The Design and Implementation of a Web-Based Mosque Information System (Case Study at Sirothol Mustaqim Mosque, Manukan) Using *Requirement Prototype* Approach

Dhany Novaris Maulana[1*] , I Gede Wiarta Sena[2] , Alexander Wirapraja[3]

[1,2,3]Department of Information Systems, Faculty of Computer Science, Institut Informatika Indonesia
[*]Corresponding Author:
Email: dhenynovaris@gmail.com

Abstract.

Mosques play a broad role not only as places of worship, but also as centres for educational, social, and community empowerment activities. However, manual management of mosque activities often leads to problems such as irregular activity schedules, limited information dissemination, and weak communication between administrators and congregations. This study aims to design and develop a web-based Mosque Activity Information System at the Sirothol Mustaqim Manukan Mosque to support more structured, efficient, and integrated management of mosque activities. The development method used is Requirement Prototyping, which consists of ex ante, execution, and expost execution stages, ensuring the system is developed based on user needs. The resultant system efficiently manages data regarding worship schedules, da'wah initiatives, imam and khatib timetables, mosque finances, and administrative documentation, while enhancing communication between administrators and congregants through prompt dissemination of information and activity alerts. The User Acceptance Testing (UAT) results indicated high user acceptance, with all participants rating their experience as either fairly good or very good. Consequently, the developed system is deemed suitable for implementation and has the potential to be applied in the management of mosques with analogous requirements.

Keywords: *Mosque Information System; Requirement Prototyping; Web-Based Application; User Acceptance Testing and Mosque Activity Management.*

I. INTRODUCTION

A mosque is not only a place of worship in the literal sense; it also serves many other purposes. Mosques not only serve as places of worship but also host other activities such as education, learning, guidance, community empowerment, and the celebration of important days. Mosques can also serve as venues for social activities. Several recent studies show that mosques serve as centres for religious, educational, and social activities that contribute directly to community development [1]. Mosques certainly have a schedule of events held at specific times, based on their functions. As social organisations, mosques require a structured management system to ensure all activities run effectively and sustainably [2].A group of individuals who collaborate to fulfill the requirements and interests of an organization or community institution is referred to as an organization or community institution. They collaborate to provide services to customers or communities that require them. Given the circumstances, the use of information technology is undoubtedly crucial to accelerating the activities currently underway. Research conducted between 2021 and 2024 found that manual mosque management often leads to issues with data recording, scheduling, and information dissemination to congregations [3]. In many mosques, activities are still organized manually, leading to irregularities and inefficient communication with congregations.Although several applications serve to remind users of prayer times, most are not related to the mosque's overall activities. The lack of an integrated mosque information system results in weak internal coordination and poor communication effectiveness between administrators and congregations [4]. An integrated system is necessary to manage these functions effectively.

A system that can adapt to the ever-evolving requirements of the community is needed. Recent studies have shown that implementing a web-based mosque information system can improve administrative efficiency, transparency, and accessibility of services for congregants [5]. In addition, the digitisation of mosque management has been shown to expand the reach of information services and strengthen

congregational involvement in mosque activities [6]. Therefore, integrating information technology into mosque management has become a strategic necessity for modern mosque management [7]. With advances in information technology, web-based systems have been proposed as a platform for improving efficiency, transparency, and accessibility in mosque management [8]. According to another study, the implementation of digitalization in mosque management has the potential to make a positive contribution to mosque administration, improve internal communication, and expand services to congregations [9]. According to Trianto's (2023) research at IKADO, the implementation of web-based information systems in community service institutions has the potential to enhance administrative order, transparency in data management, and the efficiency with which information is delivered to service users [10].In a study on the development of a web-based activity system for mosques in Central Java, it was found that manual recording remains time-consuming and challenging to process activity data, underscoring the need for an easily accessible system for administrators and congregations [11].

In addition, research conducted on web-based mosque accounting systems demonstrates that web platforms make it possible to manage mosque funds in real time and increase the level of financial transparency [12]. Methods of software development, particularly those that make use of prototyping, are effective in the context of web development. Prototyping is a method that enables the creation of initial prototypes to be tested and evaluated quickly before the whole development process begins [13]. Research indicates that User Acceptance Testing (UAT) has greater informational value when conducted during the prototype stage rather than after the system is fully completed [14]. It is in reference to user acceptance.Based on this explanation, it can be concluded that there is still a difference between the demands of modern mosque management and the actual conditions at the Sirothol Mustaqim Manukan Mosque, which still uses a manual management system. Therefore, this study aims to design and build a web-based information system that seeks to facilitate the management of mosque activity schedules. The developed system is expected to organise the schedules for congregational prayers, recitations, Friday sermons, and various other social activities in a more organised and efficient manner, provide a systematic scheduling and selection mechanism for preachers, and improve communication between administrators and congregations by delivering timely notifications.With the implementation of this system, the potential for errors and irregularities in activity scheduling can be reduced while increasing participation and the quality of service to congregants.

To strengthen the conceptual basis, this study reviews previous studies relevant to web-based information system development. These studies serve as comparative references and a basis for determining the direction of growth and innovation in this study. This study reviews several previous studies that serve as the primary references for the preparation of the final project journal. One of the studies used as a reference is entitled "Designing *a Website-Based* Mosque Management Information System (Case Study: Al-Muttaqin Ketaping Mosque)" conducted by Fauzan, R. Y., Wahyudi, R., Fahreza, M., Putra, R. R. E., and Falah, M. F. (2024). This research identified the main problems in manual administration and information delivery, leading to low transparency and reduced management efficiency. This research aimed to develop a web-based mosque management information system to streamline the management of congregation data, finances, activity schedules, and mosque announcements in a more organized and accessible way. This system aims to enhance the transparency and accountability of mosque management. The employed development methodologies include needs analysis, system design using the System Development Life Cycle (SDLC) framework, and web-based implementation with PHP, MySQL, and the Laravel framework. Simultaneously, the investigation into the Sirothol Mustaqim Mosque Information System offers precise activity notification features and mechanisms for congregants to submit feedback, providing a basis for assessing and enhancing future mosque initiatives.

