



## Utilizing Web Engineering to Build a Savings and Loans Information System in A Plasma Pratama Mandiri Cooperative

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### Abstract

The Plasma Pratama Mandiri Cooperative operates in the field of savings and loan fund services for its members. However, the cooperative faces significant challenges due to its reliance on conventional, archive-based systems for processing savings transactions, loans, installments, and report preparation. These outdated methods result in time-consuming data searches and inefficiencies. To address this issue, the aim of this study is to develop a more efficient and computerized savings and loan information system for the Plasma Pratama Mandiri Cooperative. The study employs the Web Engineering method, encompassing stages such as communication, planning, modeling, construction, and deployment, with system modeling conducted using the Unified Modeling Language (UML). The outcome of this research is the development of an Android-based savings and loan information system for cooperative members and a web-based system for cooperative administrators. This new system facilitates online management and significantly enhances service efficiency for cooperative members.

**Keywords:** Information Systems, Cooperatives, Savings and Loans, Web Engineering.

## 1 INTRODUCTION

The Plasma Pratama Mandiri Cooperative, like many other financial cooperatives, relies heavily on efficient processing of member savings, loan, and installment transactions. The necessity for fast and accurate information is paramount to support decision-making processes, ensuring the cooperative's operational objectives are met. However, the current system in place faces significant challenges and shortcomings due to its reliance on conventional, manual data processing methods. This often results in human errors, lengthy recording, and calculation processes, ultimately leading to delays and inaccuracies in report preparation [1].

Currently, data processing services for savings transactions, loans, installments, and report preparation still utilize archaic systems, resulting in data being recorded



in physical archives. This manual approach is not only time-consuming but also prone to errors due to the large volume of data handled. Furthermore, the physical storage of documents leads to challenges in quick data retrieval, making it difficult to maintain efficient operational workflows [2]. The reliance on manual systems hinders the cooperative's ability to quickly adapt to changing member needs and market conditions, creating a significant gap in operational efficiency.

To address these issues, it is imperative for the cooperative to adopt a professional management approach through proper data processing. With advancements in technology, there is a critical need for a computerized and integrated system to streamline the processing of savings, loans, and installment data for cooperative members [3]. Such a system would enhance accuracy in information compilation, improve cooperative performance, and ensure data is securely stored in an accessible database. The gap between the current manual systems and a potential automated solution represents a significant opportunity for improvement. By implementing a web-based information system, the cooperative can not only reduce errors and improve efficiency but also provide real-time data access to its members and management [4].

This study aims to develop a Savings and Loans Information System using web engineering principles to overcome the current inefficiencies. By leveraging technology, the cooperative can achieve optimal performance and reliability in managing its financial operations, thus supporting its sustainability and growth [5].

## 2 METHODS

The research method used in this study is web engineering, a robust framework designed for the systematic development of web-based systems. This method is structured into several critical phases: Communication, Planning, Modeling, Construction, and Deployment, as shown in Figure 1.

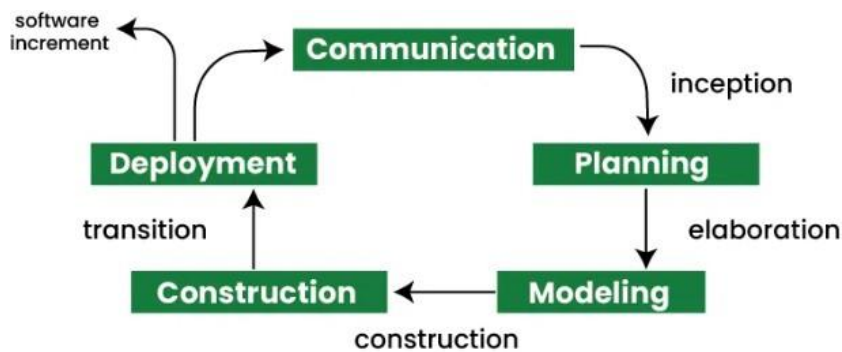


Figure 1. Web Engineering Process

## **2.1 Communication**

This initial phase involves gathering requirements and understanding the needs and expectations of stakeholders. It includes activities such as interviews, questionnaires, and meetings to gather comprehensive insights into the project's scope and objectives [6]. The communication stage begins with a literature study and a review of documents and journals related to previous research. This helps to establish a foundation of existing knowledge and identify relevant insights. Following this, interviews are conducted with the administrators of the Plasma Pratama Mandiri Cooperative who are directly involved in the management of savings and loans. Additionally, the treasurer of the cooperative is interviewed. These interviews aim to gather detailed and specific information, further strengthening the foundational information necessary for this research.

