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Designing a Mobile Application for Financial Management using Mudarabah and Murabahah Contracts based on Clustering Method

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Abstrak

Penelitian ini berfokus pada pengelolaan keuangan perusahaan yang menggunakan akad mudharabah dan murabahah yang memerlukan pengelolaan yang baik karena informasi asimetris yang menyebabkan masalah adverse selection. Analisis klaster dapat mengkategorikan perusahaan berdasarkan penyajian data keuangan mereka, dan aplikasi seluler dapat membuat manajemen keuangan lebih mudah diakses dan lebih cepat. Penelitian ini bertujuan untuk merancang aplikasi mobile akad mudarabah dan murabahah berdasarkan metode clustering untuk menjawab tantangan pengelolaan keuangan. Proses perancangan aplikasi mobile akan mengutamakan kebutuhan pengguna dengan menggunakan pendekatan prototyping. Hasil pengujian fungsionalitas berhasil melakukan proses registrasi, aktivasi keanggotaan, dan penyimpanan data member. Selain itu, sistem dapat menyimpan dan memverifikasi data penyerahan Mudarabah yang dimasukkan melalui formulir penyerahan Mudarabah.

Abstract

This research focuses on the financial management of companies that use mudarabah and murabahah contracts which require good management because of asymmetric information, which causes adverse selection problems. Cluster analysis can categorize companies based on the presentation of their financial data, and mobile applications can make financial management more accessible and faster. This study aims to design a mobile application for mudarabah and murabahah contracts based on the clustering method to address financial management challenges. The mobile application design process will prioritize user needs using a prototyping approach. The functionality test results successfully carry out the registration process, activate membership, and save member data. In addition, the system can store and verify Mudarabah submission data entered through the Mudarabah submission form..

1. INTRODUCTION

Islamic finance has the potential to both increase financial access and spur new markets for Islamic banking [1]. Islamic financial institutions must improve their business model by adapting their instruments to meet the market's demands to attract depositors and grow their credit service offerings [2]. For those with deep religious convictions, Islamic banking practices are vital in gaining access to the financial mainstream [2]. Nevertheless, many variables must be analyzed to determine how introducing Islamic finance will affect the financial inclusion [1].

Mudarabah and murabahah are types of Islamic finance. A mudarabah is an agreement between two businesses in which one party invests money and the other party shares in the management and the earnings according to a predetermined formula [3]. The manager works as a trustee and is held to the highest standards

of integrity to accomplish the goals set forth by the capital provider; this interpretation of mudarabah applies to a wide range of investment and financing arrangements [4]. Due to asymmetric information that causes adverse selection problems, mudarabah contracts, which have evolved throughout history to meet the requirements of the Islamic financial market, are now less popular [5].

Using mobile applications to explain systems that facilitate and speed up the issuance of bank loans via smartphones can increase the effectiveness of financial institutions [6]. The primary advantage mobile banking apps have for banks is that they allow for more precise customer tracking and supervision [7]. Cluster analysis can categorize companies based on how they present their financial data [8]. This approach proved that combining financial clusters with industrial organizations is more effective than using either method alone [8].

Since mobile applications hold significant importance in the digital age, this research aims to design mudarabah and murabahah using cluster methods based on mobile application platforms. The application's design will prioritize user needs using a prototyping approach [9].

2. RESEARCH METHODS

2.1 System Development Method

This study adopts a system development approach using the prototyping method, which involves several stages, including requirements gathering, defining software objectives, identifying input and output requirements, designing the interface, and testing and evaluating [9].

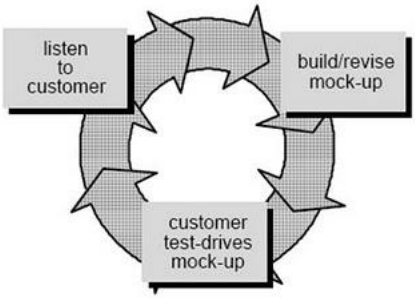

Figure 1. Pressman prototyping method

Rincian dari metode prototyping adalah sebagai berikut:

1. ***Listen to Customer***
   Customer needs analysis During this stage; user identification is carried out to gather information and identify customer problems. Data acquisition is a reference for finding the most appropriate solution and system development.

2. ***Build and Revise Mock-up***
   Mock-up creation and refinement The system requirements collected in the previous stage are utilized to create a prototype design proposed by the user. This process involves designing the system's input and output using Unified Modelling Language (UML) tools, such as Use-Case and Activity Diagrams [10]. The interface design and user-required features are also developed during this stage.