The following study, entitled "Development of the Darul Arham Mosque Information System Using the V-Model Method and *User Acceptance Testing* (UAT)", focuses on improving the existing information system to provide more complete and valuable information to the community, especially for managing mosque activities. The main objectives of this research include reducing reliance on manual data processing, improving the efficiency of mosque financial management, facilitating community access to information,

and enhancing the overall effectiveness of mosque administration. The system development process was carried out using the V-Model, while the system evaluation stage used the *User Acceptance Testing* (UAT) approach. The implementation of this web-based information system aims to meet the requirements of the administrators and congregation of the Darul Arham Mosque optimally, yielding tangible benefits such as enhanced financial management, improved access to information, and more organized, systematic data processing. This research further enhances comprehension of the application of the V-Model and UAT methodologies in the development of information systems for religious institutions. The Sirothol Mustaqim Mosque Information System prioritizes the dissemination of precise information on Friday khatib scheduling and activities by issuing notifications to both the khatib and the congregation regarding Friday prayers or events organized by the mosque administrators.

II. METHODS

The *Requirement Prototyping* method was developed by developers based on user requirements, including system functions and procedures. The steps for implementing prototyping based on user requirements were as follows:

A. *Ex ante Execution*: the initial stage of the requirements identification process, during which a series of activities is carried out to identify user requirements [16]. At this stage, the researcher conducted interviews with the administrators and congregation of the Sirothol Mustaqim Manukan mosque regarding the problems faced and analysed user requirements, including the tools and methods used. Based on the analysis results, *the prototype* design was created.

B. *Execution*: At this stage, a description of the prototype data entry, system features, and application management to be developed is provided. In addition, it covers the completeness of the forms or entries required in the application components, as well as graphic design visualisations that include elements such as lines, shapes, and other components [17]. At this stage, the researcher designed the interface for all features of the Sirothol Mustaqim Mosque Information System.

C. *Expost Execution*: At this stage, the prototype developer describes the design using transcripts from video or audio recordings obtained from sources, which are then converted into an interface display or presented in report format[18].

III. RESULT AND DISCUSSION

A. Analysis of the System to be Developed

This stage contains the system design based on the needs analysis conducted. Then, the system design will be implemented by creating *a Data Flow Diagram* (DFD), *an Entity Relationship Diagram* (ERD), a *Conceptual Database Model* (CDM), *a Physical Database Model* (PDM), and a System Design.

B. Hardware Requirements

The hardware used to develop the mosque information system supports a smooth application development and testing process. The hardware specifications used include an Intel Core i5 processor as the central processing unit, 16 GB of *Random Access Memory* (RAM) to support system performance, and a 64 GB *Solid State Drive* (SSD) storage medium.

C. Software Requirements

The software required for developing the mosque information system includes several supporting applications: Windows 11 64-bit as the primary platform, XAMPP as a local server, Google Chrome for testing web-based applications, and Visual Studio Code as a programming tool.

D. User Requirements

User requirements are the stage of identifying user needs in the design of mosque activity information applications through the requirements and analysis process. At the requirements stage, development provides various data related to the design of the mosque activity information system. The mosque activity information application display media offers the following information delivery functions:

1. There is information on prayer times.
2. There is a table for conveying weekly infaq information.

3. There is content to convey study information.
4. There is content for conveying the schedule of prayer leaders and Friday prayer officers.

E. System Design

1. Data Flow Diagram

The diagram below illustrates the data flow within the developed mosque information system. This diagram depicts the interaction between two external entities—the administrator and the user—and the system. The administrator serves as the primary coordinator, overseeing mosque management data, letter templates, documents, travel authorization letters, meeting minutes, imam schedules, ustad data, khatib schedules, study records, and financial information. Meanwhile, users can access mosque-related details, including economic data, imam schedules, and khatib schedules.

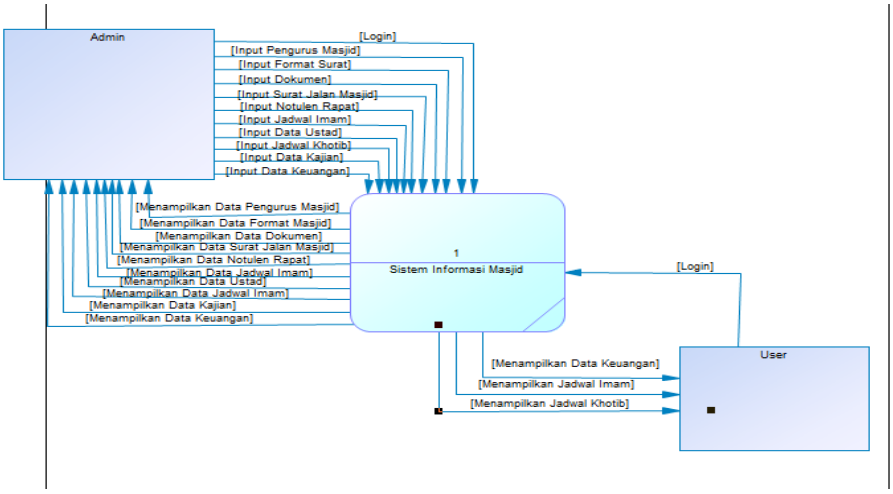

Fig 1. Data Flow Diagram

2. Entity Relationship Diagram

The diagram below shows *the entity relationship diagram* (ERD) explaining the database structure in the mosque information system. The ERD clarifies the relationship between entities and databases, such as the Administrator who is responsible for inputting mosque administrators, letter formats, documents, mosque travel letters, meeting minutes, imam schedules, ustad data, khatib schedules, study data, and financial data. *Users* can view the mosque's income and expenditure, the imam schedule, the khatib schedule, and the themes of the lectures delivered.

