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Web-Based Assignment Information System Serves to Improve Economic Research at Universities and Public Services

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Abstract

Community Outreach is one of the Tridharma of Higher Education which is the obligation of lecturers in Indonesia. The Institute for Research and Community Outreach (LPPM) at Universitas Multimedia Nusantara (UMN) is an institution that supports and facilitates Community Outreach activities, starting from submitting proposals, monitoring implementation, assignment letters, and completion reports. There are several procedures such as filling in data on a form which can be accessed using the Linktree link. This makes it difficult for LPPM admins to manually recap data by checking the forms that have been submitted. Even though there is a Research and Community Outreach (RCOS) website, there is no feature for Community Outreach services yet. This research develops the RCOS LPPM website at UMN by adding features for Community Outreach services. By using the Agile development method which focuses on developers, existing software, customers, and change requirements, the web-based information system created is expected to further complement the digitalization and automation of LPPM UMN service features, making it easier for both lecturers and admins in the process.

Keywords: Information System, Web-Based, Agile Development, Community Outreach, Public Services.

1. Introduction

A university contributes not only to education, but also to the application of science for the benefit of the nation and state. One of these is fulfilled through community outreach, which is performed by lecturers as part of the Tri Dharma of Higher Education. As a result, most universities have a Research and Community Service Institute (LPPM), which is an organization that supports and facilitates research and community outreach activities. The Institute for Research and Community Outreach (LPPM) of Multimedia Nusantara University (UMN) has a vision to become a leading institution in the field of research and development of science, technology, and art, focusing on the field of New Media and its application in community service, to create a community and a knowledge-based economy. This support and facilities are provided starting from submitting proposals, supporting the implementation process, to monitoring program accountability delivered by lecturers [1].

One of the means used by LPPM UMN to support these activities is using a link creation site or social media reference landing page called Linktree, specifically for services related to community outreach which can be accessed at https://linktr.ee/PKM_INOVASI_UMN. In this link, there are 18 services provided ranging from guidance, the potential for assisted villages, and funding applications, to accountability related to community outreach activities carried out by UMN lecturers. However, the use of this link means that the process is still carried out manually because most only use tools such as Google Form, which is connected to storage media that is not a database, and the checking process is still carried out manually by the LPPM UMN administration [2]. This can result in a waste of time, and energy, and difficulty in managing and monitoring running processes [3].

Before the RCOS website was created, the process of activities carried out by LPPM UMN such as submitting proposals, requests for supporting data, assignment letters, and others still used Linktree which would connect to the Google Forms link manually [4]. This causes the process to take a long time because when LPPM UMN staff want to check the documents and files that have been sent via Google Forms, sometimes they are duplicated and messy so they are not very effective [5]. Apart from Google Forms, there are also other tools that are also used, such as Google Forms, Google Drive, Google Sheets, and Gmail, each of which is not integrated with each other so each admin needs to do a manual check [6]. As a result, many application processes become slow and miss being checked and followed up to the next process. To overcome this, an RCOS (Research and Community Outreach Service) website was created [7].

Unfortunately, although the RCOS website has been developed, there are still flaws in the website, such as limited features/services, which require manual ways for both LPPM UMN admin personnel and lecturers [8]. Furthermore, some features/services are complicated enough that the process must be optimized. As a consequence of these inadequacies, LPPM UMN staff and lecturers have encountered process performance challenges. As a result of this

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issue, the process was restarted manually, this time via accessing the Google form through Linktree.

Several previous studies have produced significant progress in the development of web-based information systems [9]. In a study related to the Information System Success Model with the Delone Model and Mclean Information System (IS) integrating compatibility and Transformational Leadership (TL) constructs as precursors for user satisfaction and actual use to estimate performance [10]. Subsequent research explained the application of the Agile Development method and proved that the agile development method can be used in developing information system applications whose development only requires a short time [11]. Based on the results of the Systematic Literature Review (SLR) which was carried out in several journals which have been researched and published in 2021, the model of the Agile method which is widely used for developing website-based information systems is the scrum model, based on the results of the Systematic Literature Review (SLR) which is carried out in journal publications, the focus is on areas that develop website-based information systems using agile methods, namely the business sector, then the Systematic Literature Review (SLR) method can be used to analyze agile method models used to develop web-based information systems in 2021, and the last one is that further research can use the object model information system development method for analysis and is not only based on websites but also on Android [12].

