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Implementation of Research and Community Service Information System (SIMLITABMAS) at LPPM Politeknik Piksi Ganesha Based on Laravel Framework

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Abstract: The management of data and information related to research and community service (LITABMAS) at LPPM Politeknik Piksi Ganesha frequently faces obstacles due to manual processes and difficulties in tracking project progress. This research adopts a case study approach to describe the implementation of the Research and Community Service Information System (SIMLITABMAS) based on the Laravel Framework. The primary objective is to present an efficient, centralized solution. The development of SIMLITABMAS utilizes the Rapid Application Development (RAD) methodology, which emphasizes iterative development and responsiveness to user feedback. The Laravel Framework was selected for its structured Model-View-Controller (MVC) architecture, reliable security features, and rich package ecosystem. The implementation of SIMLITABMAS successfully created an integrated platform to manage various stages of LITABMAS activities, ranging from proposal submission to result reporting. It is expected that this system can improve the effectiveness, efficiency, and transparency in the management of research and community service at LPPM Politeknik Piksi Ganesha.

Keywords: SIMLITABMAS, Laravel Framework, Information System, Research and Community Service, Rapid Application Development, Case Study, Politeknik Piksi Ganesha.

INTRODUCTION

Information technology has developed quite rapidly, especially in the fields of information systems and applications. Many new systems and applications are now being created, further facilitating humans in completing various tasks (Kurniawan & Romzi, 2022). Research and community service (LITABMAS) is an important pillar in the Tri Dharma of Higher Education, which serves as the foundation for the development of knowledge and the tangible contribution of educational institutions to society.

An information system is a collection of components containing vital information related to the operational processes of a company or other entity. More than just a data warehouse, an information system in this context actively assists in the management, processing, and

presentation of information needed so that decisions can be made effectively and efficiently (Santoso, 2024).

At Politeknik Piksi Ganesha, as is common in other higher education institutions, LITABMAS activities are carried out continuously by lecturers and students. However, the management of data and information related to these activities frequently faces challenges, ranging from still-manual proposal submission processes, difficulty in tracking project progress, and several other issues. This situation has the potential to hinder the efficiency and effectiveness of LITABMAS implementation, as well as complicate the reporting and institutional performance evaluation processes.

LPPM Politeknik Piksi Ganesha recognizes the importance of effective and efficient information management, thus promoting digital transformation through the development and implementation of the Research and Community Service Information System (SIMLITABMAS). This system is designed to facilitate all stages of LITABMAS activities, ranging from proposal submission, implementation, to reporting and dissemination of results, involving both LPPM and lecturers.

In the development of SIMLITABMAS, the Laravel Framework was selected as the technological foundation. Laravel is a PHP framework that can be used by both novice and advanced programmers. Laravel can reduce web application development time and market it using modern object-oriented PHP methods. Its expressive syntax and modern functions appeal to developers who want to create robust applications (Subecz, 2020). Laravel is designed to help developers build web applications with clean and well-organized code structure, while providing various built-in features that support modern development such as routing, middleware, and authentication systems (Aipina & Witriyono, 2022).

This article aims to describe the process of implementing SIMLITABMAS based on the Laravel Framework at LPPM Politeknik Piksi Ganesha. Through this case study, it will explain how this system is designed, the main features implemented, as well as the challenges and solutions encountered during the development and implementation process. It is hoped that this article can provide insights and references for other higher education institutions planning to develop similar information systems in order to improve the management of research and community service activities.

METHODS

This section will explain the methods used in this research, which include the research approach and the information system development methods applied in building SIMLITABMAS.

Research Method

This research uses a case study approach to describe the implementation of the Research and Community Service Information System (SIMLITABMAS) based on the Laravel Framework at LPPM Politeknik Piksi Ganesha, with a focus on the system development process, features implemented, as well as perspectives from the Head of LPPM and several staff members as representatives of primary users. Data collection was conducted through direct communication and discussion with LPPM to explore system requirements and obtain feedback during the development process. The collected data includes system requirement descriptions, development stages, and the main features of SIMLITABMAS, which were analyzed descriptively. System documentation and user interface screenshots were also used to strengthen the presentation of implementation results.

Information System Development Method

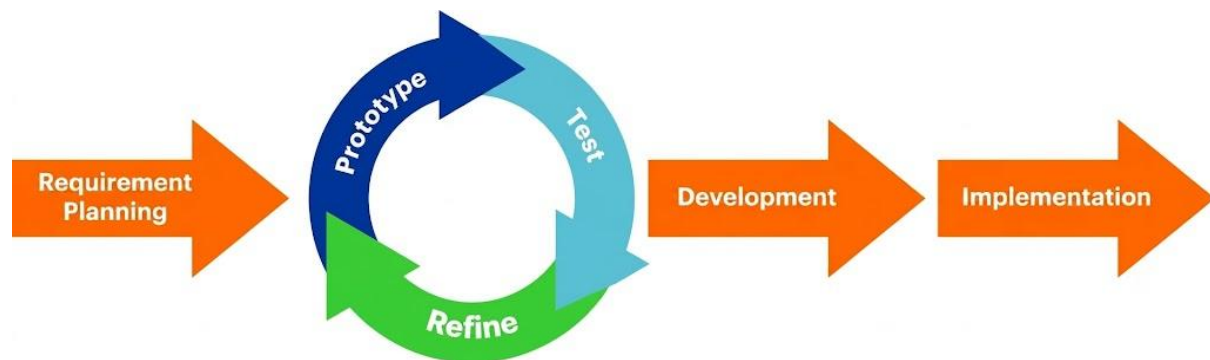


Figure 1 – Rapid Application Development Method Diagram

The application development methodology used is Rapid Application Development (RAD). RAD is a linear sequential software development process model that emphasizes very short development cycles. This RAD model is a "high-speed" adaptation of the linear sequential model where rapid development is achieved through component-based construction approaches (Pricillia T, 2021). In the context of this research, the RAD development cycle involves the stages of requirement planning (obtained from the Head of LPPM) including prototyping, testing, and refinement, development, and system implementation. Feedback from the Head of LPPM becomes an integral part of each development iteration, ensuring the resulting application meets LPPM's needs. The SIMLITABMAS application development process took place from February to April 2025.