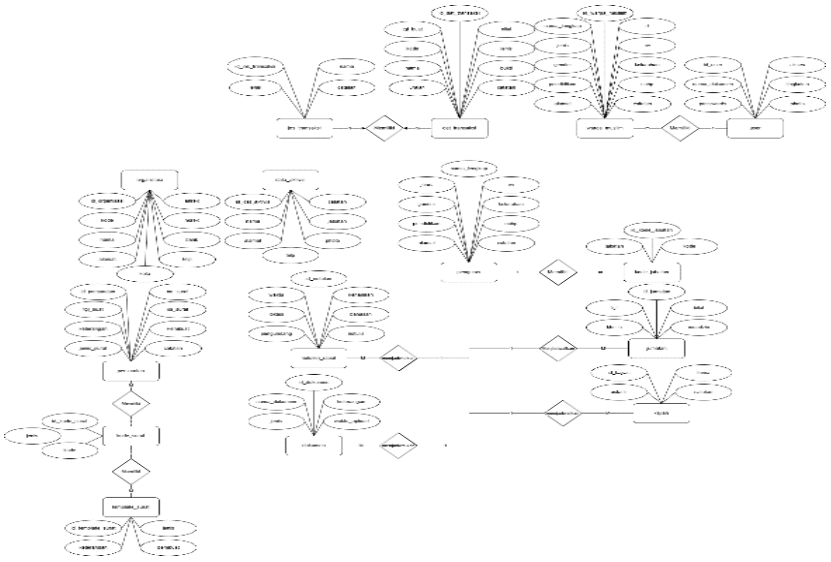

Fig 2. Entity Relationship Diagram

3. Conceptual Data Model

The image below provides a conceptual overview of the structured interconnection between data in the system. This model serves as a bridge between needs analysis and technical database design, ensuring that all recorded data support one another for scheduling, transactions, and documentation.

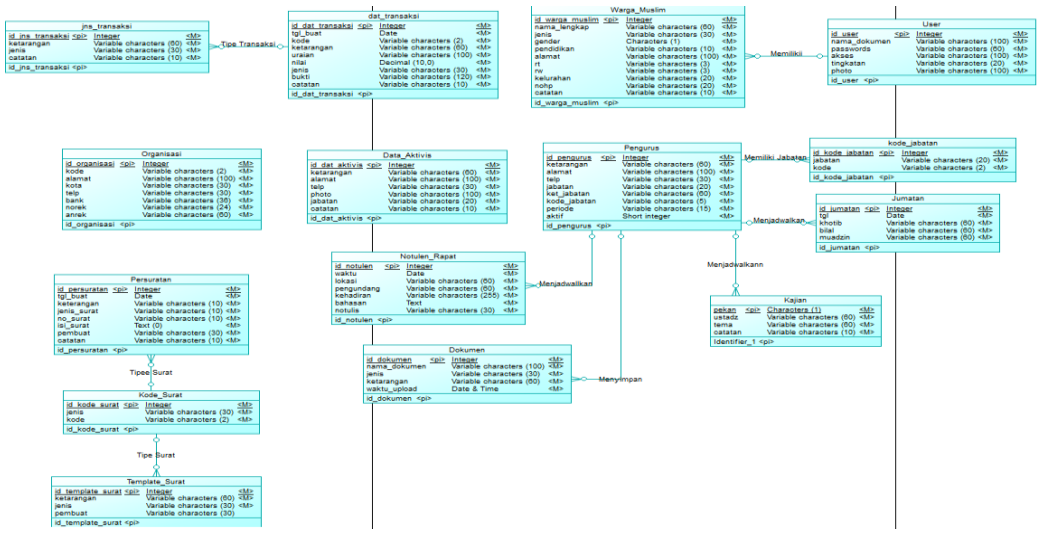

Fig 3. Conceptual Data Model

4. Physical Data Model

The image below shows a detailed representation of the database design in physical form. This model contains table structures, attributes, relations, and primary and foreign keys used in database implementation. PDM is a direct reference in the system development stage because it provides the technical details needed for actual data storage and processing.

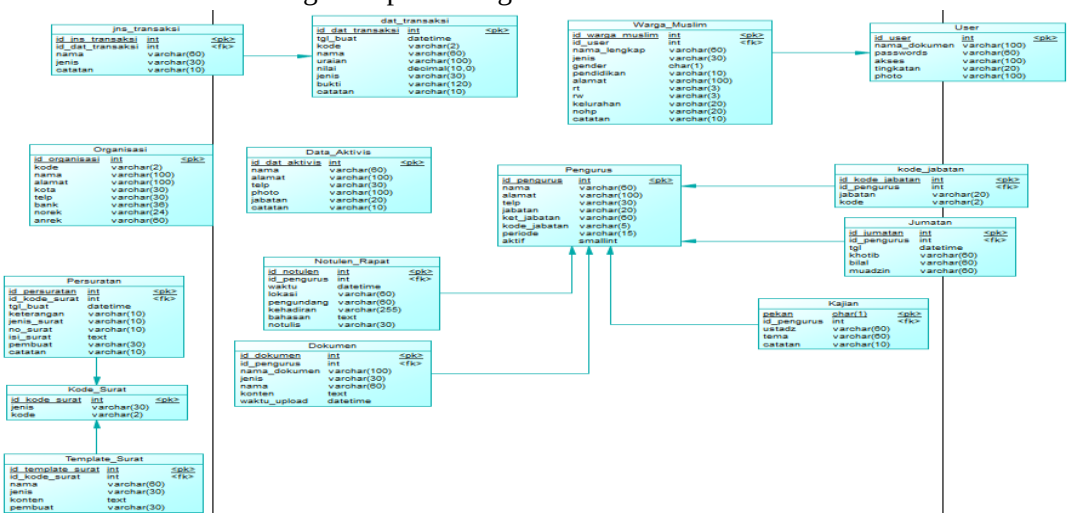

Fig 4. Physical Data Model

F. User Interface Design

1. User Interface Login Page

The following is the user interface design for the Login page.