In various software development methods and activity process models, no one does not have testing activities in its application [13]. System testing is the final stage of testing carried out by developers in the internal workspace [14]. However, the testing phase is not the end of the entire testing phase, because there are still other stages that must be passed before the product deployment process, namely Acceptance testing. A popular method for conducting user acceptance testing is usability testing, where in this method, the results provide an important quality indication for clients to decide whether to accept or reject the product [15]. In this research, usability testing was carried out using the System Usability Scale (SUS) technique and the Net Promoter Score technique to measure the suitability of the information system [16]. Meanwhile, this research also seeks the optimal testing required using sampling techniques [17]. The results obtained through this research are: according to the Usability testing results the proposed system developed by this research is better than the current system and the number of testers participating in system testing can optimize the use of the sampling method [18]. Subsequent research related to SUS testing of web-based service apps shows objective test results following the SUS Score Results range, so that in this final phase the system that has been designed or developed becomes more suitable for use [19].

Based on this background, this research aims to develop features RCOS UMN to facilitate community outreach procedures, especially the assignment letter feature [20]. The benefit of this research is to simplify the service process at LPPM UMN, especially for submitting assignment letters for community outreach by UMN lecturers.

2. Research Method

This research uses Agile methodology for website development. Software development methodologies that have previously existed or are now often called traditional software development methods, such as Waterfall, are often used on large projects. However, the use of this method causes many problems, especially in the maintenance phase and in dealing with changing user needs. The changes that occur can cause major changes, resulting in major problems. Agile methodology can be the right solution to overcome this. This approach is lightweight and can overcome the limitations of convolutional development methods by reducing costs and providing the flexibility to adapt to changing requirements at any stage.

Agile itself is a term that describes the interaction of a software development approach that emphasizes gradual results, development team collaboration, continuous planning, and continuous learning. Agile methodology is a method for developing systems that require agile adaptation to any type of change. Instead of focusing on detailed development processes, Agile development sets its focus on developers, existing software, customers, and changing requirements. Active user involvement and close collaboration are required throughout the development cycle. This methodology divides the entire system into the results of each module or subsystem so that users can use or check the results before the system is completed as a whole.

Agile development is very demanding on the time of user representatives and requires a large commitment over the duration of the project as one of the determining factors for success. Requirements emerge and evolve throughout development. The flexibility to change direction as needed and to ensure the right product outcome, as requirements may change before development is complete, are prominent advantages of Agile. This is suitable for projects that frequently receive intervention from users and can adapt to user needs which often change in the middle of development. The principle of the Agile methodology is a short-term system development method, and can adapt to change. This methodology is designed to help the development team work quickly and adapt to user needs for the system. The stages that will be carried out in this research use Agile methodology, as follows in Figure 1. Agile Development Methodology.

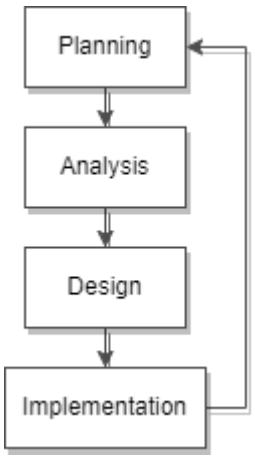

Figure 1. Agile Development Methodology

At this stage, data is collected directly by conducting interviews with users, namely the LPPM UMN administration, as well as observing the system that has been running. Based on the findings of interviews and observations of problems during the planning stage, the team analyzed the system needs to be developed. The results of this study will occasionally be double-checked and, if necessary, altered for the planning stage. When the system requirements have been determined, it will go on to the next stage, design.