3. **Customer Test Drives Mock-up**
   User testing of the mock-up The final stage involves testing the prototype system that has been developed [10]. An evaluation is conducted to determine if the system meets the expected requirements. This stage is performed iteratively until the prototype system that best meets the user's needs is identified.

2.2 Research Flow

This section describes the complete and detailed stages of the research flow through the following five stages:

1. Observation and Literature Study
   This stage is carried out by making direct observations in the field, namely at BMT Sahabat Umat, to obtain data. A literature study is carried out by looking for theories and studies related to the contract of Murabaha and mudarabah financing.
2. Analysis and Design

Analysis and design begin with making business processes from the Murabaha and mudarabah systems using BPMN 2.0 [11]. Next, the system needs analysis, and design stages are carried out.

3. Application Development using the prototyping method.
   The application was developed with a prototyping method approach.
4. Testing
   The resulting prototype continues to be tested and evaluated repeatedly until it gets results that match the user's needs.
5. Results
   The result of the application is from the prototype that best suits the user's needs.

3. RESULTS AND DISCUSSION

3.1 Business process

The business process of the mobile-based Mudharabah investment information system for the Baitul Maal Tamwil Sahabat Umat case study consists of 3 processes, namely the member registration process, the process for storing mandatory savings, and the Mudharabah investment process and Murabahah financing. The member registration process is the main requirement to use BMT financial services and products. Figure 2 shows that the customer must register as a BMT Sahabat Umat cooperative member, whose business process.

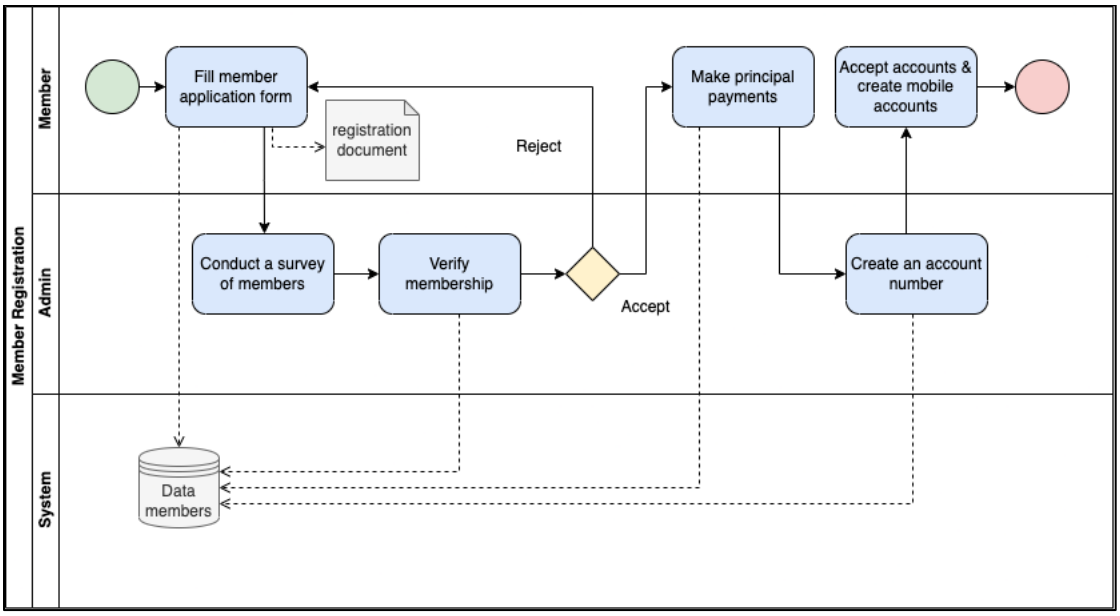

Figure 2. Member registration process

The conditions for acceptance as a member are by paying the principal deposit at the start of registration and the mandatory monthly savings, the amount of which follows the agreement with BMT Sahabat Umat. The mandatory deposit storage business process can be seen in Figure 3.

Other services that members can use are mudharabah and murabahah investments. Members carry out Mudharabah investments through deposits at the BMT Sahabat Umat office with a Mudharabah contract agreement. Investors can periodically monitor the use of investment. In addition, members can also apply for murabahah financing. The payment method can be made in installments by the agreement and can monitor the installments per month. The Mudharabah investment business process and Murabahah financing can be seen in Figure 4.

