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Design and Development of a Web-Based Correspondence Management Information System at Politeknik Negeri Tanah Laut

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ABSTRACT

Correspondence at Politeknik Negeri Tanah Laut (Politala) is currently still done manually in the vertical delivery process between work units. This manual process results in inefficiency, especially in monitoring the status of documents such as Staff Review Documents. Staff Review is a document that must be made by the department to the director as a basis for requesting assignment letters, decrees, recommendation letters and the others. These documents often require repeated checking, causing delays in the workflow. In addition, paper-based correspondence archives increase the risk of losing documents and make it difficult to find them again. Therefore, the implementation of the Correspondence Management Information System (SiMantan) is needed to improve the efficiency of the correspondence administration process by providing electronic document management and real-time status monitoring. This information system is built using the waterfall development model and designed with the Unified Modelling Language (UML) in the form of Use case Diagrams. While the programming language used is the PHP programming language with the Code Ignitor 3 framework and MySQL database. Functional testing of the system is carried out using the black box testing and user acceptance testing (UAT) method which shows that all features in the information system function properly according to the expected specifications.

INTRODUCTION

Correspondence management is the process of receiving, sending, recording, and storing letters, both internal and external, within an institution, specifically at Politeknik Negeri Tanah Laut (Politala). Currently, Politala still applies a manual system for correspondence, both horizontally and vertically across work units. One example of a vertical correspondence flow at Politala is the submission of letters from study programs to the highest leadership, in this case, the Director. Some of these letters relate to reporting, requests for approval, proposal submissions, or conveying important information that requires the attention or decision of the Director.

The procedure for issuing these letters requires a review by the department staff, which is then directed to the Director. Currently, the process of submitting the Review Document is done conventionally, where department staff must deliver the document in hard copy directly to the administrative staff of the leadership. This method not only demands significant time and effort but is also inefficient because department staff often have to repeatedly check with the administrative staff about the status and progress of the Review Document. This condition slows down the workflow and can disrupt the overall productivity of the organization.

Additionally, correspondence management at Politala is still stored through paper-based archiving and recorded in a large ledger arranged by date, so if any letter is lost and needs to be retrieved, it becomes challenging to locate. Therefore, a Correspondence Management Information System (SiMantan) is needed to optimize document management electronically, enabling real-time monitoring of document status and thereby enhancing effectiveness and productivity in the correspondence workflow, especially for incoming and outgoing letters, assignment letters, review documents, and letter disposition.

The implementation of a digital correspondence management information system at higher education institutions is essential for streamlining administrative processes and ensuring the security of electronic documents (Aswari & Sulianta, 2022). This is particularly important in the context of higher education digitalization, where integrating information technology can significantly enhance educational efficiency (Gromova, T. V., 2021). The adoption of digital correspondence management systems at universities has proven to significantly improve efficiency and organization.

Research Aswari & Sulianta (2022) highlights the benefits of a system with digital signatures, which can simplify bureaucratic procedures and ensure document security. Similarly, Septian, Jaenudin, & Eosina (2023) emphasizes the advantages of a web-based system, including faster processing, centralized storage, and improved search capabilities. Several studies have examined the design of systems that manage centralized correspondence data processing in personnel departments using use case diagrams and activity diagrams as data flow models for correspondence (Suminten, Rani, Roni, Anggraeni, & Indarti, 2021), (Fithri & Naim, 2021), (Kuswantoro, Ungu,

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Rahmahwati, & Rahmawati, 2022). Other research discusses a task command information system at the Public Works and Spatial Planning Department of Lampung Province using a web engineering development model and black-box testing as functional testing, achieving a success rate of 74% (Qomariah & Sucipto, 2021). Meanwhile, other researchers have developed a web-based correspondence administration information system as a solution to similar issues, using the waterfall development model with PHP programming language and MySQL database (Ramadhani, Nurul, Aryani, Amiruddin, & Imasita, 2022), (Shen, 2022), (Dzhamaldinova, Kurdyukova, & Kunanbayeva, 2021).