RESULTS AND DISCUSSION

The following is the workflow for Lecturers, Reviewers, and Administrators in conducting LITABMAS activities, ranging from proposal submission to providing final reports after completing research, presented in the form of Activity Diagrams with explanations.

Lecturer/User Workflow in SIMLITABMAS

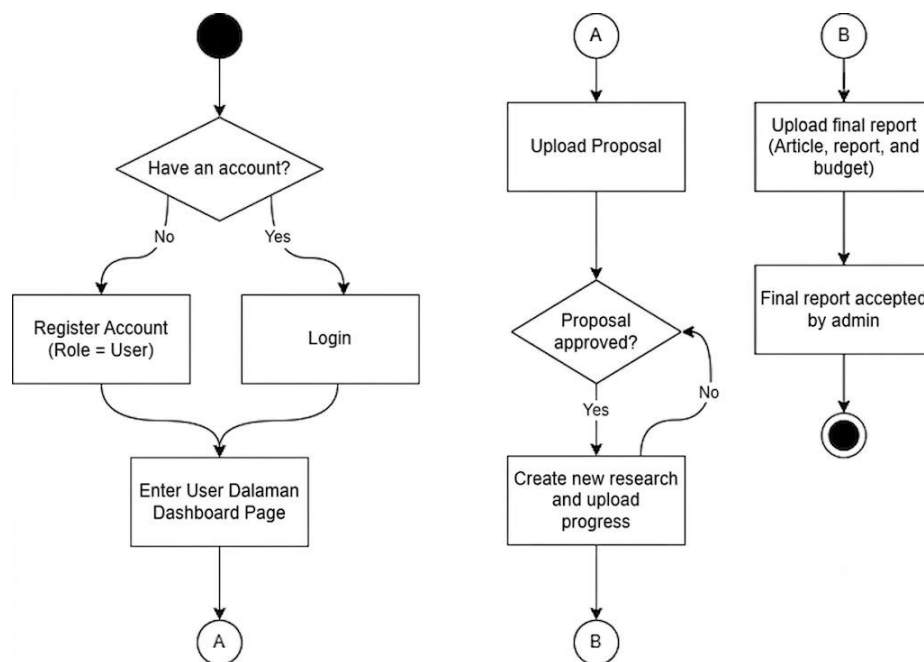


Figure 2 - Lecturer Activity Diagram

The activity diagram shows the lecturer's workflow in using SIMLITABMAS for research activities, starting with registration or login to the system. After logging in, the lecturer can submit a research proposal through the available page. The submitted proposal will go through a review stage, and if approved, the lecturer can create research notes and periodically upload research progress. After the research is completed, the lecturer must upload a final report that includes articles or publications, research reports, and budget reports, which are then processed by the administrator. This workflow is designed to increase research administration efficiency, with easy access through a simple login process and a proposal upload feature that eliminates the need for physical submission. The standardized final report structure also increases accountability and facilitates evaluation by LPPM. However, it is recommended to develop automatic notification features regarding proposal status to improve user experience and reduce the need for manual checking by lecturers.

Administrator Workflow in SIMLITABMAS

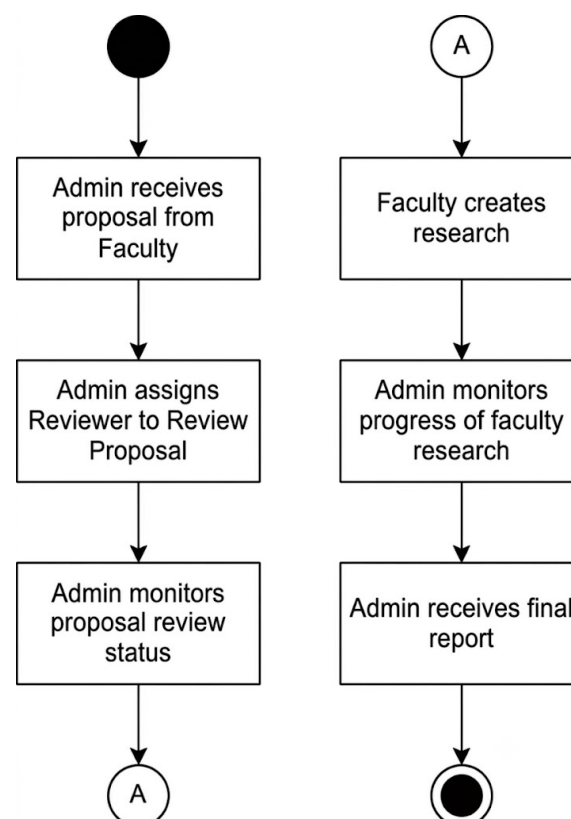


Figure 3 - Admin Activity Diagram

The activity diagram above shows the administrator's workflow in managing research activities through SIMLITABMAS, starting with receiving proposal submissions from lecturers that enter the system. The administrator then assigns one or several reviewers to review the proposal, as well as monitors the status of each submission, including whether the review process is complete. After the lecturer begins research, the administrator can monitor progress uploaded periodically by the lecturer, and when the research is completed, the administrator receives final reports in the form of articles or publications, research reports, and budget reports for further processing. This workflow reflects the strategic role of the administrator in facilitating and monitoring the entire research cycle. The centralized receipt of proposals provides full visibility of all incoming submissions, while the reviewer assignment feature ensures quality proposal evaluation. The ability to monitor review status and research

progress facilitates administrators in reporting and evaluating institutional research performance. Additionally, structured final reports from lecturers simplify the management and documentation of research results systematically.