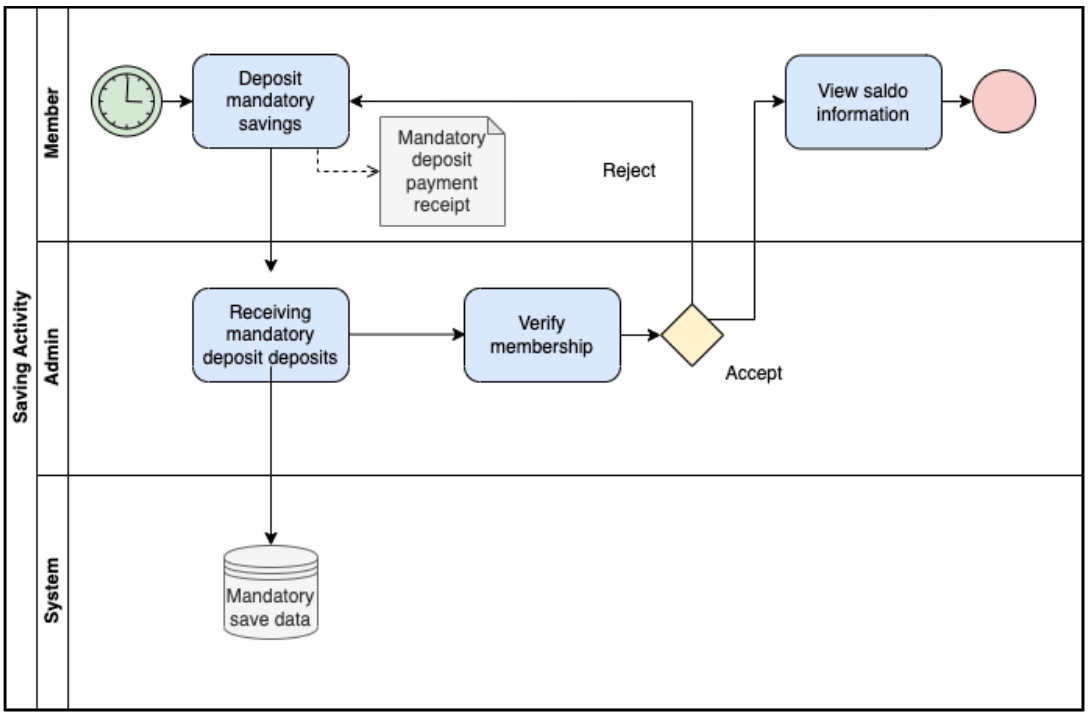

Figure 3. Compulsory Deposit Payment Process

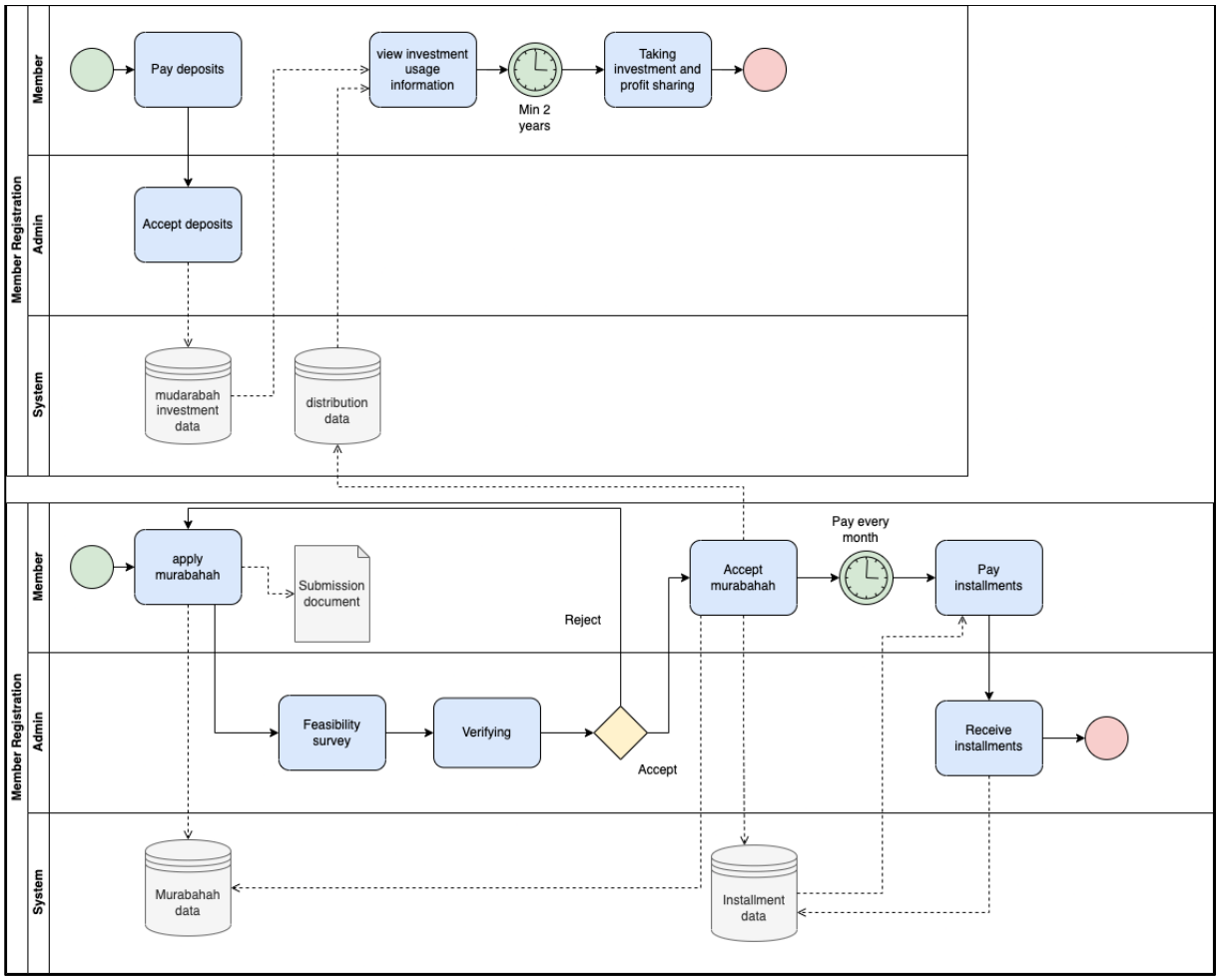

Figure 4. Mudarabah Investment Business Process and Murabahah Financing

3.2 Use Case Diagram

Preparation of Use case diagrams based on functional requirements consisting of registering members; displaying member data; displaying the history of deposit payments; displaying mudarabah investment history (estimated profit sharing); displaying cluster data; displaying the history of the distribution of the use of mudarabah investment funds; apply for murabahah financing; display murabahah usage history; displays Murabahah installment history. Use case diagrams can be seen in Figure 5.