LITERATURE REVIEW

Previous research related to the study of mail management is presented in Table 1.

Table 1. Previous research review

Source	Result	Relevance
(Praja, Darmansah , & Wijayanto , 2022)	Website-Based Incoming and Outgoing Mail Recording Information System Using the Waterfall Method	Using the Waterfall Model to Create Information Systems
(Putra, Santoso, & Jonemaro, 2019)	Mailing application that focuses on disposition for incoming and outgoing mail. The system development model uses a spiral model with functional testing of 29 features declared 100% valid by users.	Building an information system that focuses on incoming and outgoing mail but with the same testing method, namely focusing on system functionality.
(Putri, 2022)	The letter management information system at the Medan Belawan District Office is web-based with design tools using the Unified Modeling Language.	Using the same design method, namely the Unified Modeling Language (UML) using use case diagrams.
(Mulyani, Zulhalim , & Yasin, 2021)	Web-based management of correspondence at the Directorate of Traffic and Sea Transportation to overcome the delay in the mail delivery process. The programming language used in developing the application is PHP using the CodeIgniter framework.	The correspondence information system at Tanah Laut State Polytechnic was also built using the PHP programming language with the CodeIgniter framework.
(Dharmawan, 2022)	Building an application that is able to solve problems in storing and searching for letters needed quickly and on time. This application is built using the Bootstrap framework, MySQL database server, PHP 7, HTML, CSS, and JavaScript.	The correspondence information system at Tanah Laut State Polytechnic was also built using the PHP programming language with the CodeIgniter framework and MySQL database server.

Based on the review of previous research on mail management, including incoming and outgoing mail, assignment letters, and letter dispositions, several of these studies have developed web-based mail management information systems. Therefore, this study focuses on mail management for handling documents such as staff review letters, request letters, submission letters, and other types of letters, implemented in a Web-Based Mail Management Information System using PHP programming language and MySQL database. The system's functional testing method uses black box testing and user acceptance testing.

METHOD

The research methodology for the Web-Based Correspondence Management Information System (SiMANTAN) at Politeknik Negeri Tanah Laut will be completed based on the research framework presented in Figure 1.

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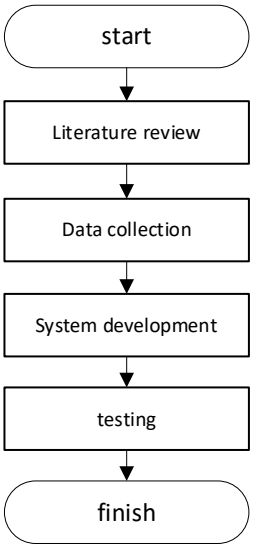

Figure 1. Research Flow Diagram

The Literature Review consists of literature related to the Correspondence Management Information System, including journals and Standard Operating Procedures (SOP). Additionally, interview and observation methods are also applied in this research, where researchers conduct interviews with digital correspondence users, namely administrative staff, department heads, and the director/vice-director. Subsequently, the development of the correspondence management information system is carried out using the PHP programming language with the Laravel Framework and MySQL Database. The development model used for the system's development is the waterfall model, with several stages shown in Figure 2.