Reviewer Workflow in SIMLITABMAS

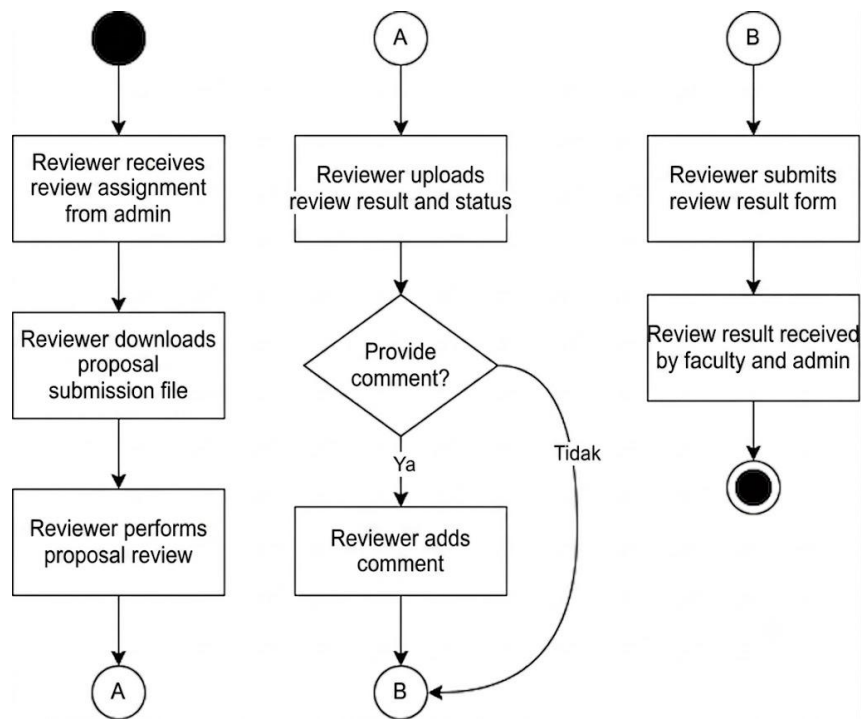


Figure 4 - Reviewer Activity Diagram

The activity diagram above illustrates the reviewer's workflow in evaluating research proposals through SIMLITABMAS, starting with receiving proposal assignments from the administrator that appear as notifications or task lists in the reviewer's account. The reviewer then downloads the related proposal file to study and evaluate it. After the review process is complete, the reviewer uploads the evaluation results into the system, either in the form of separate files such as assessment forms or additional comments as feedback. These review results are then forwarded to the proposing lecturer. This workflow is designed to facilitate efficient and structured evaluation, eliminating the need for physical file submission, and enabling document access anytime and anywhere. The upload feature for review results along with comments encourages constructive feedback provision, while result delivery directly through the system accelerates the revision process. SIMLITABMAS, developed using the Laravel Framework, provides comprehensive features for all stakeholders at LPPM Politeknik Piksi Ganesha—lecturers, administrators, and reviewers—to support the management of research and community service activities from the proposal stage to final reporting efficiently and systematically.

(Note: Data displayed in figures, including lecturer, administrator, and reviewer data, are placeholder data. The data in the figures do not represent actual data):

Features Accessible by All Roles

Several basic features in SIMLITABMAS can be accessed by all roles (lecturers, administrators, and reviewers) to support interaction and account management within the system:

Homepage

The homepage displays the system's main landing page presenting welcome information to users. This page also provides links or buttons for new account registration and login for registered users.



Figure 5 - SIMLITABMAS Homepage Display

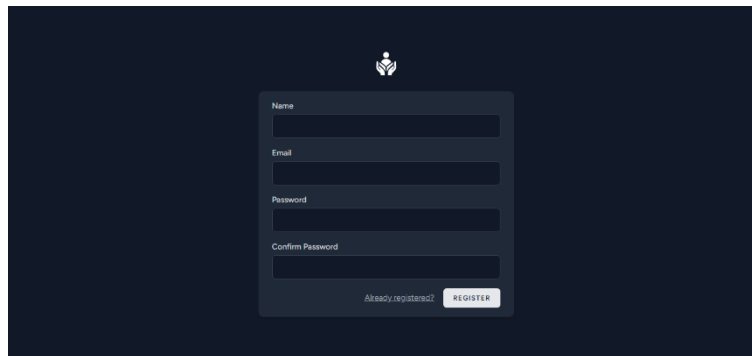


Figure 6 - SIMLITABMAS Registration Page Display

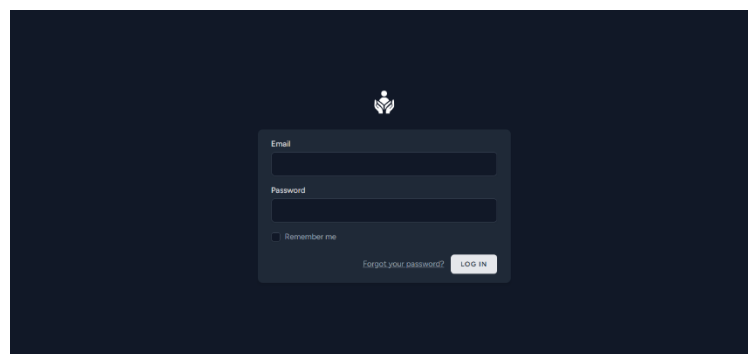


Figure 7 - SIMLITABMAS Login Page Display

Profile

The profile page allows each user to view and update their personal account information. The main features on this page include updating email addresses, changing passwords, and options to delete accounts (with appropriate verification mechanisms).

