



WEBSITE-BASED RESEARCH AND COMMUNITY SERVICE INFORMATION SYSTEM USING THE WATERFALL METHOD AT TAKUMI POLYTECHNIC, BEKASI

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ABSTRACT (10 PT)

This study focuses on developing a web-based Research and Community Service Information System (SIPPMAS) for Politeknik Takumi Bekasi, utilizing the Waterfall methodology. The aim is to create an integrated platform that streamlines the management of research and community service activities, from proposal submission and budget allocation to project execution and final reporting. The Waterfall method was chosen for its structured, sequential approach, ensuring a systematic development process through distinct phases: requirements analysis, design, implementation, testing, and maintenance. This approach is expected to enhance data accuracy, improve operational efficiency, and provide real-time project monitoring, ultimately facilitating better collaboration among stakeholders and increasing the overall impact of research and community service initiatives at Politeknik Takumi Bekasi. The system is designed to address current manual administrative challenges, offering a centralized and accessible solution for all users.

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1. INTRODUCTION

Politeknik Takumi Bekasi is a higher education institution offering diverse academic and vocational programs across various fields of science, technology, and art. The university also houses several institutional units, including the Institute for Education Quality Development and Assurance (LP2MP), the Institute for Research and Community Service (LPPM), and the Institute for Off-Campus Study Program Management (LPPSDKU). The LPPM of Politeknik Takumi Bekasi plays a vital role in coordinating, monitoring, and evaluating all research and community service activities conducted by the university's lecturers. The execution of research and community service is not merely an obligation but an integral part of lecturers' performance in fulfilling the *Tri Dharma* [1,2].

In 2022, the LPPM (Research and Community Service Institute) of Politeknik Takumi was already actively conducting various research and community service activities, demonstrating a strong commitment to the Tri Dharma of Higher Education. However, despite this strong spirit, the LPPM's internal business processes were not yet systematized. This means there were no structured, properly recorded, or fully integrated workflows and procedures. This condition potentially led to administrative inefficiencies, difficulties in tracking and monitoring projects, and challenges in performance evaluation and external reporting, thus necessitating strategic steps to build a more robust system for the LPPM's future advancement.

Consequently, the author proposes the Research and Community Service Information System (SIPPMas) as an appropriate solution. SIPPMas is a web-based application designed to assist LPPM Politeknik Takumi in the management and administration of research and community service activities. By leveraging the latest information technology, SIPPMas is expected to enhance efficiency, accuracy, and speed in data processing, while also reducing potential human errors in data recording and manipulation [3,4]. SIPPMas will serve as a valuable tool in supporting the *Tri Dharma of Higher Education* and amplifying the positive impact of research and community service activities at Politeknik Takumi Bekasi.

2. METHOD

In the development process of the research and community service management information system, a Waterfall methodology was employed within the Software Engineering Design paradigm. This approach [5, 6, 7], ensures a structured and sequential process for system development.

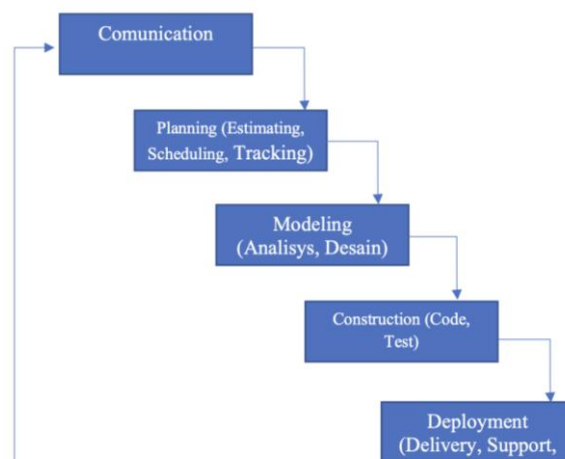


Figure 1. Waterfall Method

Table 1. Waterfall Method Stages

Content	Information
Communication	In this phase, the author gathered data by consulting with the Head of the LPPM (Institute for Research and Community Service) of the Politeknik Takumi. Following this, the author formulated the existing problems and devised solutions by designing an information system with features and functions tailored to address these issues.