Design decisions are critical in any project since they serve as the fundamental blueprint upon which the entire endeavor is built. Effective design decisions guarantee that a project not only achieves its technical requirements, but also fits smoothly into its intended purpose and objectives. Thoughtfully planned design decisions increase development efficiency, reduce the likelihood of errors, and save significant time and resources by avoiding substantial adjustments in the future. In summary, the design decisions taken ensure that this project remains on track, allowing it to not just function but thrive in its intended context. In the design stage, a design for the web system to be developed is carried out, using several assistance diagrams such as flowcharts, database designs, and mock-ups to illustrate the interface. The results of this design stage are re-evaluated so that they suit the user's needs as planned and analyzed.

The implementation stage builds a web with design references created. The RCOS website development in this research uses the PHP programming language and the Laravel framework with the main Tailwind CSS library. The framework is designed in PHP in accordance with the model-view-controller (MVC) architecture, a language that is becoming increasingly popular in industry, particularly for critical and strategic projects. Tailwind CSS, a utility-first CSS framework, is known for its fast development process and highly customizable styling capabilities. Tailwind CSS provides various benefits to the project, including a utility-first approach that provides a distinct and very efficient way to style elements. It has a rich set of utility classes that can be applied straight to HTML components, making styling and design quick and easy. This method eliminates the need to write custom CSS for most stylistic jobs, saving time and lowering the size of the stylesheet. Furthermore, Tailwind CSS is extremely flexible, allowing for quick customization to meet the application's exact design and branding requirements. Tailwind CSS has a thriving community and ecosystem, including various plugins and extensions. In addition, Tailwind CSS provides built-in responsive design classes, which make it easier to create responsive layouts. Enabling UI adaptation to diverse screen sizes and devices.

3. Result and Discussion

The results of the planning and analysis that have been carried out are represented in a flowchart diagram. Figure 2. Flowchart of Assignment Letter Submission from Lecturer via RCOS UMN represents the flowchart of submission of assignment letter by lecture via RCOS UMN. Lecturers as users need to log in to the UMN RCOS website via UMN Single Sign On (SSO). If the data is declared valid and log in successfully, the user can then navigate to the Assignment Letter menu. The system will automatically retrieve data from the database according to the logged in user, and display it on the page. The user then fills in the required data and makes a submission, then the data will be entered into the database and the system will send a notification of the submission to the admin for further processing. Flowchart of Assignment Letter Submission from Lecturer via RCOS UMN on Figure 2.

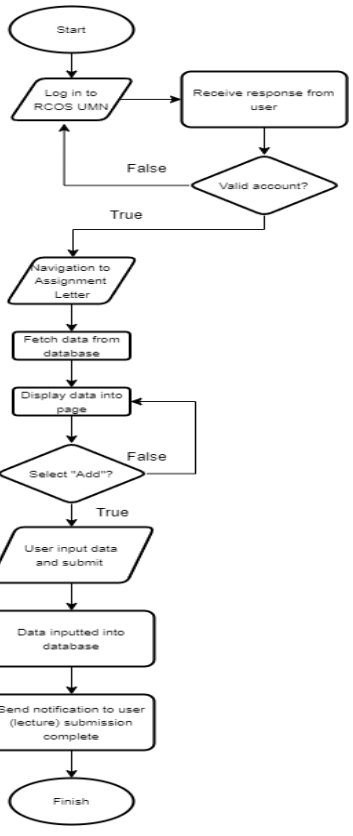

Figure 2. Flowchart of Assignment Letter Submission from Lecturer via RCOS UMN

Then, Figure 3. Flowchart of Checking Assignment Letter Submission by Admin via RCOS UMN represents the flowchart of the next process where the admin follows up on incoming assignment letters. On the admin side, users can change the status of the submitted Assignment Letter to "Approve" or "Reject". Apart from that, there is an Add Assignment Letter feature on the admin side which can be used if a lecturer wants to submit an Assignment Letter manually directly through the admin. When the admin has submitted an additional assignment letter, a notification will be sent to the lecturer concerned.