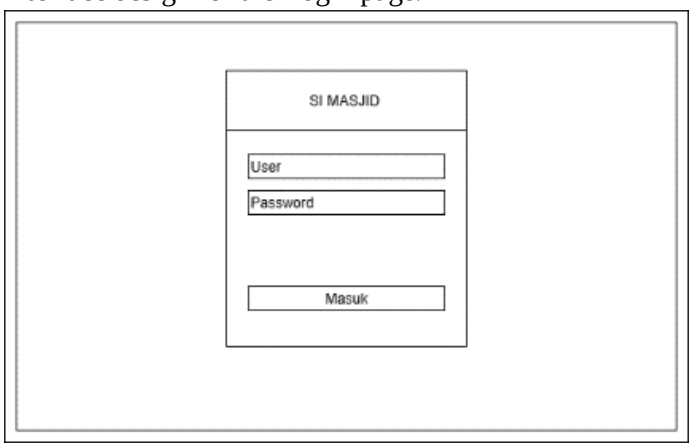

Fig 5. Login Page User Interface

2. Dashboard Page User Interface

The following is the user interface design for the Dashboard page.

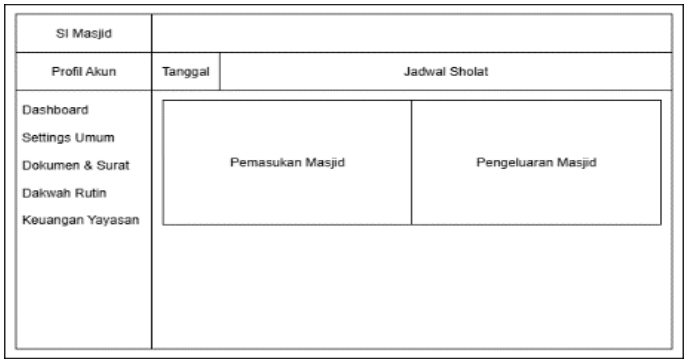

Fig 6. Dashboard Page User Interface

3. User Interface for the Mosque Profile Page ( )

The following is the user interface design for the mosque profile page.

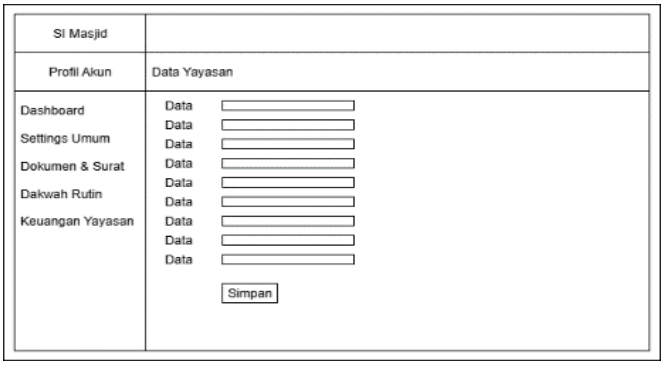

Fig 7. User Interface for the Mosque Profile Page

4. Mosque Management Page User Interface

The following is the user interface design for the mosque administrators' page.

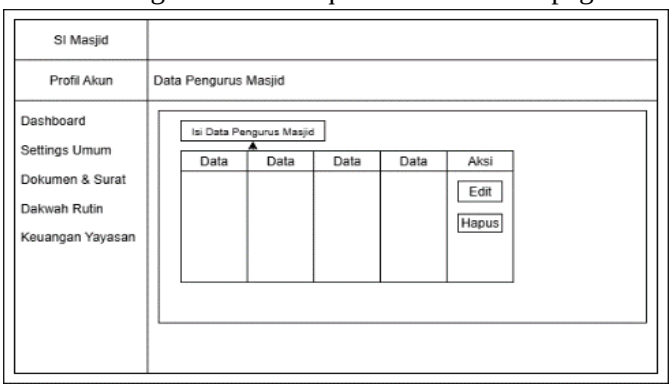

Fig 8. User Interface for the Mosque Management Page

5. Letter Format Page User Interface

The following is the user interface design for the letter format page.

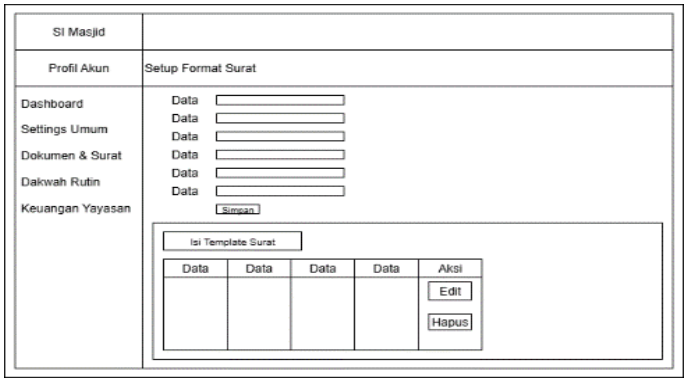

Fig 9. User Interface for the Letter Format Page

6. Document Access Page User Interface

The following is the user interface design for the document access page.

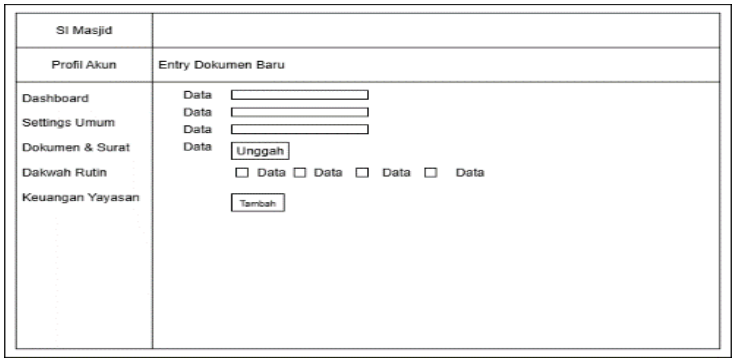

Fig 10. Document Access Page User Interface

7. User Interface for the Mosque Travel Letter Page

The following is the user interface design for the mosque travel letter page.

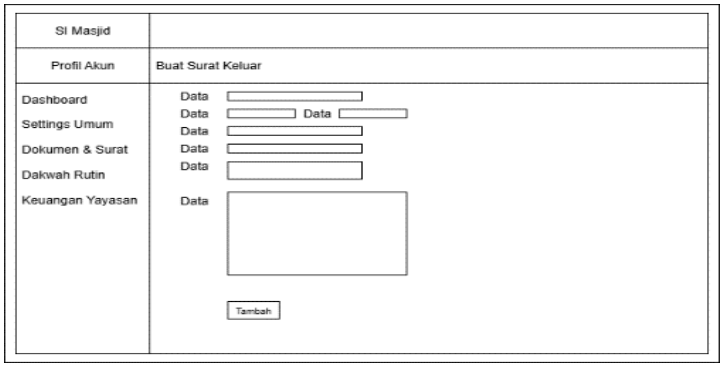

Fig 11. User Interface for the Mosque Travel Letter Page

8. Minutes Page User Interface

The following is the user interface design for the meeting minutes page.