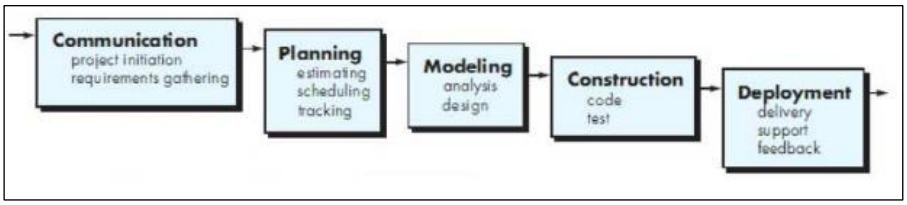

Figure 2. Waterfall Model

The phase of analyzing the Web-Based Correspondence Management Information System (SiMANTAN) at Politeknik Negeri Tanah Laut involves conducting interviews with the correspondence department, as well as observations and case studies. After completing the analysis, the next phase is designing the system, including creating a user interface (UI) design using the Figma application. In addition, the researcher uses Unified Modelling Language (UML) to illustrate system components, data flows, and storage for each process occurring within the system. Implementation is carried out through the development of the web-based information system with black-box testing and User Acceptance Testing (UAT). UAT and Black-box testing are conducted to verify system functionality without knowledge of the system's internal structure.

RESULT

The system currently operating based on the Standard Operating Procedures (SOP) for the correspondence system in the Department of Computer and Business at Politeknik Negeri Tanah Laut is shown in Figure 3.

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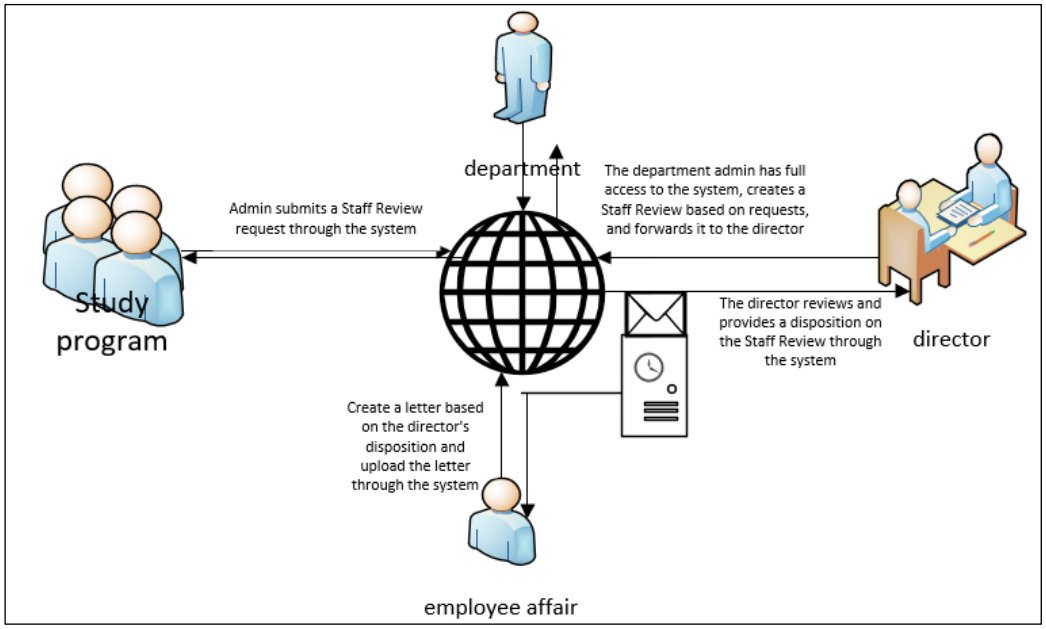

Figure 3. Current System

Figure 3 displays the correspondence process flow involving several departments: Study Program, Department, Director, and Correspondence Department. The first step in the process is a Letter Request by the Study Program Coordinator through the program staff, who submits a request to create a document, such as an Assignment Letter or a Decree to the department staff. Next, the department staff prepares a Staff Review based on the letter to be further processed. The TS is a preliminary document used to draft the assignment letter/decision letter and contains considerations and follow-up suggestions. Once the TS is completed, it is forwarded to the Director through the leadership secretary for further review.

The Director reviews the submitted Staff Review. Based on the evaluation and considerations, the Director approves it through a disposition which contains instructions for the correspondence department to create an assignment letter/decision letter in accordance with the review content. The correspondence department is responsible for creating the Assignment Letter or Decree as instructed by the Director's disposition. Once the assignment letter/decision letter is completed with the Director's signature, the correspondence department reports and submits it to the department staff. Similarly, the department staff must forward the assignment letter/decision letter to the study program.