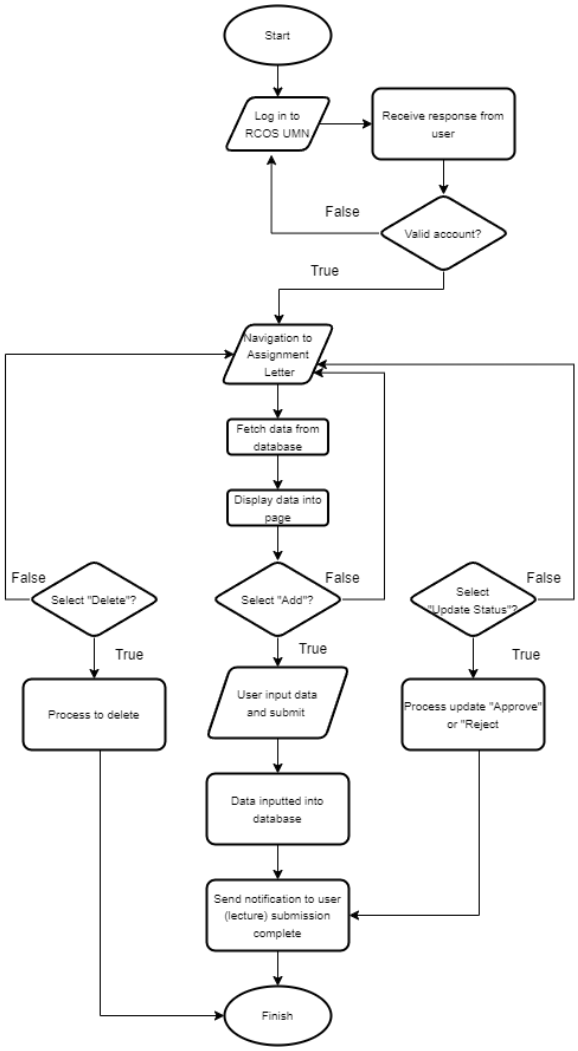

Figure 3. Flowchart of Checking Assignment Letter Submission by Admin via RCOS UMN

Figure 4. Database Schema of Assignment Letter Submission Feature depicts the database structure of the website that was constructed; however, because the total database architecture is rather complex and will be difficult to see in this article, a class diagram of one of the features, Assignment Letter, is displayed. This feature is used by users, specifically lecturers, to submit assignment letters that can be used as proof that they can participate in community service programs.