## **2.2 Planning**

In this phase, the project plan is developed, outlining the tasks, timelines, resources, and milestones. Effective planning ensures that the project stays on track and that resources are optimally utilized. Tools such as Gantt charts and project management software are often employed to facilitate this process [7].

Based on the analyzed interview results, a comprehensive plan has been developed to build a system that addresses the identified problems. The functional requirements and responsibilities are clearly defined for both cooperative members and administrators. Cooperative members will have access to functionalities such as logging in and out, viewing savings data, loan data, payment data, and various reports related to their accounts. Specifically, members can view savings reports, loan reports, and payment reports.

On the administrative side, cooperative admins will have a broader range of responsibilities. These include logging in and out, managing master data (such as division data and member cards), overseeing member information, handling mandatory savings, and managing transactions, which encompass savings data, loan data, and payment data. Additionally, admins will manage user data and have the ability to add new users. They will also generate and manage comprehensive reports, including member reports, savings reports per member, period savings reports, loan reports per member, payment reports per member, and period payment reports.

Data within the system will be categorized into input and output data to streamline operations. The input data, entered by the cooperative finance admin, will include division data, member data, savings data, loan data, and payment data. The output data required from the system will be in the form of member cards, member reports, savings reports per member, period savings reports, loan reports per

member, payment reports per member, and period payment reports. This structured approach ensures that all necessary data is accurately captured and processed, facilitating efficient management and reporting within the cooperative.

### 2.3 Modeling

This phase focuses on creating models that represent the data, processes, and user interfaces of the system. Techniques such as Unified Modeling Language (UML) diagrams, wireframes, and prototypes are used to visualize and refine system components before actual development begins [8].

To develop the system design based on the planning phase, the researcher created a comprehensive activity system for the web and application using the Unified Modeling Language (UML) method. This approach includes the creation of Use Case Diagrams, which illustrate the interactions between users and the system, ensuring that all functional requirements are clearly defined and understood.

Firstly, the Use Case Diagram for cooperative members shows how members interact with the system. This diagram, depicted in Figure 2, highlights the various actions that members can perform. These actions include logging in and out, viewing their savings data, loan data, and payment data, as well as accessing various reports related to their accounts. By visualizing these interactions, the diagram helps to clarify the specific functionalities available to cooperative members and ensures that their needs are adequately addressed in the system design.

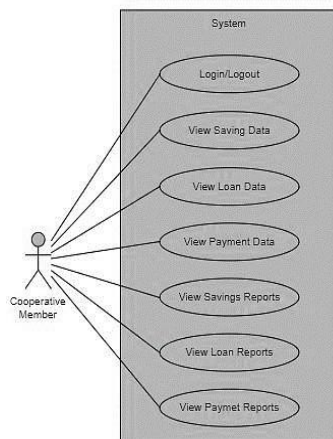


Figure 2. Use case member

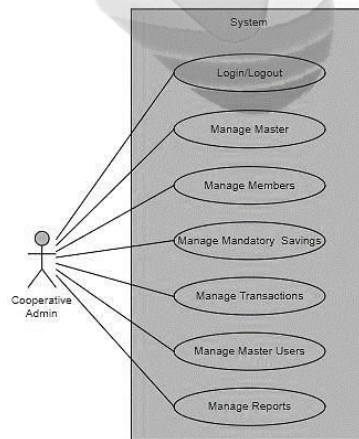


Figure 3 Use case admin

Secondly, the Use Case Diagram for cooperative admins illustrates the interactions between administrators and the system. As shown in Figure 3, this diagram includes a broader range of responsibilities for admins, such as managing master

data (including division data and member cards), overseeing member information, handling mandatory savings, and managing transactions. Additionally, admins have the capability to manage user data, add new users, and generate comprehensive reports, including member reports, savings reports per member, period savings reports, loan reports per member, payment reports per member, and period payment reports. This detailed visualization ensures that all administrative functions are clearly outlined and integrated into the system design.