The proposed system to address the above issues, namely a web-based correspondence information system for the Department of Computer and Business at Politeknik Negeri Tanah Laut, is shown in Figure 4.

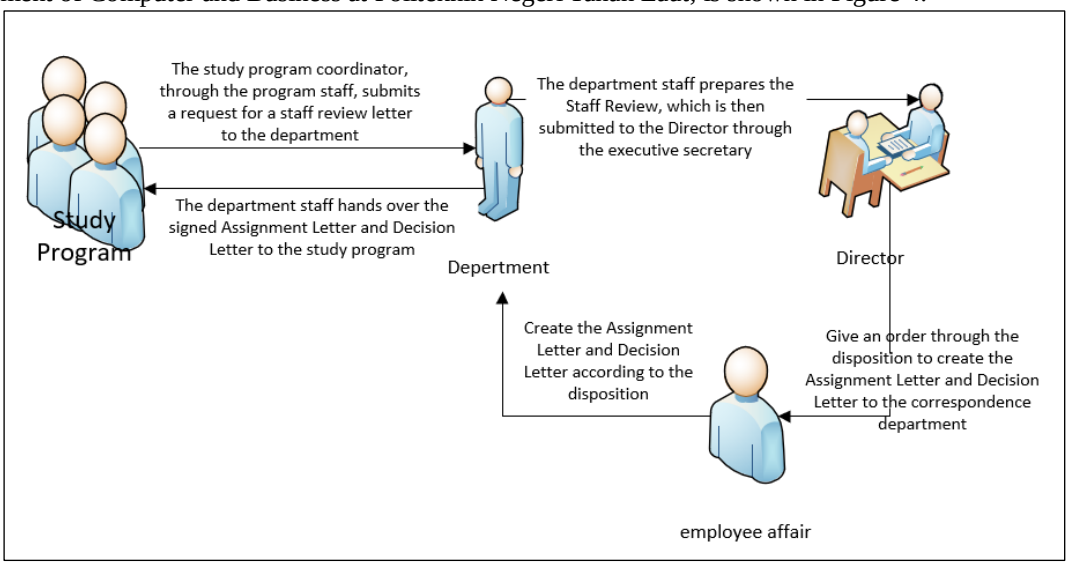

Figure 4. Proposed System

Figure 4 shows the proposed system to address correspondence issues in the Department of Computer and Business at Politeknik Negeri Tanah Laut, where all relevant parties are connected within an information system. In this

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system, study program staff can request letters through the system, which will then be processed by the department staff. The department staff have full access rights to the system. Through this system, the department staff will prepare a staff review that will be forwarded to the Director. The Director will also provide disposition through this system. The Director has access rights to manage dispositions, including adding, editing, viewing, and deleting dispositions on the staff review.

Design Systems

The design of the correspondence information system is done using Unified Modeling Language (UML) with a use case diagram. A use case diagram illustrates the interaction relationship between actors and the system. As shown in Figure 5 above, there are three actors: admin, department, and director.