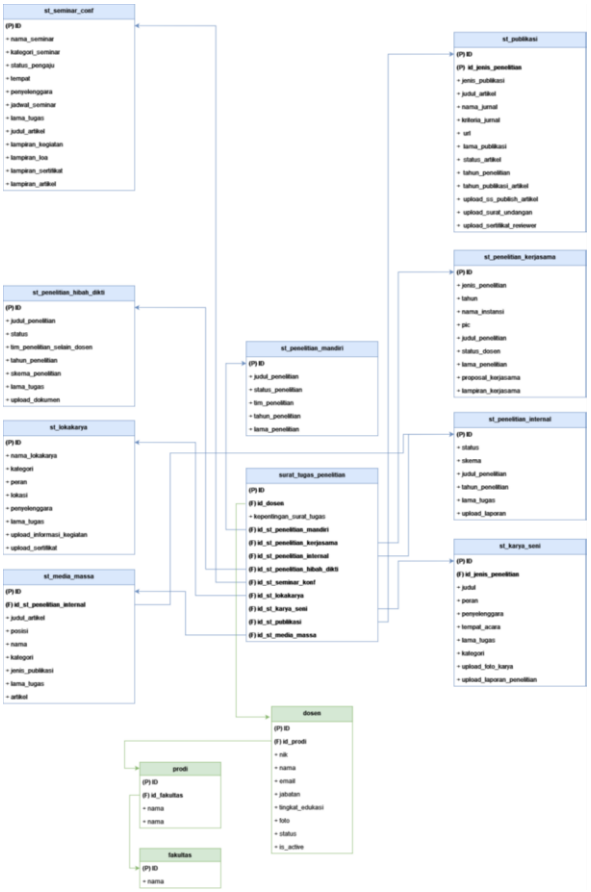

Figure 4. Database Schema of Assignment Letter Submission Feature

Previously, the RCOS UMN website was developed using the PHP programming language and the Laravel framework. As a result, in order to facilitate development and take use of the benefits of the programming language that is still in use, we continue to use PHP and the Laravel framework. Improvements were made by including Tailwind CSS as the main library. Figure 5.Dashboard of RCOS UMN Sub-menu Community Outreach to Figure 13. Display of Supporting Document Submission of RCOS UMN Sub-menu Community Outreach displays an example of the appearance of the RCOS UMN website, Community Outreach sub-menu that has been implemented. Dashboard of RCOS UMN Sub-menu Community Outreach on Figure 5.

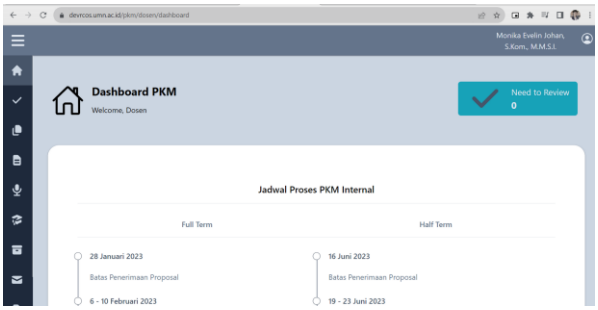

Figure 5. Dashboard of RCOS UMN Sub-menu Community Outreach

Figure 6. Menu Reviews of RCOS UMN Sub-menu Community Outreach

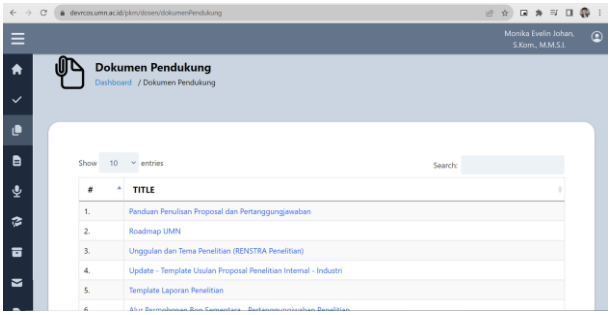

Figure 7. Menu Dokumen Pendukung "Supported Documents" RCOS UMN Sub-menu Community Outreach

Figure 8. Menus of Jurnal (Journal) RCOS UMN Sub-menu Community Outreach

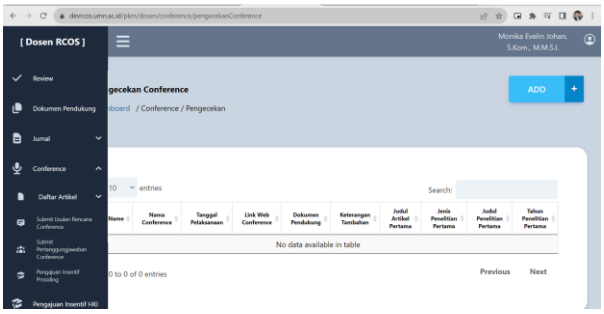

Figure 9. Menus of Conference RCOS UMN Sub-menu Community Outreach

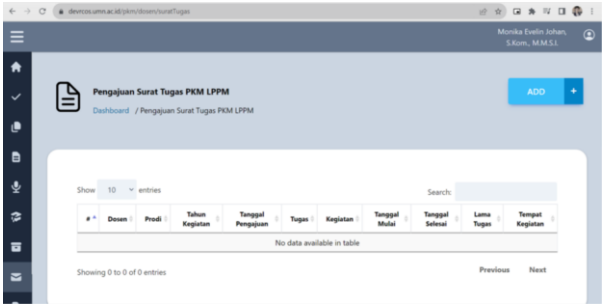

Figure 10. Display of Assignment Letter Submission of RCOS UMN Sub-menu Community Outreach