These Use Case Diagrams provide a clear and structured representation of the system's functional requirements, facilitating a better understanding of how the system will operate for both cooperative members and administrators. By using UML methods, the researcher ensures that the system design is robust, comprehensive, and aligned with the needs of all stakeholders.

## **2.4 Construction**

During construction, the actual coding and development of the web application take place. This phase involves frontend and backend development, database integration, and rigorous testing to ensure that the system meets the specified requirements. Agile development practices and continuous integration/continuous deployment (CI/CD) pipelines are often used to enhance efficiency and quality [9].

## **2.5 Deployment**

The final phase involves deploying the web application to a live environment where it becomes accessible to end-users. This includes server setup, domain registration, and security configurations. Post-deployment activities such as monitoring, maintenance, and user support are also critical to ensure the system's ongoing performance and reliability [10].

# **3 RESULTS AND DISCUSSION**

## **3.1 Savings and Loans Information System**

Based on the results of the research conducted, a comprehensive application savings and loan system has been developed. The web-based system is specifically designed for cooperative admins, while the Android-based system is tailored for cooperative members. This information system is highly beneficial for efficiently processing the existing data at the Mandira Plasma Cooperative, ensuring streamlined operations and accurate data management.

To enhance work efficiency when implementing programming languages, a detailed user interface design provides a general overview of the web and Android applications. The user interface includes various pages, each serving a specific function within the system.

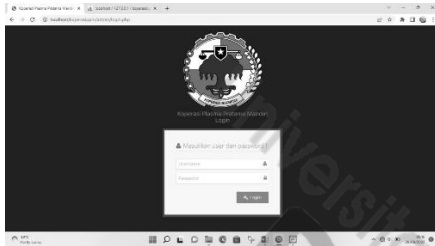


Figure 4 Login page

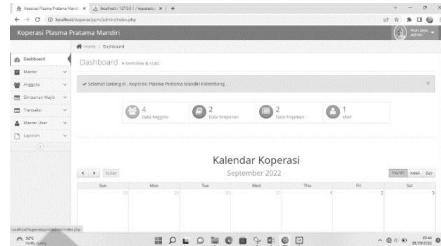


Figure 5 Dashboard page

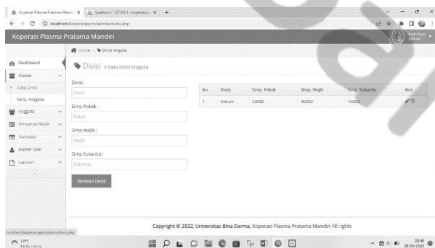


Figure 6 Division data page



Figure 7 Member card page

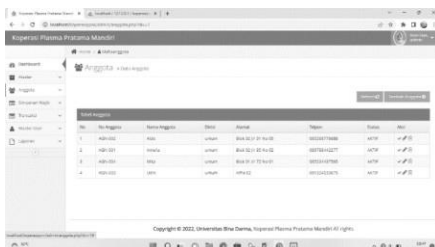


Figure 8 Member page

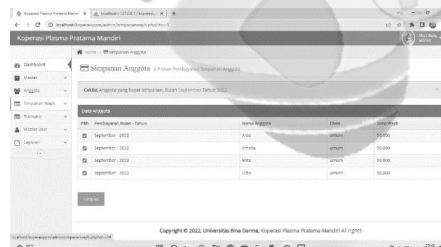


Figure 9 Mandatory savings page

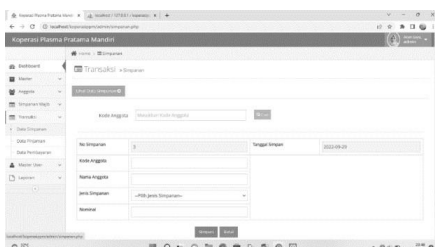


Figure 10 Save data page

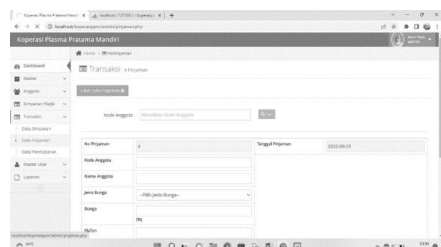


Figure 11 Loan data page

The Login Page (Figure 4) is the initial interface, featuring input fields for username and password, allowing users to securely access the system. Once logged in, users are directed to the Dashboard Page (Figure 5), which serves as the main menu. The dashboard presents several facilities, including member data management, mandatory savings, transactions, master user management, and report generation.