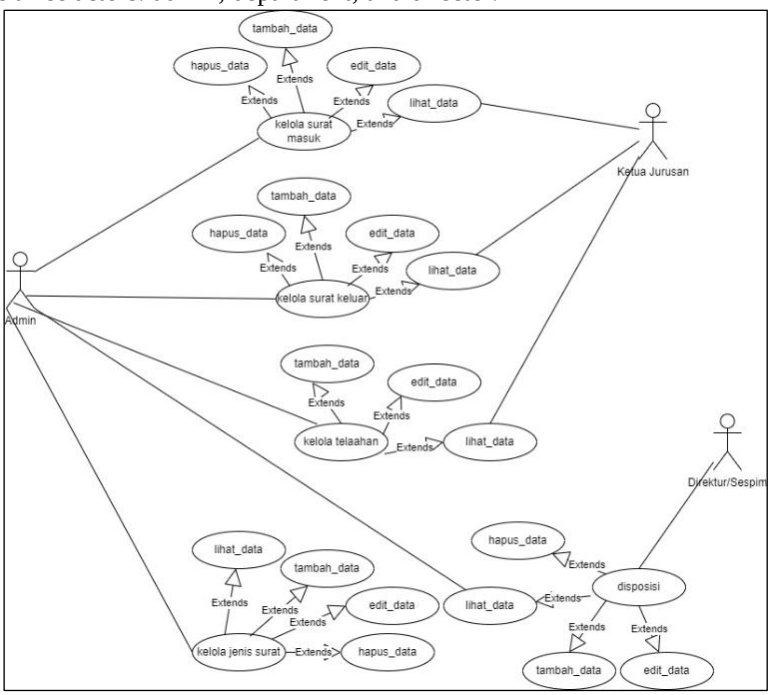

Figure 5. Diagram Use Case SiMantan

The use case scenario of the correspondence management information system at Politeknik Negeri Tanah Laut is divided into 2 (two) tables, namely the actor definition table and the use case definition table which are shown in Table 2 and Table 3 below.

Table 2. Actor Definition

Actor	Definition
Admin	Have full access to manage incoming mail, outgoing mail, reviews, and types of letters. Including adding, editing, deleting, and viewing letter data.
Head of Department	Have access to view data on managing incoming mail, outgoing mail and letter reviews.
Director	Have access rights in managing letter review dispositions. In addition, can also take actions related to letters, including viewing, editing, adding, and deleting dispositions.

Table 3. Usecase Definition

Usecase	Usecase Definition
Manage Incoming Mail	Incoming mail usecase management consists of adding, editing, displaying and deleting incoming mail
Manage Outgoing Mail	Incoming mail usecase management consists of adding, editing, displaying and deleting outgoing mail.
Manage Staff Reviews	Incoming mail usecase management consists of adding, editing, displaying and deleting staff review documents.
Manage Mail Types	Incoming mail usecase management consists of adding, editing, displaying and deleting letter types.
Manage Dispositions	Incoming mail usecase management consists of adding, editing, displaying and deleting dispositions.

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Implementation

The implementation of the Correspondence Information System is the process of managing correspondence in the Department of Computer and Business at Politeknik Negeri Tanah Laut, encompassing the management of incoming mail, outgoing mail, staff reviews, and dispositions.

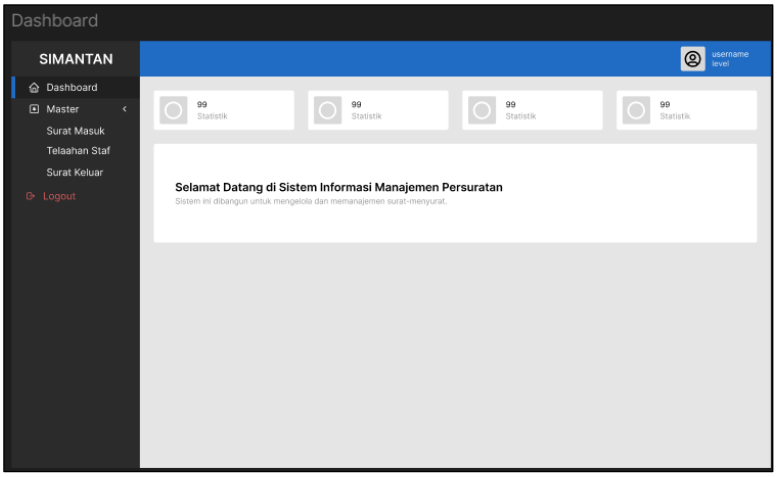

Figure 6. Dashboard Page

Figure 6 shows the dashboard interface of the Correspondence Management Information System (SIMANTAN). It includes navigation menus such as Dashboard, Master, Incoming Mail, Staff Review, Outgoing Mail, and Logout. In the upper right corner, a user icon displays the username and access level information. Overall, the interface is designed to be simple and intuitive, making it easy for users to navigate and access key functions in mail management.