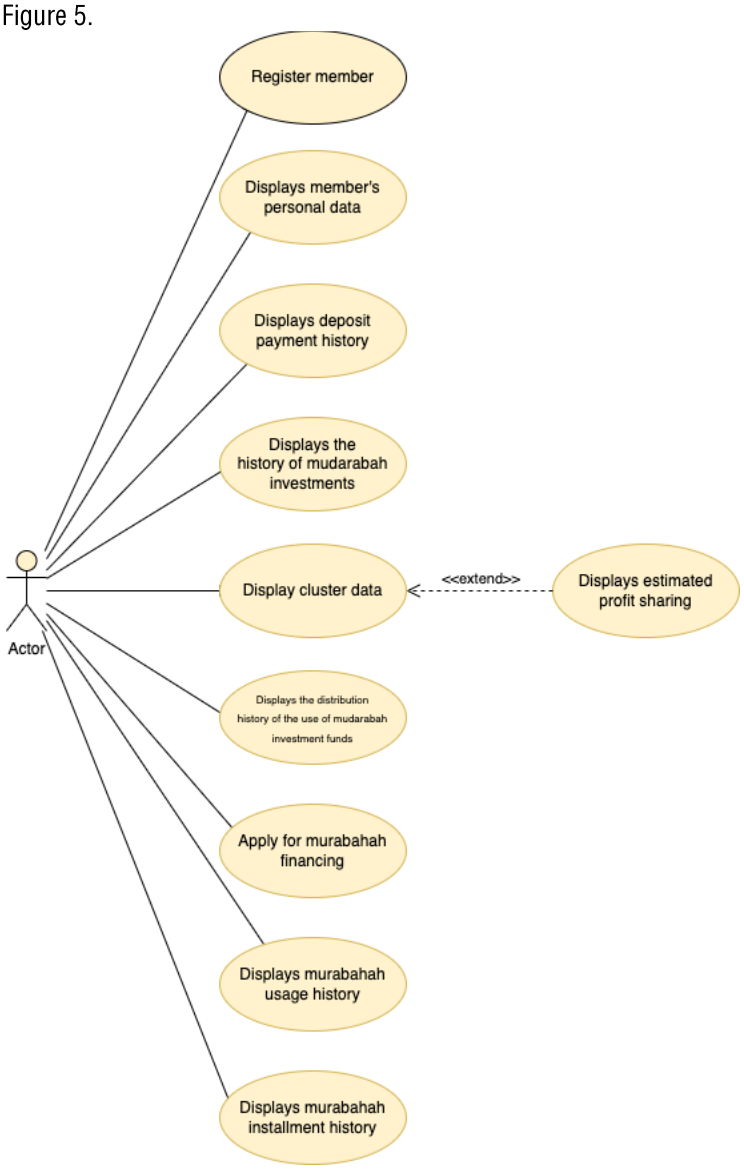

Figure 5. Use Case Diagram

3.3 Implementation Results

Login Page

The login page (Figure 6) is the initial display when the user opens the application, where there are several options, including mobile account activation, member registration guide, and member registration. If the user is already a member and has activated a mobile account, the user can log in directly.