Content	Information
<p>Planning (Estimating, Scheduling, Tracking)</p>	<p>In this phase, the author developed a plan for system creation, including scheduling the work to be executed. Additionally, the author also documented potential risks that might arise.</p>
<p>Modeling (Analisis, Desain)</p>	<p>In this phase, the author performed system analysis and modeling using a UML (Unified Modeling Language) approach. Additionally, the author designed the system's user interface, menu structure, and data tables. This was done to gain a clearer understanding of the overall scope of what would be developed.</p>
<p>Construction (Code, Test)</p>	<p>In this phase, the author implemented the system design into code. The system, a web-based application, was built using the Laravel framework. The author utilized Visual Studio Code as the text editor and MySQL as the DBMS (Database Management System). Once all the code was implemented, system testing was conducted using the black-box testing method, which involved end-users. The purpose of this testing process was to identify potential bugs or errors so that the system could be refined to meet requirements.</p>
<p>Deployment (Delivery, Support, Feedback)</p>	<p>In the Deployment phase, the author installed the software, configured the system, provided support and maintenance, interacted with users, received feedback, and conducted monitoring to enhance system performance and security.</p>

3. RESULT DAN ANALISIS

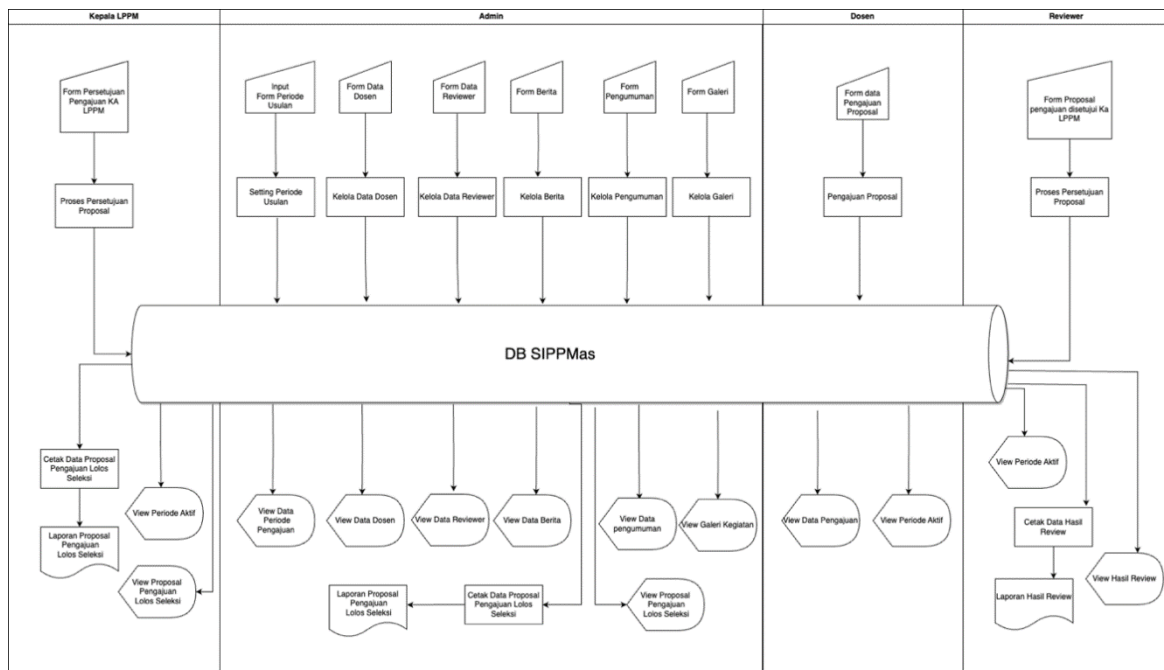


Figure 2. Flowmap Sistem

Politeknik Takumi currently handles the selection process for research and community service proposals manually. This method is time-consuming and results in unintegrated data, with all information stored disparately across individual devices, leading to an inefficient data workflow. To address these challenges, the author proposes a new Research and Community Service Information System (SIPPMas). This proposed information system will offer data integration and a significantly faster and more efficient proposal selection process. It will involve several key entities responsible for the submission and publication of research and community service proposals at Politeknik Takumi Bekasi. These entities include the Head of LPPM, Admin, Reviewer, and Lecturers. The specific roles and definitions of these involved actors can be found in the table below:

Table 2. Defining Actors

No	Aktor	Deskripsi
1	Admin	The Admin is a user with access to manage ongoing proposal schemes and periods, as well as manage user data, and publish news and announcements.
2	Head of LPPM	The Head of LPPM is a user who has access to review submitted proposals from lecturers before they are passed on to reviewers. This user can also cancel approved proposals if errors are found during the approval process
3	Reviewer	The Reviewer is a user who has access to review and approve proposals submitted by lecturers that have already gone through the approval stage by the Head of LPPM.
4	Lecturer	A Lecturer is a user who has access to submit research and community service proposals.