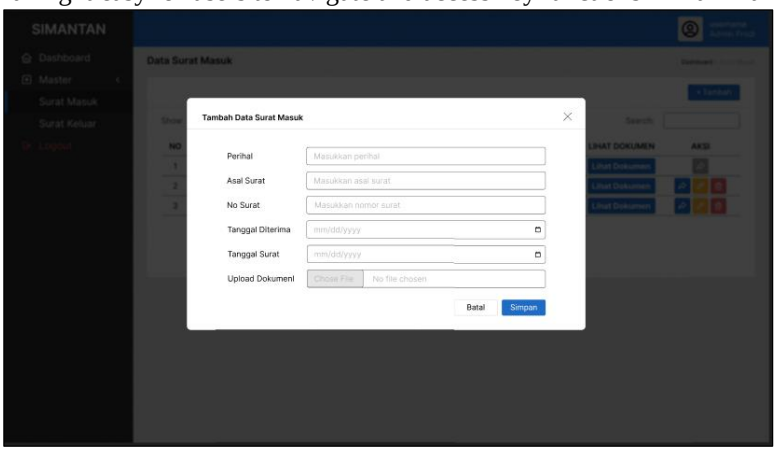

Figure 7. Incoming Mail Data Addition Page

Figure 7 shows the Incoming Mail Data Addition form in the correspondence information system. Users can enter new mail data with several input fields, including the subject, which is a brief description of the content or topic of the letter; the origin of the letter, used to specify the source institution or party that sent the letter; the letter number, serving as the letter's identification number; the date received; the date of the letter; and a document upload option for uploading the related letter document. Additionally, there are save and cancel buttons for saving the entered data or canceling the letter entry. This form is used to add new letter entries into the system.

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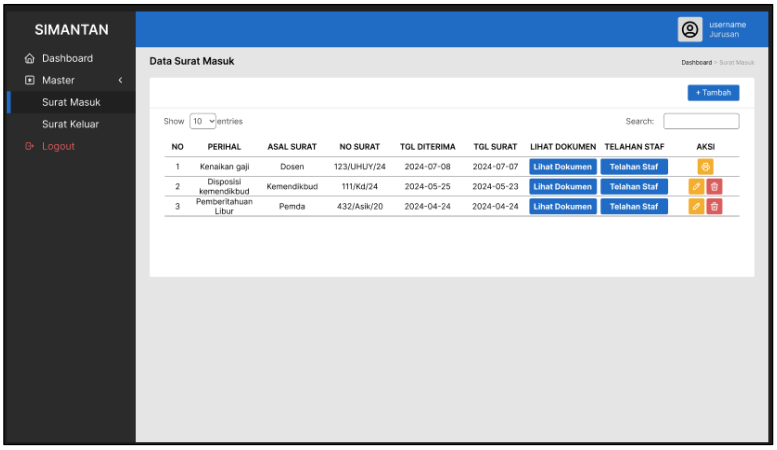

Figure 8. Incoming Mail Report Page

Figure 8 displays Incoming Mail Data in the correspondence information system. This table contains important information about the received letters, including number, subject, origin of the letter, letter number, date received, and date of the letter. The user in this case is the admin. The admin can view document details or conduct staff reviews by selecting the appropriate button. Additionally, the page is equipped with edit and delete buttons. If the incoming mail data is incorrect, the admin can edit it using the edit button.