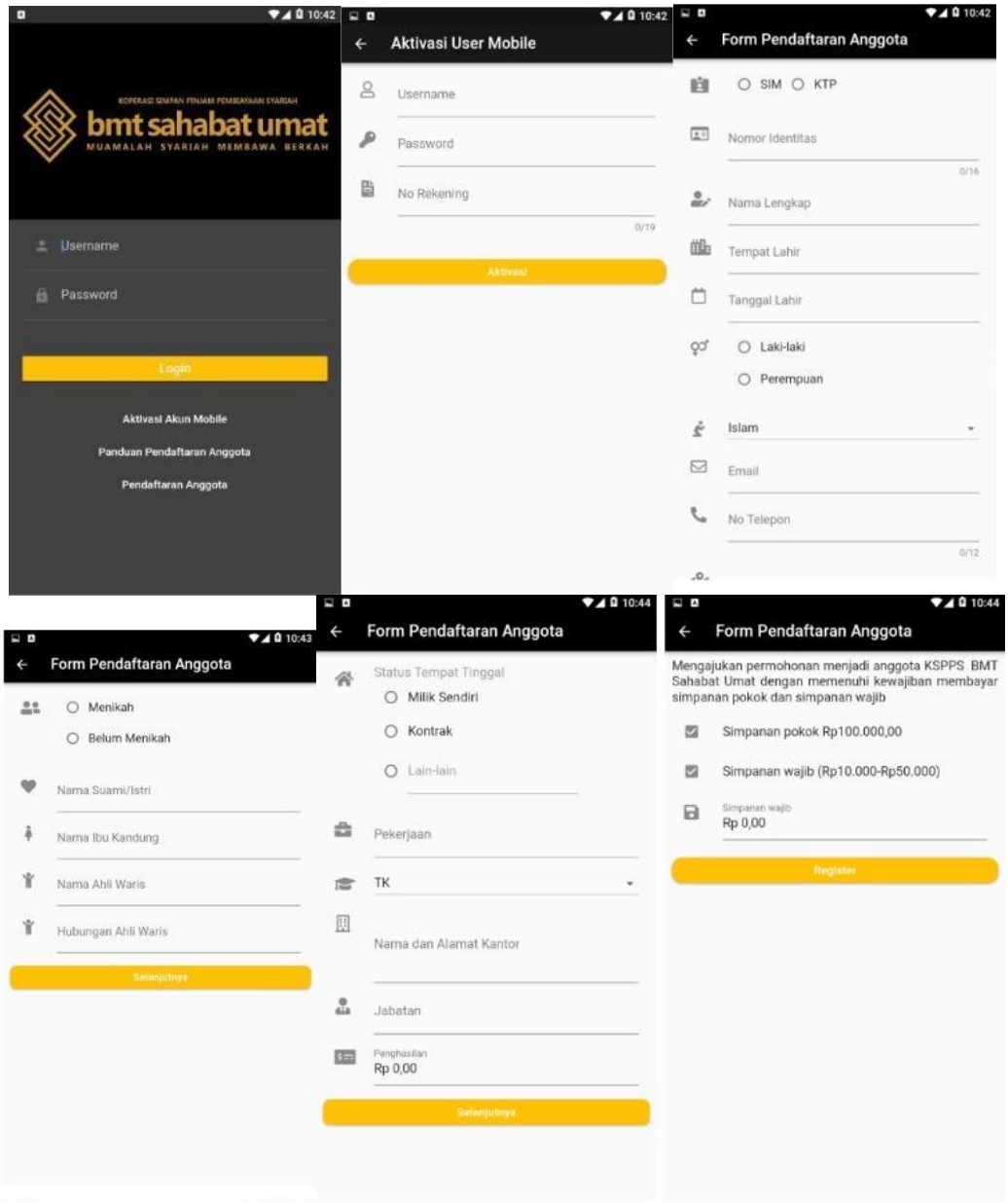

Figure 6. Login page, member registration and activation

Home page

The home page is the initial interface when the user logs into the system, which presents the main menus, namely deposits, investments, financing, and accounts. The home page can be seen in figure 7.

Figure 7. Home page

Money Saving Page

Figure 8 shows information like the transaction date, the type of transaction, the amount entered or taken out, and the amount still in the account. With this information, the user can keep track of how much money they have saved and see how their finances are changing over time.

Figure 8. Money Saving Page

Investment Page

The Mudarabah investment page is used to manage the investment of Mudharabah investors. This page consists of two submenus: investment history and cluster menus. The display of the Mudharabah investment page can be seen in Figure 9, while the cluster page can be seen in Figure 10.