3.1. User view

The User Interface (UI) is a crucial component in developing the Research and Community Service Information System [8, 9]. A well-designed UI will help ensure that users, including lecturers and university administrative staff, can access and utilize the system easily and efficiently. With an intuitive interface, users can quickly manage research data, submit proposals, and track and report their project progress more smoothly. Therefore, special attention must be given to UI design to enhance productivity and user experience. The following is the main display of the Research and Community Service Information System:

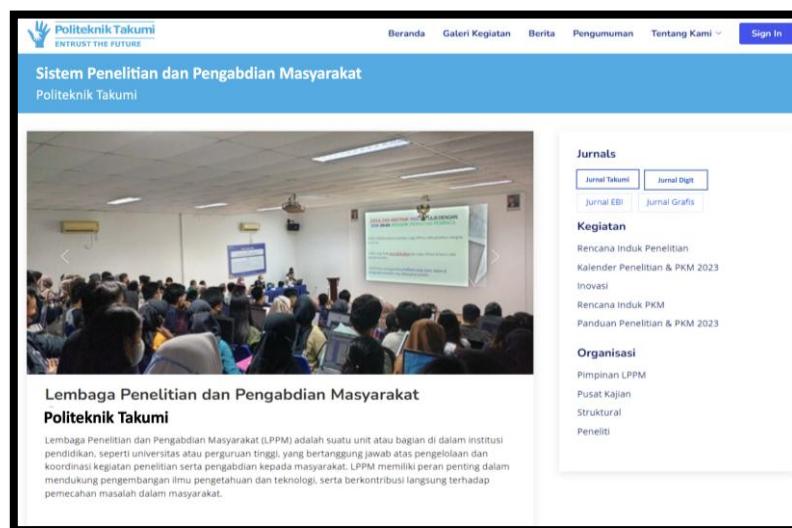


Figure 3. Home Page

The Homepage is your primary entry point into the Research and Community Service Information System (SIPPMAS). This page is designed to provide a quick overview and easy access to key features.

3.2. Login

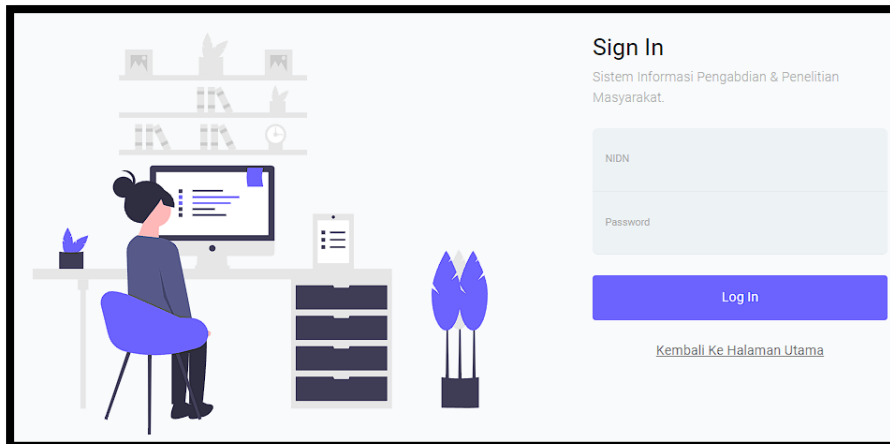


Figure 4. Login

The Login Page is your gateway to accessing the full functionality of the Research and Community Service Information System (SIPPMA). Here, you'll be prompted to enter your registered username and password.

3.3. Lecturer Research Proposal

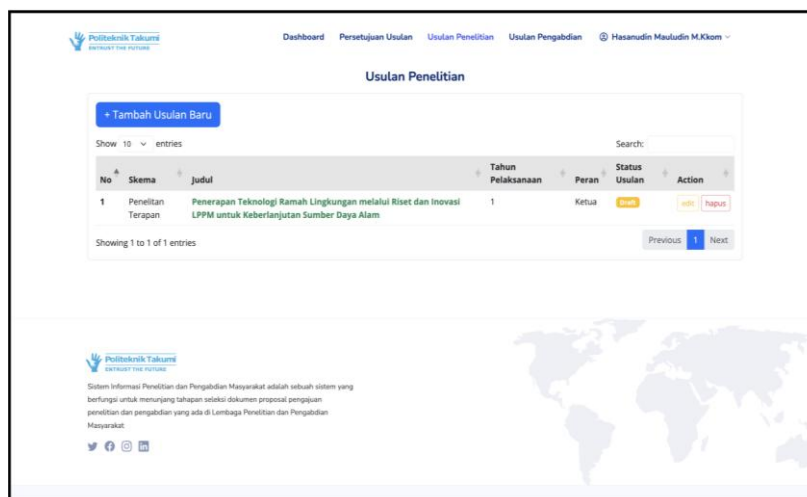


Figure 5. Lecturer Research Proposal

The Lecturer Research Proposal Page is a dedicated dashboard for lecturers to manage all aspects related to submitting research proposals. This page is designed to streamline the process from start to finish, ensuring every stage runs smoothly and transparently.