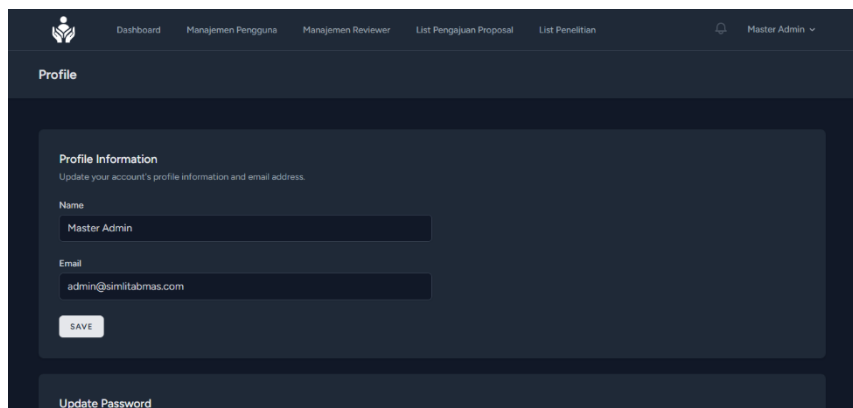


Figure 8 - User Profile Page Display

Notification

The notification feature serves to convey important information or updates regarding proposal status, review assignments, or other announcements to relevant users. These notifications can be displayed within the system and/or sent via email.

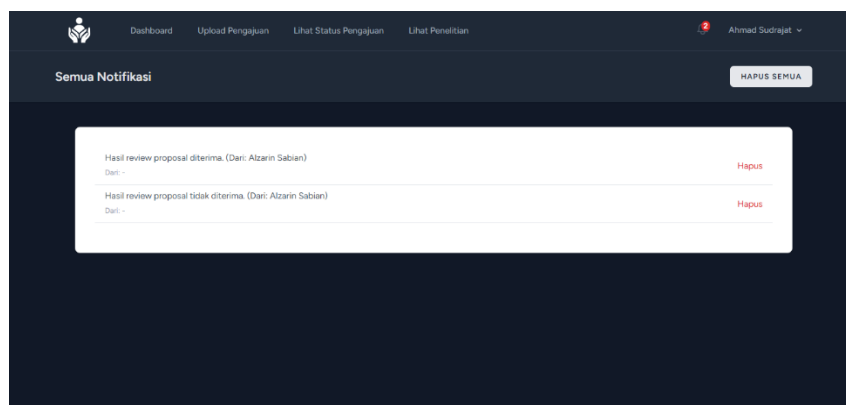


Figure 9 - Notification Feature Display

These general features accessible by all roles form the basis of user interaction with SIMLITABMAS. The homepage serves as the entry point and provides initial orientation. The profile feature gives users control over their account information, including security aspects such as password changes. The presence of the notification feature is crucial to keep users up-to-date with developments related to LITABMAS activities relevant to them, thus minimizing the risk of missing important information.

Admin Role-Specific Features

The system administrator has access to several specialized features that enable management of the entire system and LITABMAS data. These features include:

Admin Dashboard

The admin dashboard displays important statistical information regarding LITABMAS management. These statistics may include the total number of proposals received, the number of proposals still pending (unassigned or under review), the number of approved proposals, the number of ongoing research, and other relevant information.

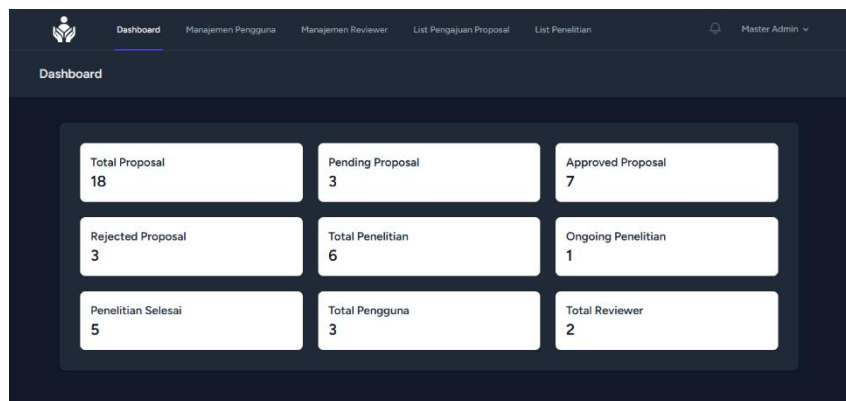


Figure 10 - admin dashboard Display

Study Program Management

This feature allows administrators to add, view, edit, and delete study program data existing at Politeknik Piksi Ganesha. This study program data will then be used in dropdown form elements on the lecturer's proposal upload page and also in user/lecturer information sections.

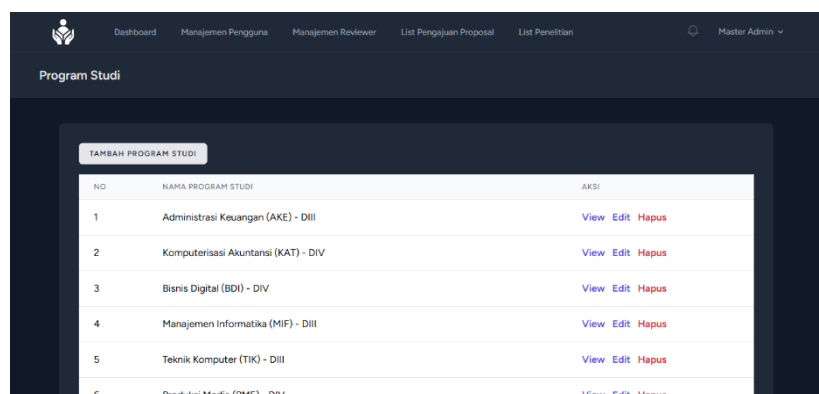


Figure 11 - Study Program Management Display

User Management

Through this feature, administrators can view a complete list of system users along with detailed information such as email addresses and assigned roles. Administrators also have the ability to view details of each user record, make changes (edit) to user information if necessary, and delete user records from the system.