The Division Data Page (Figure 6) allows users to add member divisions, including basic, mandatory, and voluntary savings based on the division specified. This page facilitates organized data entry and management for various member categories. The Member Card Page (Figure 7) enables the admin to print cooperative member cards by selecting the relevant data and using the print preview function, ensuring easy access to member identification.

On the Member Page (Figure 8), the admin can add new member data by filling in details such as member number, name, division, address, and telephone. This page also allows the admin to delete members, maintaining an up-to-date member database. The Mandatory Savings Page (Figure 9) provides an interface for recording mandatory savings for members. Users can save this data efficiently by pressing the save button.

Continuing, the Save Data Page (Figure 10) allows users to add savings information for members by entering the member code, name, type of savings, and amount. Users can also view existing savings data by pressing the view savings data button. The Loan Data Page (Figure 11) enables users to add loan information by filling in the member code, name, interest rate, and loan ceiling. Viewing loan data is also possible through the view loan data button.

The Payment Data Page (Figure 12) allows users to add payment information for members who are repaying loans. Users can enter details such as member code, name, loan amount, and payment details, and view this information using the view payment data button. The User Data Page (Figure 13) displays user information, including user count, names, usernames, emails, photos, and roles (admin or member). This page also allows users to add, change, and delete user data, ensuring proper user management.

The Add User Page (Figure 14) provides an interface for adding new users by entering their name, username, email, password, role, and photo, followed by pressing the save button to store the information. The Member Reports Page (Figure 15) displays member reports, allowing users to view member names, addresses, and telephone numbers, and print member data reports using the print button.