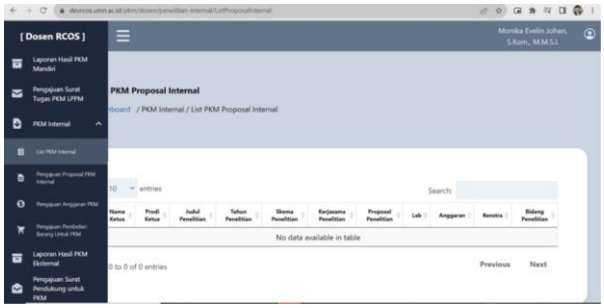

Figure 11. Display of Internal Proposal List of RCOS UMN Sub-menu Community Outreach

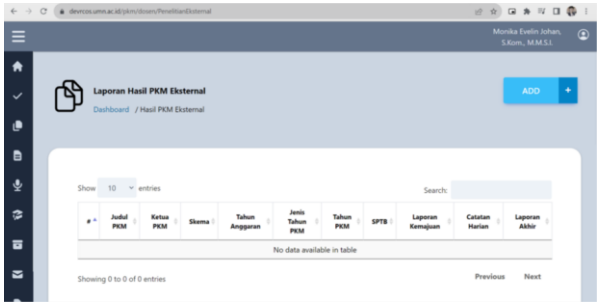

Figure 12. Display of External Report List of RCOS UMN Sub-menu Community Outreach

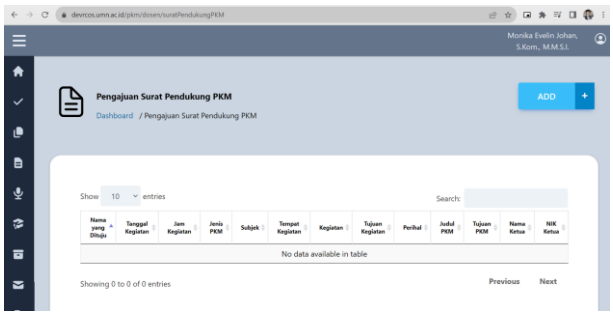

Figure 13. Display of Supporting Document Submission of RCOS UMN Sub-menu Community Outreach

The development of the Community Service (PKM) feature on the RCOS UMN website (rcos.umn.ac.id) has been carried out using the Laravel framework, which is based on the PHP programming language, and the Tailwind library. Even though it is a programming language that has been developed for a long time, PHP has proven to still be suitable for use in website development and is still easy to use, because it is open source and does not require complicated installation.

However, this development does not fully cover all the menus required by LPPM. There are still several features that need further development. Apart from that, it is also necessary to test a system that has been designed so that it can really be used by users and meets user needs completely, without any errors or bugs. Testing has been carried out by the developer, but has not been carried out by users because the entire feature needs to be completed.

4. Conclusion

Research has been conducted on the establishment of the Community Service (PKM) feature on the RCOS UMN website (rcos.umn.ac.id), albeit it does not fully cover all of the menus required by the LPPM. There are

still some features that require additional development. Aside from that, it is also required to test a system that has been created so that it can truly be utilized by users and fully fits their needs, with no problems or faults. The use of the Agile methodology in developing the PKM feature on the RCOS UMN website was successful, and was deemed suitable for implementation. The use of the Agile methodology in developing the PKM feature on the RCOS UMN website was successful, and was deemed suitable for implementation. This is because the Agile methodology is suitable for short-term system development, which requires adaptation and flexibility to change, where in the development process there are several changes such as adjusting the priorities of the features being worked on and the content of the features being developed. As a result, the Agile technique continues to be appropriate for future development. It is envisaged that the RCOS UMN website would assist LPPM UMN lecturers and staff with the submission, reporting, and monitoring of the Community Service (PKM) program. The website's features can replace Linktree and Google Form, allowing them to overcome the issues posed by these two platforms.

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