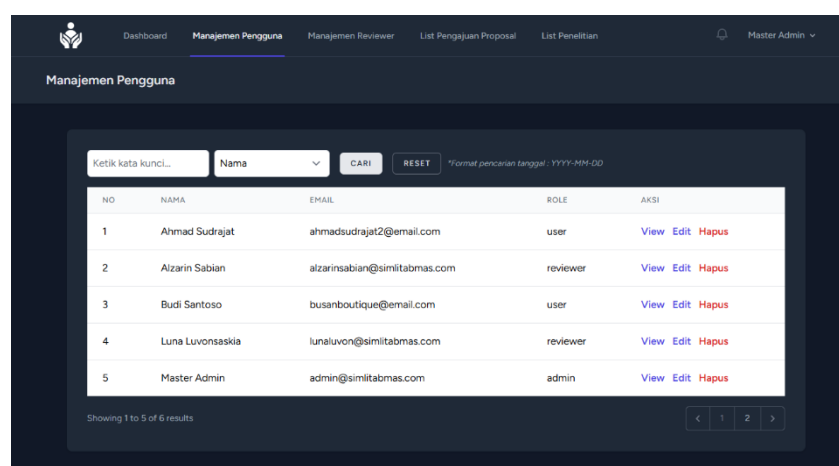


Figure 12 - User Management Display

Reviewer Management

This feature is specifically used to manage reviewer data. Administrators can view the list of reviewers, their email addresses, and their availability status (available or not) for assignment to proposals. Administrators also have functions to view reviewer record details, edit information, and delete reviewer records.

NO	NAMA	EMAIL	STATUS REVIEWER	AKSI
1	Alzarin Sabian	alzarinsabian@simlitabmas.com	Available	View Edit Hapus
2	Luna Luvonsaskia	lunaluvon@simlitabmas.com	Available	View Edit Hapus

Figure 13 - Reviewer Management Display

Proposal Submission Management

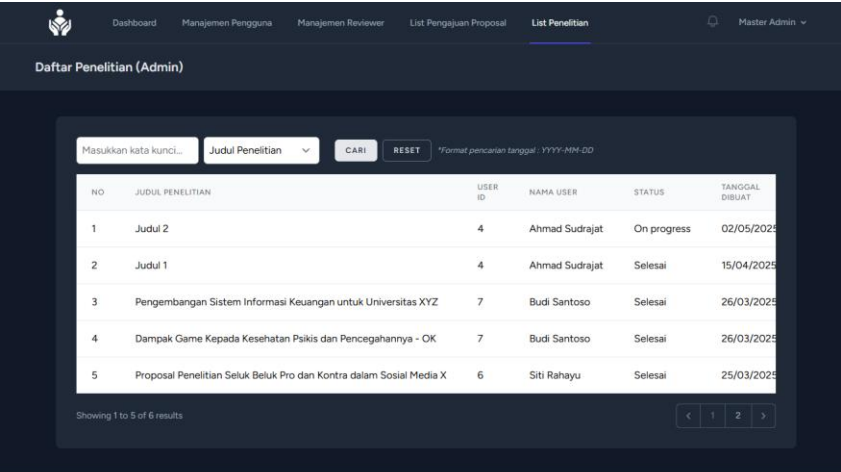
This feature provides a comprehensive list of research and community service proposal submissions entering the system. For each proposal, administrators can view summary information and access complete proposal details through a view button. Additionally, administrators have the ability to download proposal files uploaded by lecturers.

NO	JUDUL PROPOSAL	NAMA LENGKAP	PROGRAM STUDI	STATUS	TGL UPLOAD
1	Contoh Judul Penelitian 1	Dra. Siti Rahayu, M.Kom	Farmasi (FAR) - DIII	Approved	23/04/2025
2	Contoh Judul Penelitian 4	Budi Santoso, S.T., M.Eng.	Administrasi Keuangan (AKE) - DIII	Not Approved	18/04/2025
3	Contoh Judul Penelitian 2	Budi Santoso, S.T., M.Eng.	Administrasi Keuangan (AKE) - DIII	Approved	18/04/2025
4	Contoh Judul Penelitian 3	Budi Santoso, S.T., M.Eng.	Administrasi Keuangan (AKE) - DIII	Pending	18/04/2025
5	Judul 1	Budi Santoso, S.T., M.Eng.	Administrasi Keuangan (AKE) - DIII	Pending	16/04/2025

Figure 14 - Proposal Submission Management Display

Research List

This feature displays a list of research being or having been conducted by lecturers from the administrator's perspective. Administrators can view details of each research, including the history of research progress uploaded by lecturers. Additionally, administrators have access to download the final research report consisting of three files: articles/publications, research reports, and budget/funding reports.