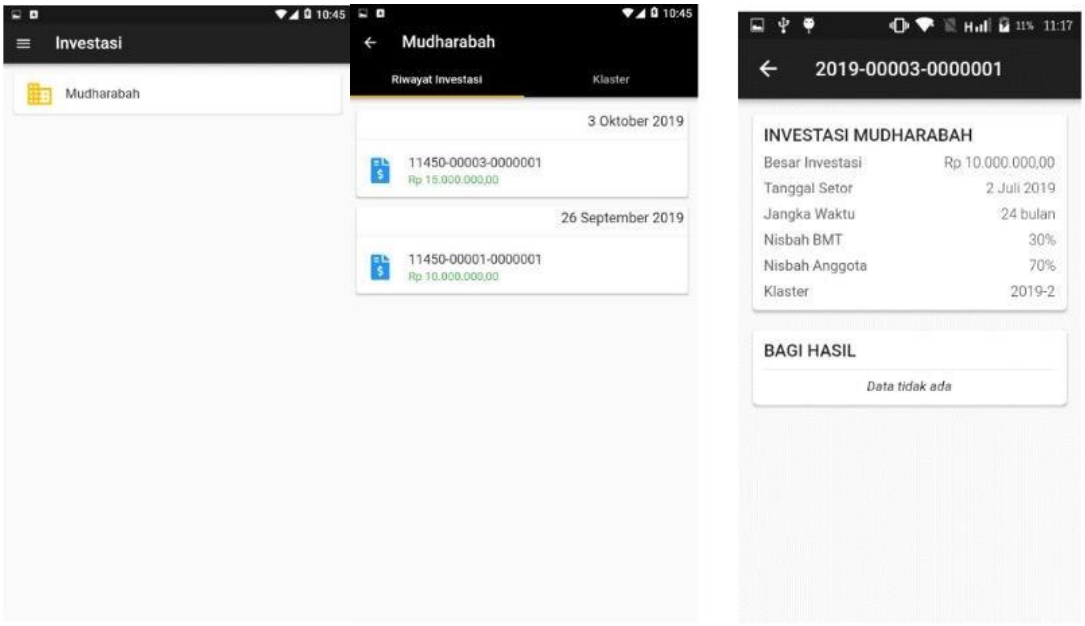

Figure 9. Investment Page

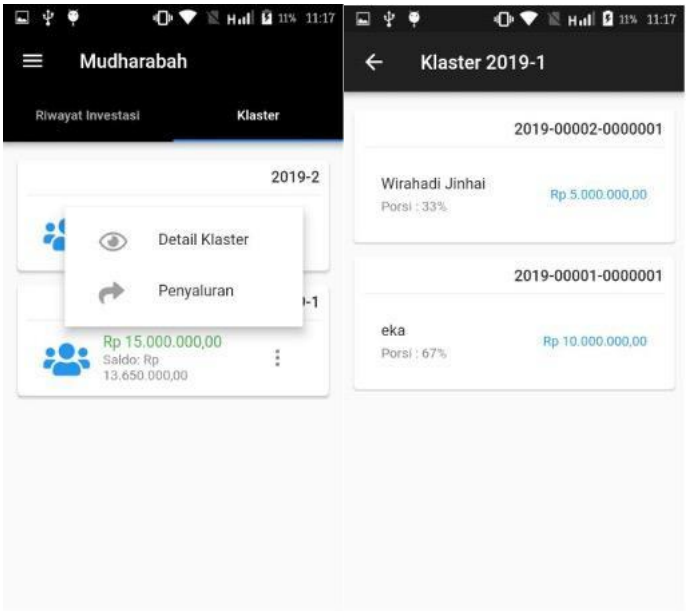

Figure 10. Cluster page

Figure 11 is a distribution page where investment funds in a cluster are used by BMT managers to be channeled into the Murabahah financing business. Investors can monitor what the investment funds are used for and who uses the investment funds for Murabahah financing.

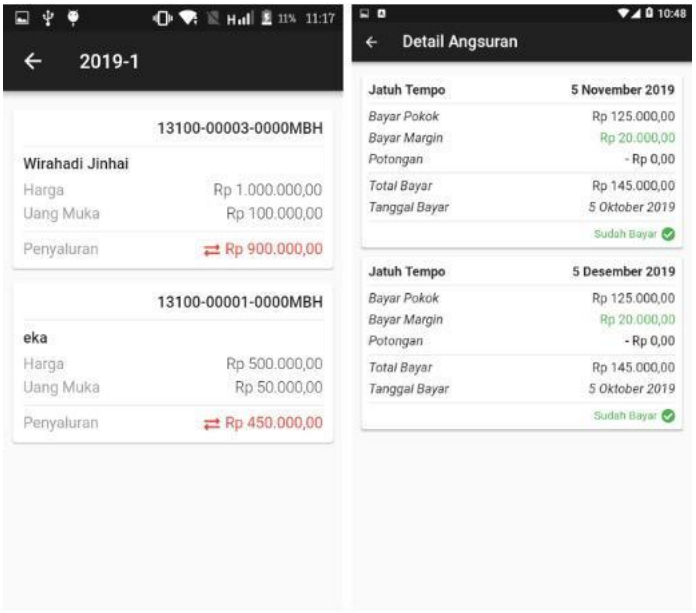

Figure 11. Distribution Page

Financing and Submission Pages