3.4. Lecturer Proposal Progress

Figure 6. Lecturer Proposal Progress

The Lecturer Submission Progress Page is an essential feature within the Research and Community Service Information System (SIPPMAS), specifically designed to allow lecturers to track the status and progress of their submitted research or community service proposals. This page provides a transparent overview of every stage a proposal goes through, from initial submission to the final decision.

4. DISCUSSION/CONCLUSION

Provide a statement that what is expected, as stated in the "Introduction" chapter can ultimately result in "Results and Discussion" chapter, so there is compatibility. Moreover, it can also be added the prospect of the development of research results and application prospects of further studies into the next (based on result and discussion). Based on the report compiled regarding the Design of the Research and Community Service Information System (SIPPMas) at Politeknik Takumi Bekasi, the following conclusions can be drawn:

1. The presence of the Research and Community Service Information System (SIPPMas) is crucial for enhancing the efficiency and effectiveness of managing research and community service data within Politeknik Takumi Bekasi. This application provides a solution to the challenges of manual and scattered data management.
2. This information has demonstrated that automating various processes, including proposal submission, review, approval, and results announcement, can save time and resources previously required for manual processes. The accessibility and connectivity among various users—such as Admin, Head of LPPM, Reviewers, and Lecturers within this system enable better collaboration in managing and executing research and community service activities.

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Research and Community Service Information System (SIPPMas) would not have been realized, and we hope its results will provide significant benefits for the entire academic community of Politeknik Takumi Bekasi.

REFERENCES

- Cikarang, W., & Wibawan, S. (2024). *Android-based Industrial Internship Management System : Waterfall Development with Dart and Flutter at SMK Negeri 1*. 2(1), 1–9. <https://doi.org/10.59431/jms.v2i1.292>
- Dalis, S. (2017). Rancang Bangun Sistem Informasi Lembaga Penelitian Dan Pengabdian Masyarakat Berbasis Web. *Paradigma - Jurnal Komputer Dan Informatika*, 19(1), 1–8. <https://doi.org/10.31294/p.v19i1.1170>
- Elekwachi, B., Anthony, C., & Bekwele, L. (2023). Self-Service Technology Adoption and Post-Purchase Intentions of Deposit Money Banks Customers in Port Harcourt. *ASPL) International Journal of Management Sciences*, 10(1), 175–211.
- Ilyas, R., Chisnanto, Y. H., Sain, F., Informatika, D., Jenderal, U., Yani, A., & Barat, C.-J. (2018). Pengembangan Sistem Informasi Penelitian LPPM Universitas Jenderal Achmad Yani Dengan Agile SDLC. *STMIK ATMA LUHUR Pangkalpinang*, 8–9. <http://simlit.lppm.unjani.ac.id>
- Khasanah, I., Gunawan, R., & Pratama, R. A. A. (2022). Penerapan Metode Extreme Programming untuk Membangun Sistem Monitoring Lembaga Penelitian dan Pengabdian Masyarakat Palcomtech. *Teknomatika*, 12(02), 175–186.
- Popa, O., Mihele, C., Făgărășan, C., & Pislă, A. (2021). Leadership approach towards Agile, Waterfall and Iterative implementation of the software development products. *IOP Conference Series: Materials Science and Engineering*, 1169(1), 012017. <https://doi.org/10.1088/1757-899x/1169/1/012017>
- Satria, R. G., Lelitasari, A., Ilyasa, R., & Vetian, R. A. (2024). *Implementasi Smart Door Berbasis Internet of Things sebagai Peningkatan Keamanan Gedung Politeknik Takumi*. 14(2), 128–138.
- Suhirman, S., Hidayat, A. T., Saputra, W. A., & Saifullah, S. (2021). Website-Based E-Pharmacy Application Development to Improve Sales Services Using Waterfall Method. *International Journal of Advances in Data and Information Systems*, 2(2), 114–129. <https://doi.org/10.25008/ijadis.v2i2.1226>
- Yurcel, R. A., Ramadhani, A. K., Rehulina, P., Ginting, B., Raditia, M. D., & Azzahra, F. (2025). *HIGH SCHOOL STUDENT COMPLAINT APPLICATION USING WEBSITE- BASED WATERFALL METHOD*. 1(1), 104–110.