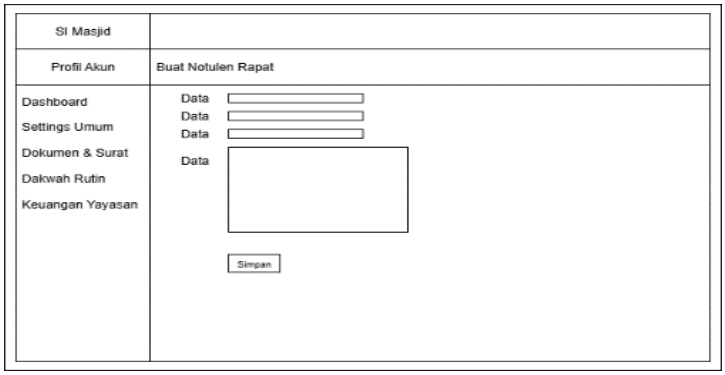

Fig 12. Meeting Minutes Page User Interface

9. User Interface for the Imam Schedule Page

The following is the user interface design for the Imam Schedule Page.

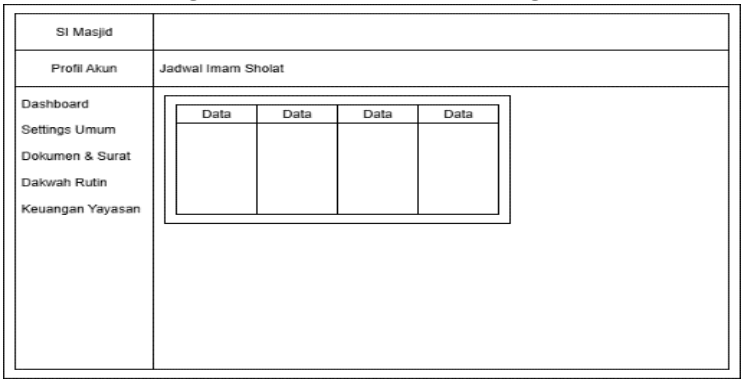

Fig 13. Imam Schedule Page User Interface

10. User Interface for the Ustad List Page

The following is the user interface design for the ustad list page.

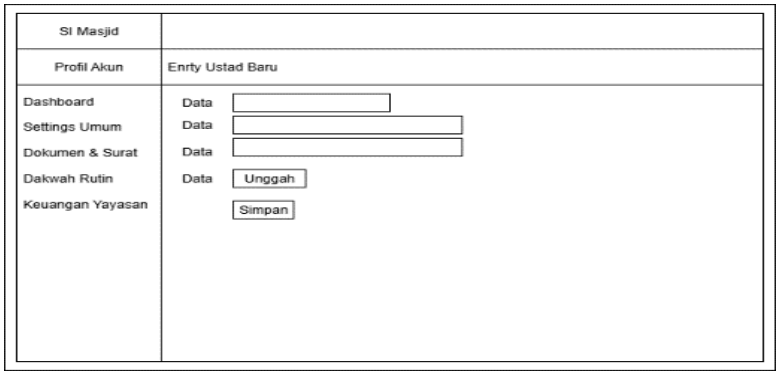

Fig 14. User Interface for the Ustad List Page

11. User Interface for the Khotib Schedule Page

The following is the user interface design for the khatib schedule page.

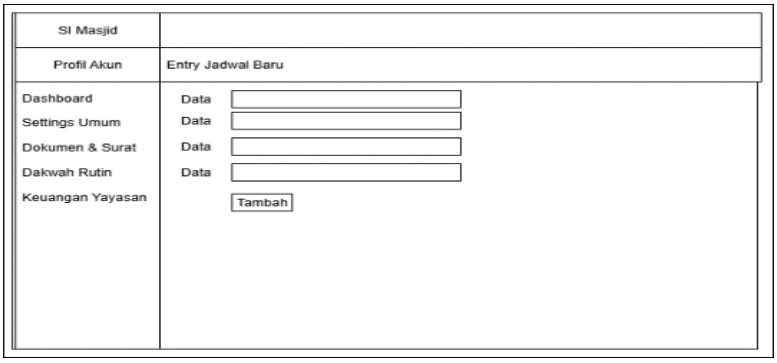

Fig 15. User Interface for the Khotib Schedule Page

12. User Interface for the Study List Page

The following is the user interface design for the study list page.

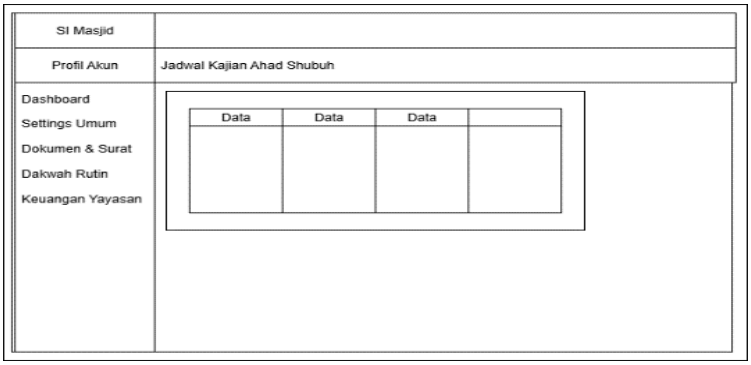

Fig 16. User Interface for the Study List Page

13. Foundation Finance Page User Interface

The following is the user interface design for the foundation's finance page.