The murabahah page is used to manage members' Murabahah financing, which consists of the submission submenu and the Murabahah contract, as shown in Figure 12.

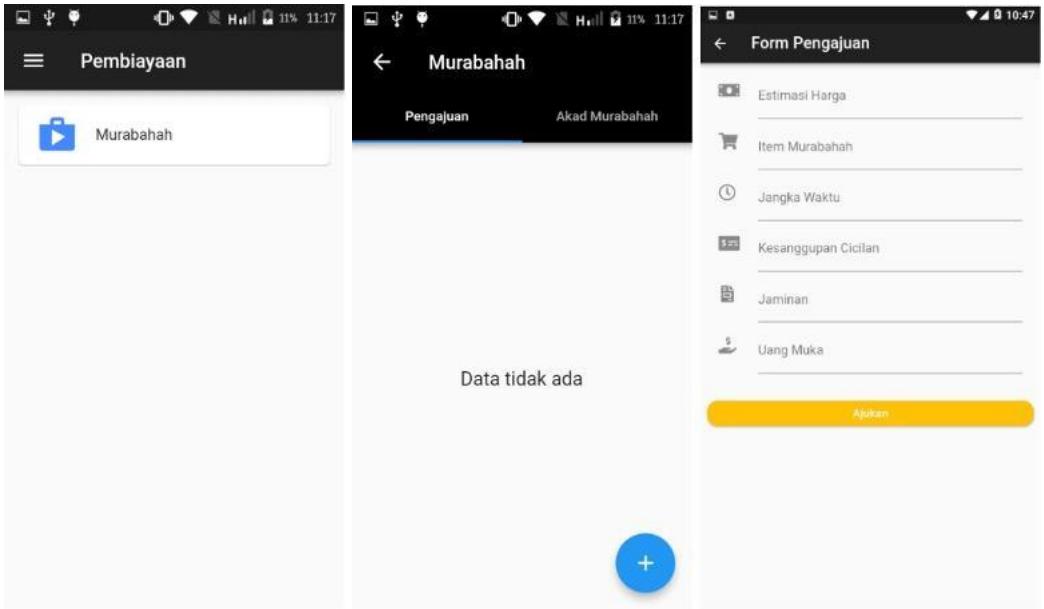

Figure 12. Financing and Submission Pages

Mudarabah Contract Page

Figure 13 depicts the page that lists the authorized murabahah contracts and their respective histories. The murabahah agreement includes this clause. We can select one of the contracts available in the system, modify its display features, and set its installments.