NO	JUDUL PENELITIAN	USER ID	NAMA USER	STATUS	TANGGAL DIBUAT
1	Judul 2	4	Ahmad Sudrajat	On progress	02/05/2025
2	Judul 1	4	Ahmad Sudrajat	Selesai	15/04/2025
3	Pengembangan Sistem Informasi Keuangan untuk Universitas XYZ	7	Budi Santoso	Selesai	26/03/2025
4	Dampak Game Kepada Kesehatan Psikis dan Pencegahannya - OK	7	Budi Santoso	Selesai	26/03/2025
5	Proposal Penelitian Seluk Beluk Pro dan Kontra dalam Sosial Media X	6	Siti Rahayu	Selesai	25/03/2025

Figure 15 - Research List Display

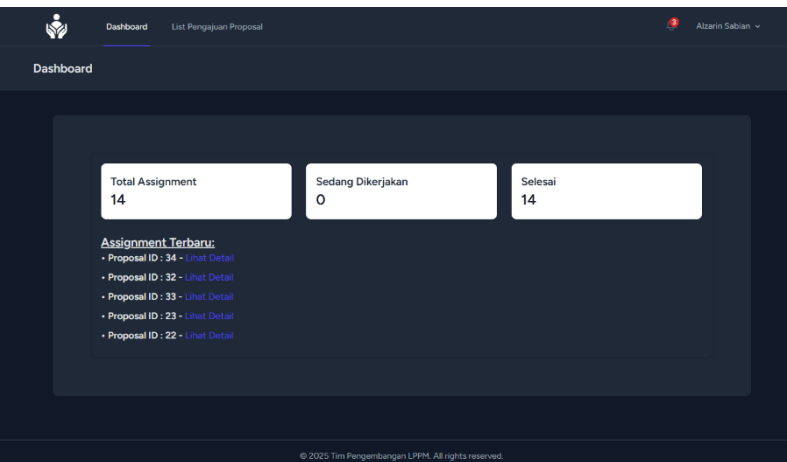
These administrator-specific features provide complete control to administrators in managing the system and LITABMAS data. The admin dashboard provides important overview for decision-making and performance monitoring. Study program management ensures relevant data is available to lecturers during proposal submission and in their profiles. User and reviewer management enables efficient access control and reviewer assignment. The ability to view proposal and research details, as well as download related files, facilitates administrative processes and evaluation.

Reviewer Role-Specific Features

Reviewers have access to specialized features that support their task of evaluating assigned research proposals:

Reviewer Dashboard

The reviewer dashboard displays statistics regarding review tasks assigned to them. These statistics may include the total number of proposals assigned for review (Total Assignment), the number of proposals still in review process or not yet complete (pending Assignments/under review), and the number of proposals that have been completed in review (completed Assignments).

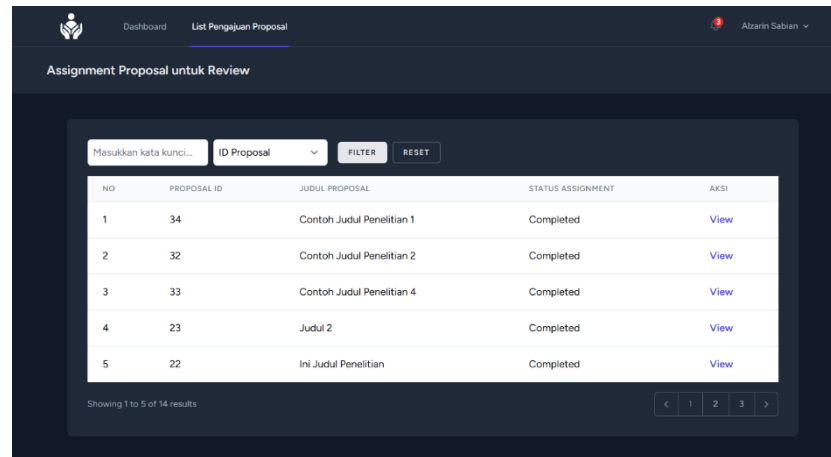


NO	JUDUL PENELITIAN	USER ID	NAMA USER	STATUS	TANGGAL DIBUAT
1	Judul 2	4	Ahmad Sudrajat	On progress	02/05/2025
2	Judul 1	4	Ahmad Sudrajat	Selesai	15/04/2025
3	Pengembangan Sistem Informasi Keuangan untuk Universitas XYZ	7	Budi Santoso	Selesai	26/03/2025
4	Dampak Game Kepada Kesehatan Psikis dan Pencegahannya - OK	7	Budi Santoso	Selesai	26/03/2025
5	Proposal Penelitian Seluk Beluk Pro dan Kontra dalam Sosial Media X	6	Siti Rahayu	Selesai	25/03/2025

Figure 16 - Reviewer Dashboard Display

Proposal Submission List

This page displays a list of research proposal submissions assigned by the administrator to the reviewer in question for evaluation. Each proposal record in this list is equipped with a view button that allows the reviewer to see the complete proposal details, including information entered by the lecturer and the uploaded proposal file.



NO	PROPOSAL ID	JUDUL PROPOSAL	STATUS ASSIGNMENT	Aksi
1	34	Contoh Judul Penelitian 1	Completed	View
2	32	Contoh Judul Penelitian 2	Completed	View
3	33	Contoh Judul Penelitian 4	Completed	View
4	23	Judul 2	Completed	View
5	22	Ini Judul Penelitian	Completed	View

Showing 1 to 5 of 14 results

Figure 17 - Proposal Submission List Display (for Reviewer)

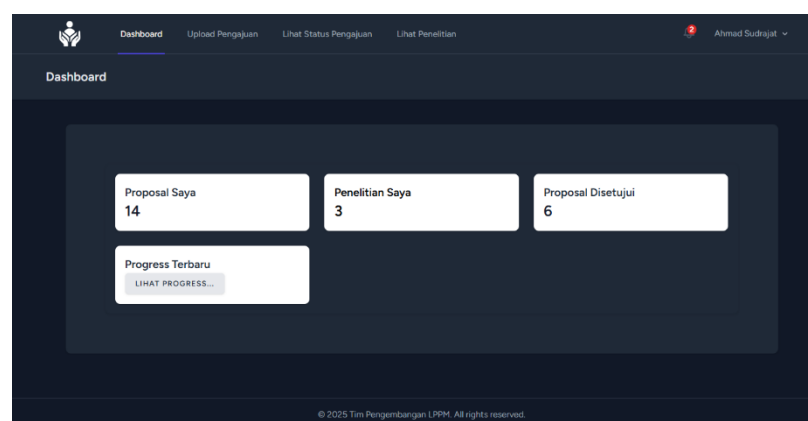
These reviewer-specific features are designed to give reviewers a clear picture of their workload and easy access to proposals that need evaluation. The reviewer dashboard helps them monitor the progress of their review tasks. The list of assigned proposals provides direct access to relevant proposals, and the view button facilitates access to proposal details for comprehensive evaluation processes.