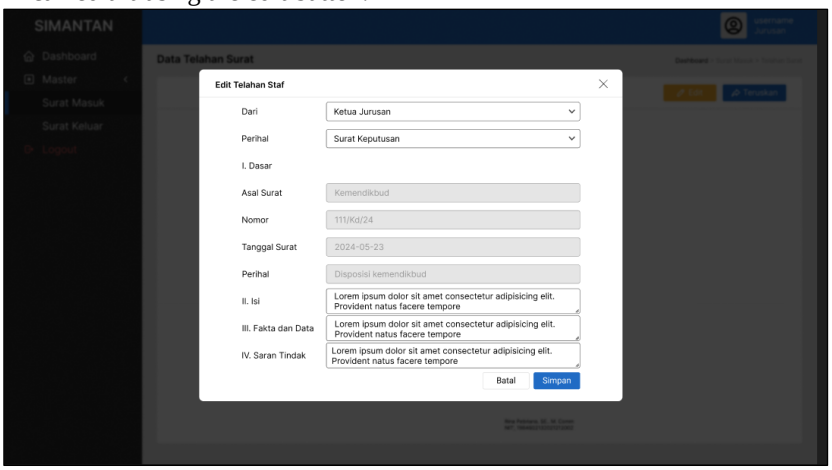

Figure 9. Staff Review Editing Page

Figure 9 shows the process of editing Staff Review in the correspondence information system. This feature is used to add letter data, including the letter's purpose, subject, origin, as well as the content sections, facts, data, and relevant action recommendations. In the context of management, such a system supports letter administration by providing a clear and systematic structure. Each incoming or outgoing letter can be tracked, processed, and stored neatly, allowing for real-time information updates. This is expected to maintain data accuracy and support transparency in the decision-making process within the institution.

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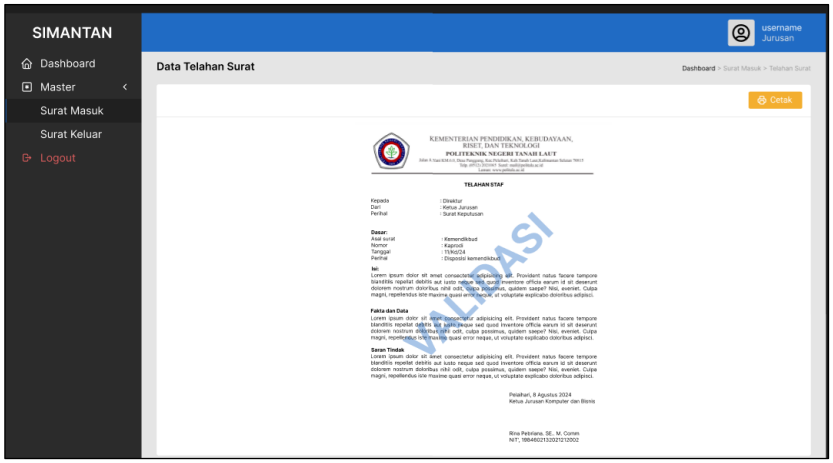

Figure 10. Staff Review Page

Figure 10 displays the interface of the correspondence information system used for managing electronic letters at Politeknik Negeri Tanah Laut. The main section shows the details of a Staff Review, complete with an official letterhead and a VALIDATION SI stamp, indicating that the letter has been validated. The system also provides a feature for printing the letter.

DISCUSSION

Testing

The testing conducted in this study used black box testing and user acceptance testing for the correspondence information system. This testing is conducted to assess the functionality of the system. The results of the system testing with black box testing can be seen in Table 4.

