:

1. **Online Submission:** Lecturers and external partners can submit MoA proposals through a web form, which includes uploading the necessary supporting documents.
2. **Automated Workflow:** Upon submission, the system automatically generates a unique document number and routes the proposal through a predefined verification workflow, involving administrators at the Program Study, Faculty, and LPPM levels.
3. **Real-Time Monitoring:** A centralized dashboard allows administrators to track the status of all MoA documents (e.g., pending, approved, expiring) in real-time.
4. **Notification and Reminders:** The system automatically sends email notifications to relevant parties at each stage of the verification process and sends reminders for MoA that are approaching their expiration date.
5. **Digital Archive:** All documents and related information are stored in a centralized database, creating a comprehensive and easily accessible digital archive.

Evaluation of System Effectiveness

The pre-test and post-test evaluation demonstrated significant improvements in operational efficiency. The average time required to process and verify was reduced from approximately five working days under the manual system to just two working days with the new system. Furthermore, the rate of administrative errors, such as duplicate data entry, missing files, or incomplete information, decreased by 60% due to system-enforced validations and a structured

workflow.

User Acceptance Testing (UAT) and satisfaction surveys yielded positive feedback. Approximately 85% of test users found the system intuitive and easy to use, while 90% specifically praised the automated reminder feature as highly beneficial. The overall user satisfaction score averaged 4.3 on a 5-point Likert scale.

Discussion

The findings confirm that the developed information system effectively addresses the inefficiencies of the previous manual process. By automating routine tasks and providing a transparent, centralized platform, the system not only accelerates the administrative workflow but also enhances accountability and transparency. Every action is logged, allowing for the tracing of the history of each collaboration agreement.

Compared to previous research in this area, this system provides a more comprehensive solution by integrating an automated reminder function, which is critical for ensuring the continuity of collaborations. This proactive feature helps prevent agreements from lapsing unintentionally, a common issue in manual systems. However, the study has limitations. The system is currently a standalone application and is not yet integrated with the university's broader academic information system (SIKAD). Additionally, the use of the Waterfall model meant that adapting to changes during development was less flexible. Despite these limitations, the system provides a robust foundation for enhancing the governance of external collaborations at the institution.

In addition to reducing verification time and administrative errors, the system was also perceived positively by users. Satisfaction surveys indicated that the majority of users considered the platform intuitive and efficient, particularly appreciating the automated notification feature, which ensured timely follow-up on expiring agreements. These results confirm the system's contribution to enhancing transparency, accountability, and governance in collaboration management, as highlighted in the abstract.

CONCLUSIONS

This research successfully developed and implemented an integrated web-based information system to enhance the management of external collaborations at LPPM UPN "Veteran" Yogyakarta. The system effectively transformed a manual, inefficient process into a streamlined, transparent, and accountable digital workflow. The evaluation demonstrated tangible benefits, including a significant reduction in processing time and administrative errors, as well as high user satisfaction. The system stands as a practical solution that strengthens institutional governance and supports the strategic goal of expanding impactful research and community service partnerships.

LIMITATIONS & FURTHER RESEARCH

1. The primary limitation of this research is the system's lack of integration with other university-wide information systems and the absence of a dedicated mobile application, which would provide greater accessibility. Therefore, future research is recommended in the following areas:
2. System Integration: Integrating the collaboration management system with the university's primary academic information system (SIKAD) and digital archives to ensure data consistency and create a unified information ecosystem.
3. Mobile Application Development: Creating a companion mobile application to allow users, particularly lecturers and partners, to submit proposals, track status, and receive notifications on the go.

4. Advanced Analytics: Incorporating an analytics module to generate strategic insights from collaboration data, such as identifying the most productive partnerships, analyzing collaboration trends by field, and evaluating the overall impact of collaborations.

ACKNOWLEDGEMENTS

This work was funded by the Ministry of Education, Culture, Research, and Technology of the Republic of Indonesia (Grant No. 457/UN62.21/PG.00.00/2025).

REFERENCES

- Ardiansyah, D. R., Sari, I. A., Benu, P. J., Takaeb, A. E., & Nayoan, C. R. (2025). Efektivitas Model Pembelajaran Berbasis Tim Dalam Meningkatkan Kolaborasi Mahasiswa di Lingkungan Kampus. *Jurnal Pendidikan Nasional Manajemen dan Bisnis*, 2(2), 101–112. <https://doi.org/10.59837/jpnmb.v2i2.463>
- Evriza, E., and Pramudibyanto, H. (2023). Optimalisasi Kolaborasi Mahasiswa dengan Instansi Praktik Dalam Menentukan Minat Praktik Kerja Perpustakaan. *Daluang: Journal of Library and Information Science*, 3(2), 145–158. <https://doi.org/10.21580/daluang.v3i2.2023.17876>
- Jenkins, A., and Culhane, D. (2019). Integrated Data Systems in the US: A National Survey of State and Local Governments and Their University Partners. *International Journal of Population Data Science*, 4(3), 1261. <https://doi.org/10.23889/ijpds.v4i3.1261>
- Ndjurumana, R., and Mailoa, L. (2020). Rancang Bangun Sistem Informasi Kerjasama Universitas Kristen Satya Wacana. *AITI*, 17(2), 86–103. <https://doi.org/10.24246/aiti.v17i2.86-103>
- Nguyen, A. (2024). Human–AI Collaboration Patterns in AI-Assisted Academic Writing. *Studies in Higher Education*, 49(6), 987–1003. <https://doi.org/10.1080/03075079.2024.2323593>
- Odeh, A. O., and Al-ma'aitah, M. A. (2019). Integrated Information Systems from Internal and External Integration Perspectives as a Prerequisite for Electronic Service Quality. *TEM Journal*, 8(2), 462–470. <https://doi.org/10.18421/TEM82-20>
- Putra, D. W., and Santoso, H. (2022). Integrasi Sistem Informasi Manajemen untuk Mendukung Tata Kelola Perguruan Tinggi. *Jurnal Sistem Informasi Indonesia*, 7(2), 77–88. <https://doi.org/10.29103/jsii.v7i2.5432>
- Vuoriainen, A., Rikala, P., Heilala, V., Lehesvuori, S., Oz, S., Kettunen, L., & Hamalainen, R. (2025). The Six C's of Successful Higher Education–Industry Collaboration. *European Journal of Engineering Education*, 50(1), 34–49. <https://doi.org/10.1080/03043797.2024.2432440>