Lecturer Role-Specific Features

Lecturers, as primary users in research proposal submission and implementation, have access to the following features:

Lecturer Dashboard

The lecturer dashboard displays a concise summary of their research activities within the system. These statistics include the total number of proposals ever created, the number of research being or having been conducted, the number of proposals approved by reviewers, as well as information about the most recent research progress made (equipped with a button that directs directly to the detailed page of that research progress).



Proposal Saya	Penelitian Saya	Proposal Disetujui
14	3	6

Progress Terbaru
LIHAT PROGRESS...

Figure 18 - Lecturer Dashboard Display

User Information Details

This page allows lecturers to complete and update more detailed academic profile information. Information to be filled includes National Lecturer Identification Number (NIDN), full name with academic qualifications, latest education level, current academic position, and other relevant information. This data is important for research identification and administration purposes.

Figure 19 - User Information Detail Page Display (Lecturer)

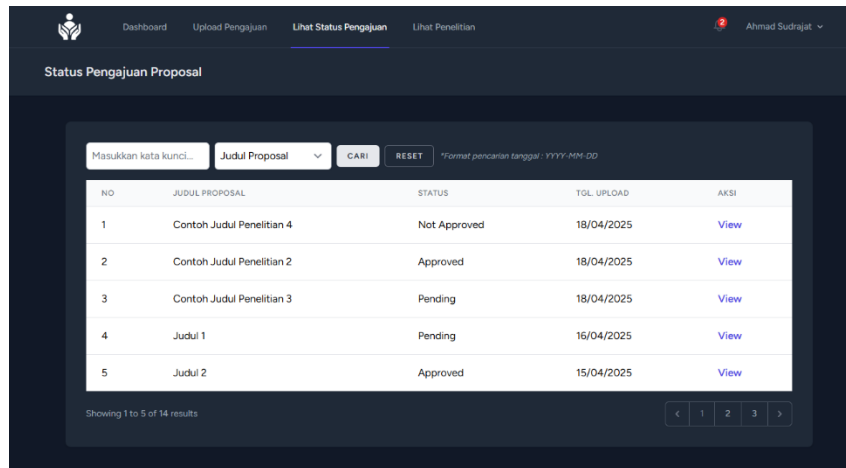
Research Proposal Upload

This page is the main feature for lecturers to submit research proposals. Lecturers will fill in a form that includes important information about the proposal, such as research title, NIDN of the principal proposer (automatically filled according to the logged-in lecturer's account), name of the principal proposer (automatically filled), research proposal scheme, list of research team members (other lecturers are selected through a dual listbox with data taken from users with the 'User' role, and students are entered manually through a regular listbox). Lecturers will also upload the research proposal file through this page.

Figure 20 - Research Proposal Upload Page Display (Full)

Proposal Submission Management

This page displays a list of research proposal records previously submitted by the lecturer in question. For each proposal, the current status is displayed (for example, 'Submitted', 'Under Review', 'Approved', 'Rejected'), and a view button that allows lecturers to see the complete details of proposals they have previously submitted.

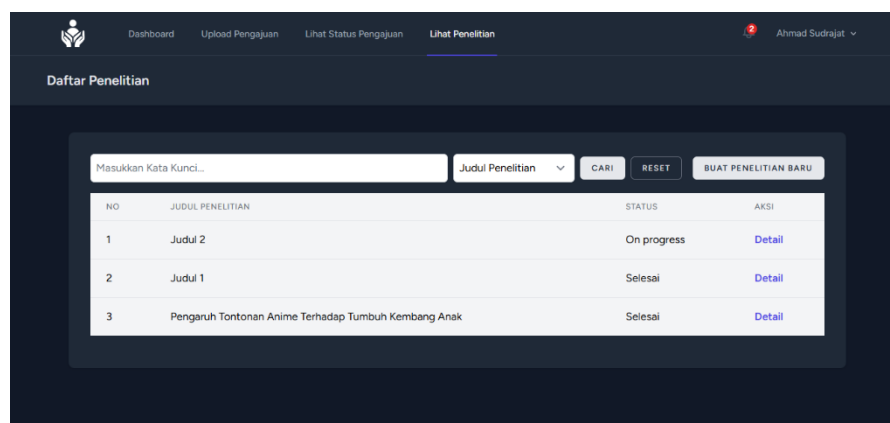


NO	JUDUL PROPOSAL	STATUS	TGL UPLOAD	AKSI
1	Contoh Judul Penelitian 4	Not Approved	18/04/2025	View
2	Contoh Judul Penelitian 2	Approved	18/04/2025	View
3	Contoh Judul Penelitian 3	Pending	18/04/2025	View
4	Judul 1	Pending	16/04/2025	View
5	Judul 2	Approved	15/04/2025	View

Figure 21 - Proposal Submission Management Display (for Lecturer)

Research Management

This page serves as the central hub for managing research being or having been conducted by lecturers. Lecturers can view a list of their research records, create new research notes, view details of each research, monitor research progress that has been uploaded, and finalize research by uploading three important files: scientific article/publication file, comprehensive research report, and research budget/funding report.