Table 4. Black Box Testing

No.	System Features	Test Scenarios	Expected Results	Test Results
1.	Login	Entering the wrong email or password	The system remains on the login page and displays a warning message	Valid
2.	Login	Entering the correct email or password	The system will enter the main page according to its respective access rights	Valid
3.	View Dashboard	Selecting the dashboard menu	Displaying the dashboard page	Valid
4.	View incoming mail	Selecting the incoming mail menu	Displaying the incoming mail page	Valid
5.	Add incoming mail	Entering data and pressing the save button to add incoming mail data	The system adds data and displays the message that the data was successfully added	Valid
6.	Edit incoming mail	Changing data and pressing the save button to change incoming mail data	The system changes data and displays the message that the data was successfully changed	Valid
7.	Delete incoming mail	Pressing the delete button on one of the incoming mail data	The system deletes data and displays the message that the data was successfully deleted	Valid
8.	View outgoing mail	Selecting the outgoing mail menu	Displaying the outgoing mail page	Valid
9.	Add outgoing mail	Entering data and pressing the save button to add outgoing mail data	The system adds data and displays the message that the data was successfully added	Valid
10.	Edit outgoing mail	Change data and pressing the save button to change outgoing mail data	The system changes data and displays the message that the data was successfully changed	Valid
12.	Delete outgoing mail	Pressing the delete button on one of the outgoing mail data	The system deletes data and displays the message that the data was successfully deleted	Valid
13.	View staff reviews	Selecting the staff review menu	Displaying the staff review page	Valid

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14.	Add staff reviews	Entering data and pressing the save button to add staff review data	The system adds data and displays the message that the data was successfully added	Valid
15.	Edit staff reviews	Change data and pressing the save button to change staff review data	The system changes the data and displays a message that the data has been successfully changed	Valid
16.	Delete staff reviews	Pressing the delete button on one of the staff review data	The system deletes the data and displays a message that the data has been successfully deleted	Valid

The second test was conducted to test the Correspondence Management Information System with the Code Igniter Framework using the User Acceptance Testing method with respondents of 4 study program staff, 1 department administrator and 1 director staff. The assessment weights on the UAT are Strongly Disagree (SD) = 1, Disagree (D) = 2, Neutral (N) = 3, Agree (A) = 4, and Strongly Agree (SA) = 5. The results of the User Acceptance Testing (UAT) can be seen in Table 5.

Table 5. User Acceptance Testing Results

No	Question	Respondent Value					Weight	Persentase
		SD	D	N	A	SA		
1.	The appearance of this simantan website is attractive				6		24	80%
2.	The menu and features of this simantan website are easy to understand?				4	2	26	86%
3.	Is the use of writing color with the background appropriate?					6	30	100%
4.	Is the use of writing (font) easy to read?				4	2	26	86%
5.	Navigation in the correspondence system is intuitive and easy to use				4	2	26	86%
6.	The process of entering letter data into the system is fast and simple				6		24	80%
7.	The speed of the system in processing and managing letters is adequate				6		24	80%
8.	The correspondence system rarely experiences disruption or downtime			2	4		22	73%
	Total Persentage							83,87%

Table 5 shows that the respondents' assessments vary greatly. It is known that the total number of respondents is 6 people. The weight column is the multiplication of the number of respondents by the assessment weight. While the percentage is the average value of respondents divided by the maximum weight which is then multiplied by 100% as in the following equation.

$$Persentage = \frac{weight/responden}{maximum\ weight}\ x\ 100\%$$

The total percentage of user acceptance testing reached 83.87%. Respondents expressed the highest level of agreement with the statement regarding the compatibility of text color with the background, indicating satisfaction with the visual design of the system. However, the lowest percentage of about 73% was related to the statement "the system rarely experiences downtime." This lower rating reflects the fact that network problems sometimes disrupt the functionality of the information system, highlighting important areas for improving system reliability and infrastructure stability. The remaining statements received percentages greater than or equal to 80%.

CONCLUSION

The web-based Correspondence Management Information System (SiMantan) was developed to enhance the efficiency of administrative correspondence processes by providing electronic document management and real-time tracking of incoming and outgoing mail, assignment letters, and staff reviews. The correspondence management system was successfully designed using Unified Modeling Language (UML), specifically for use case diagrams. This system was developed using the PHP programming language, MySQL database, and the CodeIgniter framework.

With a simple interface, users can easily navigate and understand all its features. Functional testing through the black box method confirmed that all features are valid and work as intended. In addition, user acceptance testing

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showed a satisfaction rate of around 83.87%, indicating that the system largely meets user needs, but still leaves room for further improvement to improve the usability and robustness of the system.

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