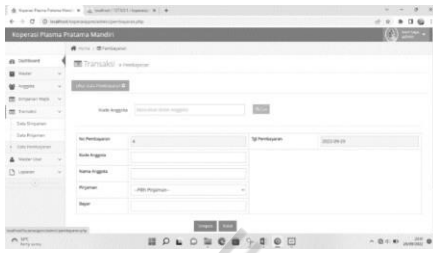


Figure 12 Payment data page

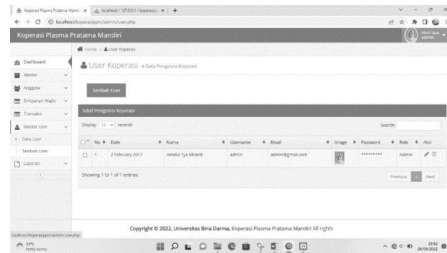


Figure 13 User data page

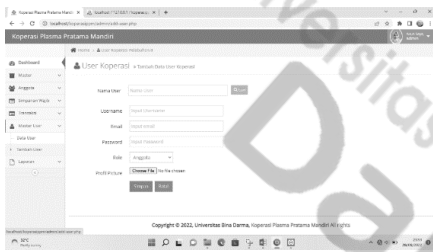


Figure 14 Add user page

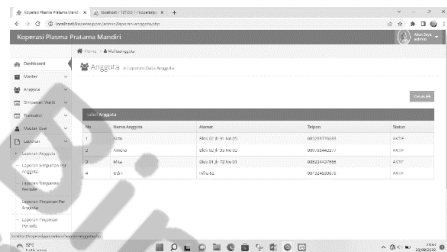


Figure 15 Members reports page

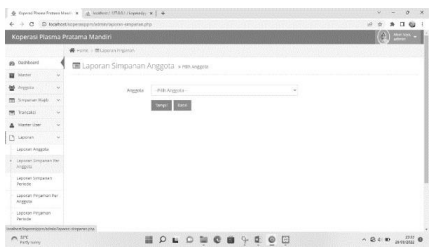


Figure 16 Member savings report page

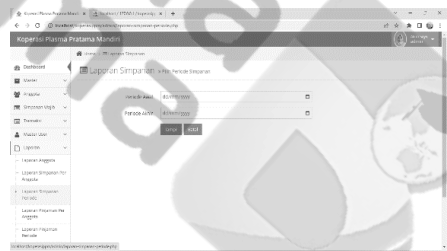


Figure 17 Period Savings report page

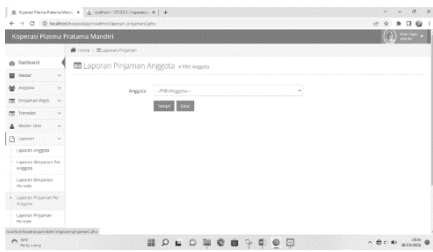


Figure 18 Member loan report

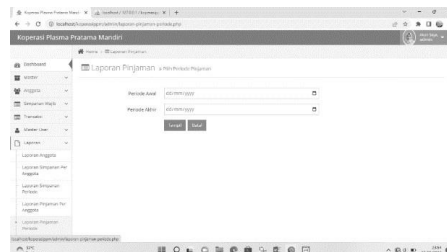


Figure 19 Period payment report page

The Member Savings Report Page (Figure 16) shows savings reports for individual members. Users can display and print these reports by entering the member's name and pressing the print button. Similarly, the Period Savings Report Page



(Figure 17) allows users to view and print savings reports based on specified start and end periods, ensuring comprehensive financial tracking.

Lastly, the Member Loan Report Page (Figure 18) and the Period Payment Report Page (Figure 19) provide detailed loan and payment reports. Users can display and print loan reports for individual members or based on specified periods, facilitating accurate financial monitoring and reporting. Overall, this system design, through its user-friendly interfaces and comprehensive functionalities, ensures efficient data processing and management for the Plasma Pratama Mandiri Cooperative.

### **3.2 Discussion**

operative marks a significant step towards modernizing its data processing and management capabilities. This system addresses the inefficiencies and challenges associated with the conventional manual methods previously employed. The introduction of this technology-driven solution is expected to enhance operational efficiency, accuracy, and overall member satisfaction.

One of the primary advantages of the new system is its ability to reduce human errors in data entry and processing. Manual systems are prone to inaccuracies due to the repetitive nature of data handling and the potential for mistakes in recording and calculations. By automating these processes, the system ensures that data related to member savings, loans, and payments is accurately recorded and promptly updated. This not only improves the reliability of the data but also frees up administrative resources for more strategic tasks.

The system's dual-platform design, with a web interface for administrators and an Android application for members, ensures that the needs of both user groups are effectively met. Administrators benefit from a comprehensive suite of tools for managing member data, transactions, and generating reports. The intuitive design of the web interface facilitates efficient navigation and use, reducing the learning curve for new users. For members, the Android application provides convenient access to their savings, loan, and payment information, enhancing transparency and engagement with the cooperative's financial services.

Another critical benefit of the system is the improved accessibility and security of data. By transitioning from physical archives to a digital database, the system ensures that data is readily accessible for authorized users while being securely stored to prevent unauthorized access. The use of secure login mechanisms further protects sensitive member information. Additionally, the system's ability to generate and print reports on demand enhances the cooperative's ability to provide timely and accurate information to its stakeholders.

However, the implementation of this system also presents certain challenges. Ensuring user adoption and proper training for both administrators and members is crucial to realizing the full benefits of the system. There may be initial resistance to change from users accustomed to the manual processes. Addressing these challenges through comprehensive training programs and continuous support will be essential for a smooth transition. Furthermore, regular system maintenance and updates will be necessary to ensure that the system remains efficient and secure over time.

The application savings and loan system developed for the Mandira Plasma Cooperative represents a significant advancement in its operational capabilities. By addressing the inefficiencies of manual data processing and providing a user-friendly platform for both administrators and members, the system is poised to enhance the cooperative's performance and member satisfaction. The successful implementation and ongoing management of this system will be critical to its long-term success, ensuring that the cooperative can continue to meet its goals and serve its members effectively.

#### 4 CONCLUSION

The development and implementation of the application savings and loan system for the Mandira Plasma Cooperative mark a significant advancement in its data processing and management capabilities. By automating data entry and processing, the system reduces human errors, improves data accuracy, and enhances overall operational efficiency. The dual-platform design ensures that both administrators and members can efficiently interact with the system. Administrators benefit from comprehensive tools for managing member data, transactions, and reports, while members gain convenient access to their financial information through the Android application. The transition to a digital database improves data accessibility and security, ensuring that sensitive information is protected and readily available to authorized users.

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Journal of Information Systems and Informatics

e-ISSN: 2656-4882 p-ISSN: 2656-5935

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