NO	JUDUL PENELITIAN	STATUS	AKSI
1	Judul 2	On progress	Detail
2	Judul 1	Selesai	Detail
3	Pengaruh Tontonan Anime Terhadap Tumbuh Kembang Anak	Selesai	Detail

Figure 22 - Research Management Display (for Lecturer)

These lecturer-specific features are designed to facilitate the entire research cycle from the researcher's perspective. The lecturer dashboard provides a summary of their research activities. The user information details page ensures lecturer personal data is recorded completely. The research proposal upload feature serves as the entry point to initiate research. Proposal submission management allows lecturers to monitor their proposal status. Finally, research management facilitates implementation, progress reporting, and research finalization.

Laravel Framework Implementation in SIMLITABMAS Development

The development of SIMLITABMAS at LPPM Politeknik Piksi Ganesha utilizes the Laravel Framework as the main foundation in building this web application. The selection of Laravel was based on several advantages offered by this modern PHP framework, including clear Model-View-Controller (MVC) architecture, built-in security features, and a rich package ecosystem. In its implementation, this project specifically leverages several starter kits and packages that accelerate the development process:

Laravel Breeze

Breeze is a starter package for authentication in Laravel Applications (Selvaraj, 2023). Laravel Breeze provides basic implementation for registration, login, password reset, and email verification. The utilization of Breeze enables the development team to quickly integrate basic security systems without needing to build them from scratch.

Spatie Laravel Permission

This package is integrated to manage authentication, authorization, and user access rights (role-based access control) (Widatama et al., 2024). With Spatie Laravel Permission, the management of permissions for each role (Administrator, Reviewer, Lecturer) becomes more structured and easier to manage, ensuring that each user can only access features appropriate to their role.

Tailwind CSS

Tailwind CSS is a utility-first responsive CSS framework. This framework gives developers complete freedom for customization and is free from design limitations already made beforehand. The framework operates at the minimal level of tools and CSS classes to build a complete single design (Al Salmi, 2023).

The use of the Laravel Framework provides several significant advantages in the development of SIMLITABMAS:

Clear MVC Structure

The MVC architecture separates application logic (Model), display (View), and control flow (Controller), making code more organized, easy to maintain, and developed by teams (Brekalo & Sedlarević, 2024).

Built-in Security Features

Laravel provides robust built-in security features, such as protection against CSRF (Cross-Site Request Forgery) attacks and data escaping to prevent XSS attacks (Steven et al, 2023). These features are crucial for protecting sensitive data in the LITABMAS system.

Easy-to-Use Eloquent ORM

Eloquent ORM (Object-Relational Mapper) simplifies database interaction using expressive and intuitive PHP syntax, reducing complexity in performing CRUD (Create, Read, Update, Delete) operations on LITABMAS data (Purnomo, 2023).

Rich Package Ecosystem

The availability of various third-party packages, such as Spatie Laravel Permission, accelerates the development of specific features without needing to build everything from scratch, thus saving development time and resources (Purnama et al., 2023).

Large Community and Good Support

The large and active Laravel developer community provides many resources, documentation, and solutions for various development issues.

Although Laravel offers many conveniences, there were several specific challenges encountered during the SIMLITABMAS development process:

Learning Curve and Mastery

For developers unfamiliar with Laravel or the packages used (such as Spatie Laravel Permission and Tailwind CSS), there is a learning curve that must be traversed to understand the concepts and their effective use. Mastering Laravel's advanced features and configuration of certain packages requires time and effort.

Configuration and Integration Complexity

Although Laravel is designed for ease, the configuration of certain system aspects and integration between packages can sometimes become complex, especially in adapting default behavior to meet SIMLITABMAS-specific requirements. A deep understanding of how various Laravel components and packages interact is very necessary to address potential integration issues.

Nevertheless, these challenges can be overcome through continuous learning, good documentation, and effective team collaboration. The overall utilization of Laravel provides a solid and efficient foundation for the development of SIMLITABMAS at LPPM Politeknik Piksi Ganesha.

CONCLUSION AND RECOMMENDATIONS

The implementation of the Research and Community Service Information System (SIMLITABMAS) based on the Laravel Framework at LPPM Politeknik Piksi Ganesha has successfully created a centralized platform for managing LITABMAS activities, by providing features that support the main workflows for lecturers, administrators, and reviewers—ranging from proposal submission, review process, research implementation, to final result reporting.

The utilization of the Laravel Framework along with the Breeze starter kit, Spatie Laravel Permission package, and Tailwind CSS facilitated the development of an efficient, secure application with a responsive interface. The Rapid Application Development (RAD) methodology applied enabled an adaptive development process to user needs through continuous feedback from the Head of LPPM as the representative of primary users, thereby ensuring that SIMLITABMAS built is relevant and appropriate to the institution's operational context.

However, this research still has limitations, particularly in collecting user feedback data more widely and deeply beyond primary stakeholders, as well as not yet covering quantitative evaluation of the impact of system implementation in improving the efficiency and effectiveness of LITABMAS management.

Recommendations

- 1) Development of More Comprehensive Notification Features.
- 2) Integration with Other Information Systems.
- 3) Collection and Analysis of System Usage Data.
- 4) Increased User Involvement in Further Development.
- 5) Exploration of Reporting and Data Analysis Features for LITABMAS.

Future research can focus on quantitative evaluation of the impact of SIMLITABMAS implementation, comparative studies with similar systems in other institutions, as well as analysis of factors affecting user adoption and satisfaction with this system.

With the implementation of SIMLITABMAS, it is expected that the management of research and community service activities at LPPM Politeknik Piksi Ganesha can become more effective, efficient, and transparent, which ultimately contributes to improving the quality of the Tri Dharma of Higher Education.

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