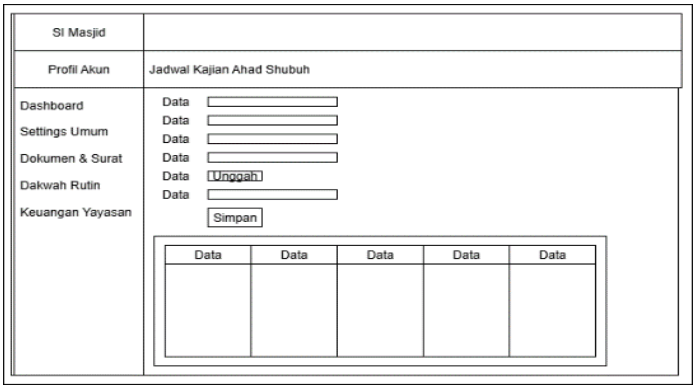

Fig 17. Foundation Finance Page User Interface

G. Implementation

1. Login Page Display

The following is the login page, which includes fields for entering a username and password, followed by a login button to log in as an administrator or a user. There is also a login button to open the mosque information system dashboard display.

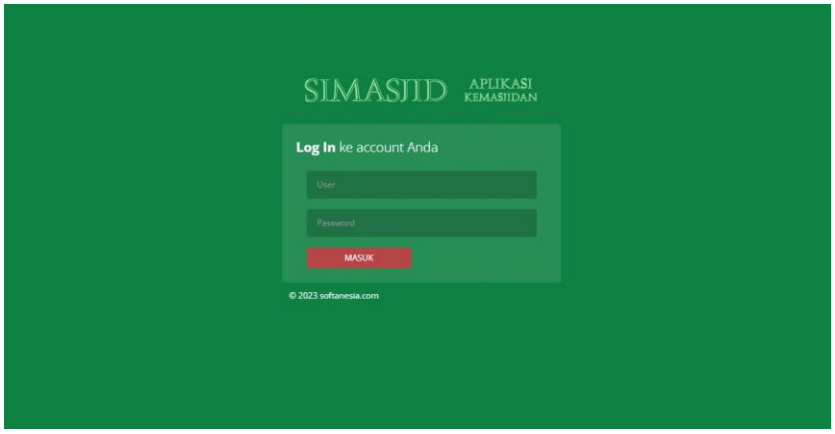

Fig 18. Login Page Display

2. Dashboard Page Display

The following is the dashboard page display that appears after logging in, showing the prayer schedule, mosque income and expenses, and the dashboard on the left side, which includes general settings, documents & letters, regular da'wah activities, and foundation finances.

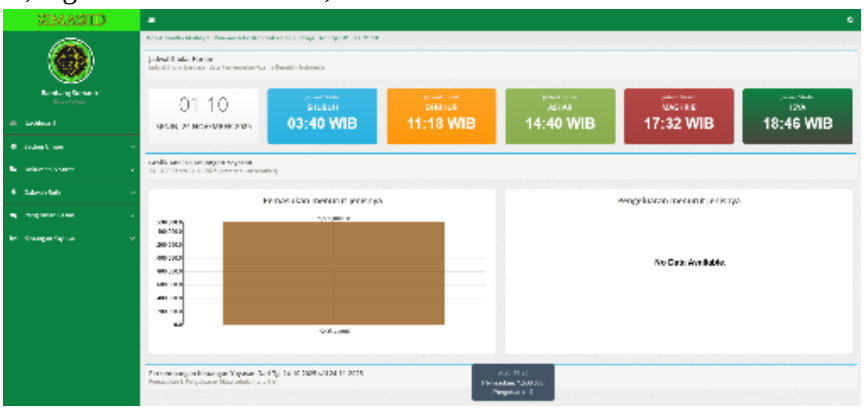

Fig 19. Dashboard Page Display

3. Mosque Profile Page Display

The following is the mosque profile page, which includes a "Save Input" button to configure the mosque profile.

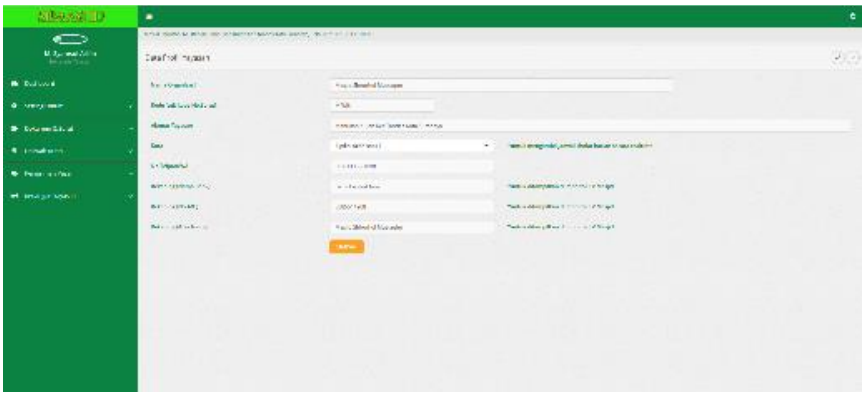

Fig 20. Mosque Profile Page Display

4. Mosque Administrator Page Display

The following is the mosque administrator's page display, which includes a new administrator entry button, an edit button, an update button, and a delete button.

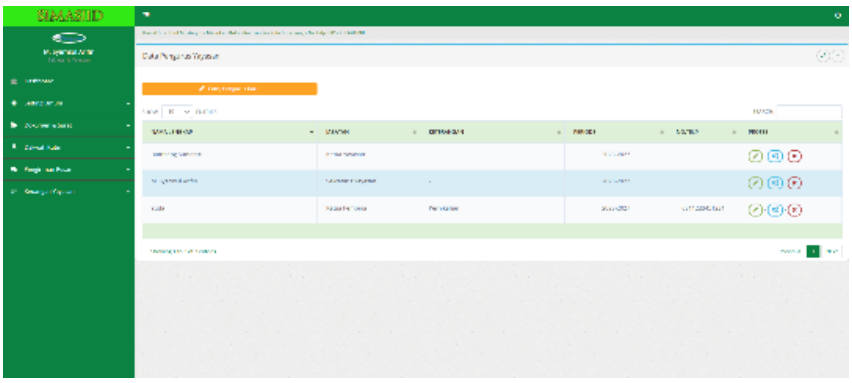

Fig 21. Mosque Administrator Page Display

5. Letter Format Page Display

The following is the letter format page display, which includes a Save Settings button, a Create New Template button, an Edit button, and a Delete button.

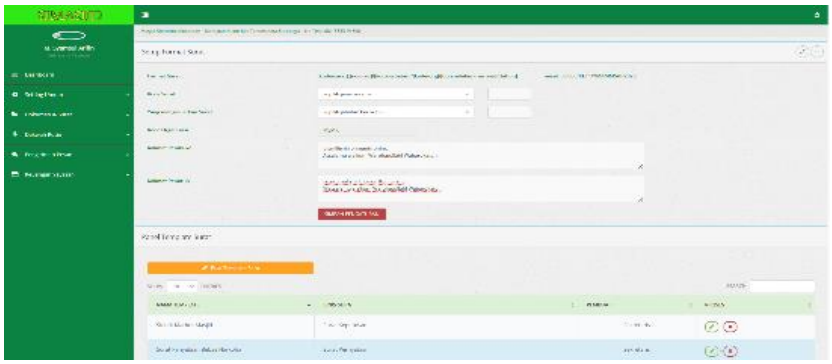

Fig 22. Letter Format Page Display

6. Document Access Page Display

The following is the document access page display, which includes an add button, a browser button, and a user checkbox.

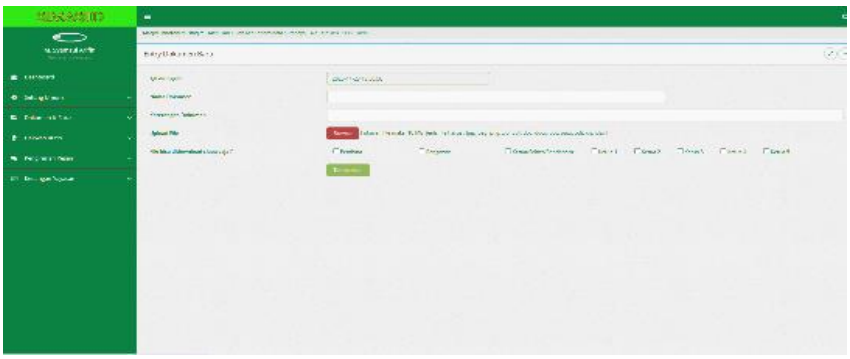

Fig 23. Document Access Page Display

7. Mosque Letter Page Display

The following is the mosque travel letter page display, which includes a new travel letter entry button and a save letter button.

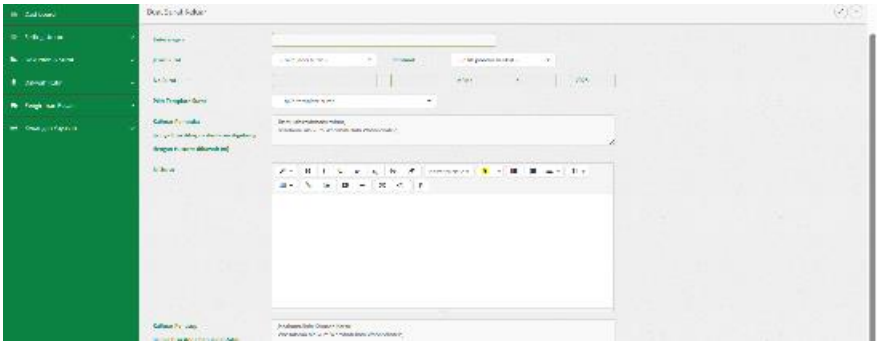

Fig 24. Mosque Travel Document Page Display

8. Meeting Minutes Page Display

The following page displays the meeting minutes, including a save button.

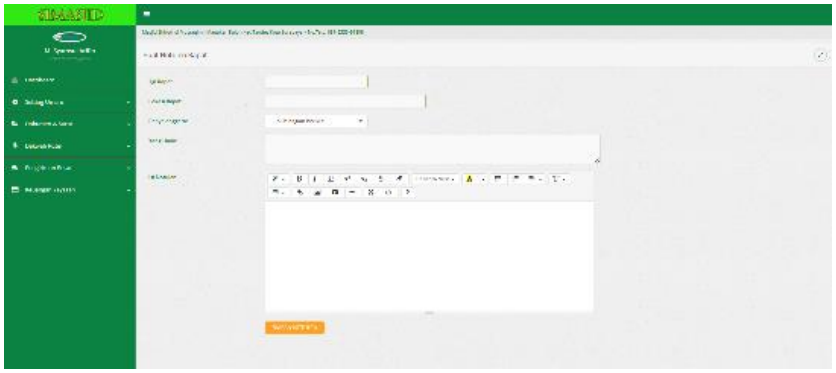

Fig 25. Meeting Minutes Page Display

9. Imam Schedule Page Display

The following is the Imam Schedule Page display, which includes an edit button to change the Imam and the substitute Imam.

Fig 26. Imam Schedule Page Display

10. Ustad List Page Display

The following is the display of the ustad list page, which includes a browser button for uploading images and an add ustad button.

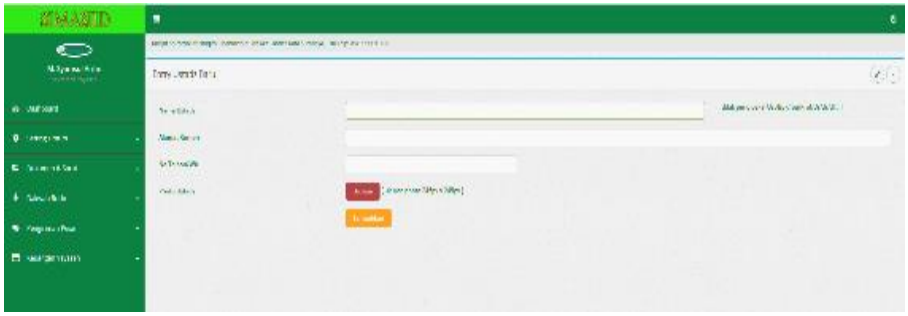

Fig 27. Ustad List Page Display

11. Imam Schedule Page Display

The following is the khatib schedule page display, which includes an add button for adding schedules and khatib names.

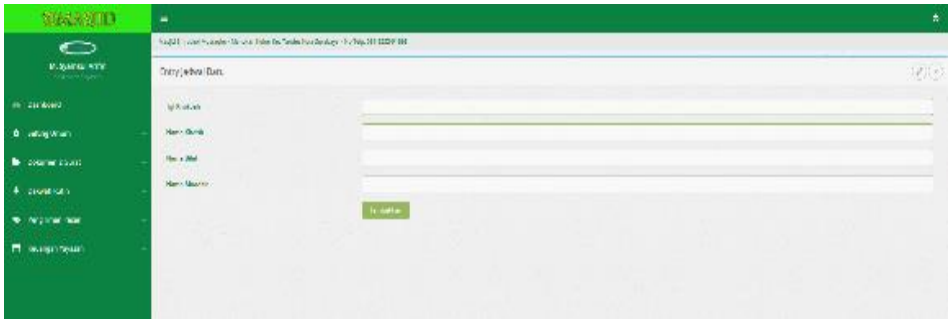

Fig 28. Khotib Schedule Page Display

12. Study List Page Display

The following is the view of the study list page, which includes an edit button to modify the ustadz and the study topic.

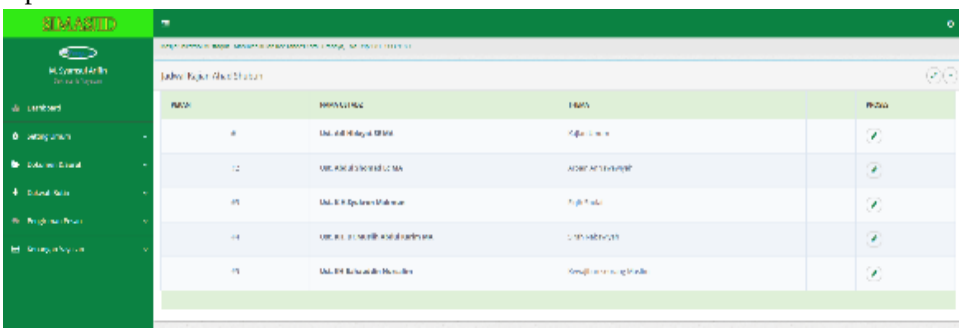

Fig 29. Study List Page Display

13. Foundation Finance Page Display

The following is the foundation's financial page display, which includes a browser button for uploading transaction receipts for expenditures and a save data button for updating income and expenditure data.

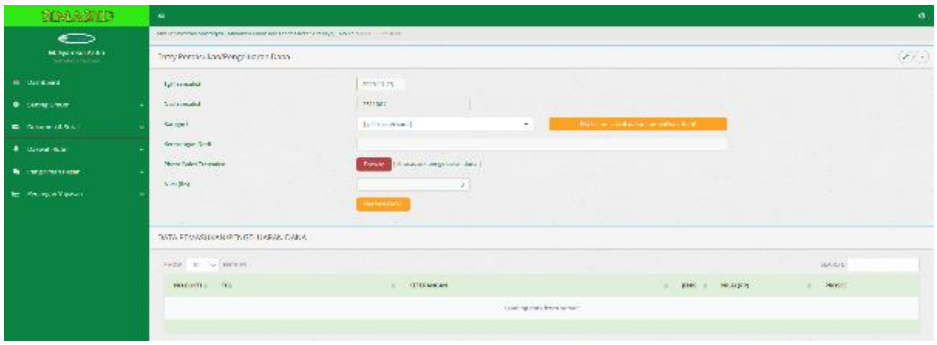

Fig 30. Foundation Financial Page Display

H. System Testing

Software testing focused on testing the appearance (design), features, and user satisfaction of the Mosque Information Application. The image below shows the results of *the User Acceptance Test* (UAT) evaluation, which found that the Mosque Activity Information System generally met user expectations. The UAT data processing results show that all respondents rated the system as pretty good (16 votes) or outstanding (24 votes), resulting in a user acceptance rate of 100%, and no respondents rated it as unacceptable. The UAT data processing results indicate that the mosque information system is well accepted. The features provided received high ratings from the congregation, with 91% rating them highly. However, the interface design and user satisfaction received the lowest scores of 88%, indicating that there are still limitations that need improvement.

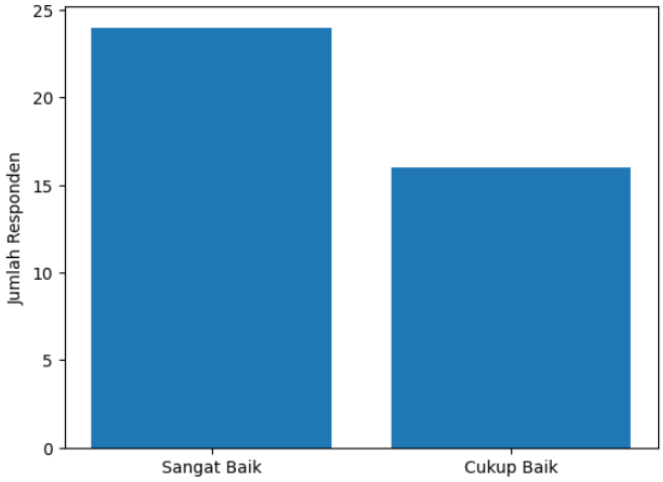

Fig 31. System Testing

IV. CONCLUSION

To facilitate more organized, integrated management of activities at the Sirothol Mustaqim Manukan Mosque, this research developed a Mosque Activity Information System deployed on the web using the Requirement Prototyping method. The system developed can manage information on worship schedules, da'wah activities, administrators, finances, and administrative documents. Additionally, it can improve communication between administrators and congregants by delivering timely information and notifications. The results of the *User Acceptance Testing* (UAT) evaluation indicate that all the system's primary functions meet user needs and that user acceptance is excellent, with all respondents rating it in the 'pretty good' and 'excellent' categories. Thus, the developed system is declared feasible for use and has the potential to be applied to the management of mosques with similar needs.

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