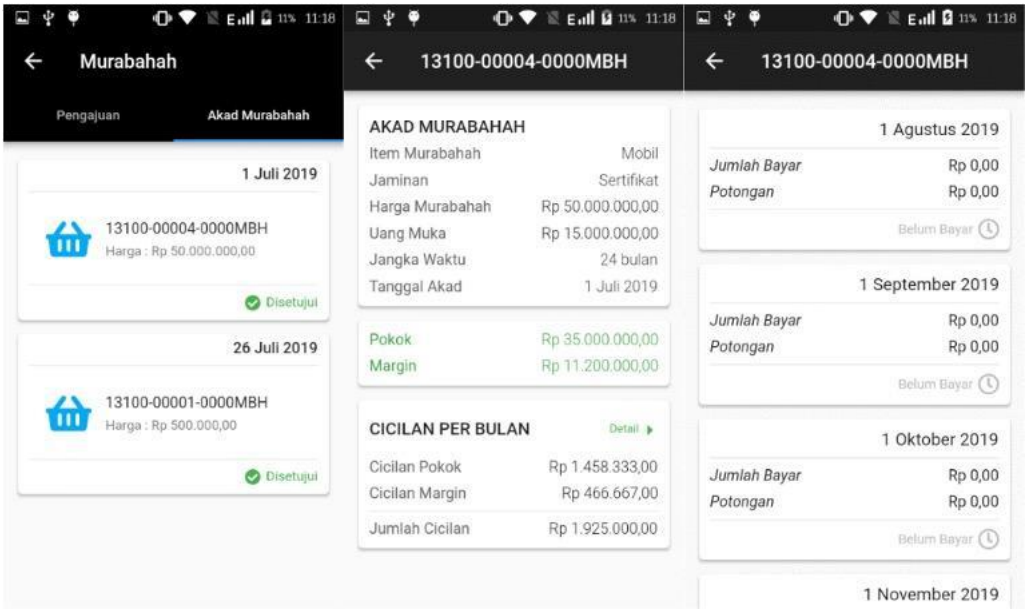

Figure 13. Mudarabah contract page

User Page

Figure 14 depicts the account screen that provides access to members' information. This screen is accessible by clicking on the corresponding figure, and it displays the member's data information, such as name, address, and contact details. Additionally, the member has complete control over their mobile apps and can edit or update their information as needed. This feature gives members autonomy over their accounts and enables them to manage their financial transactions seamlessly. Moreover, this account screen provides a secure and user-friendly interface for members to access their information and monitor their savings and investments. By giving members access to their information and the ability to manage their accounts, this system enhances transparency and accountability, leading to greater trust between members and the BMT.

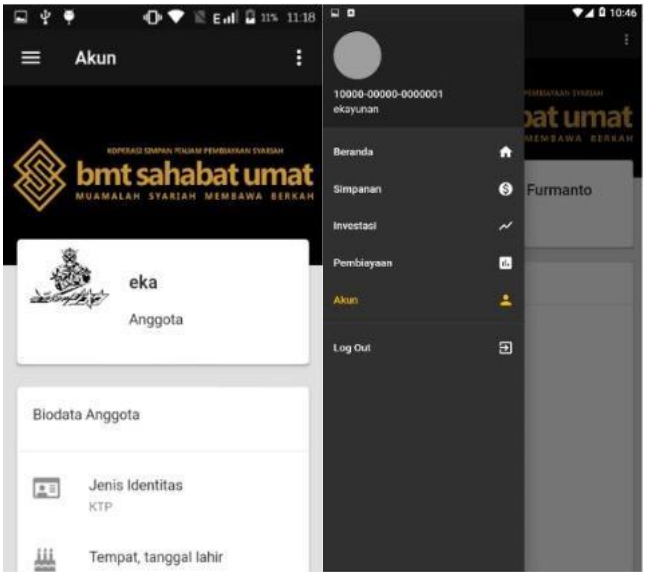

Figure 14. User page

3.4 System Testing

The mobile app's login system is tested under three conditions: with no data entered, with incorrect data entered, and with the correct data entered. When a login attempt fails, the system empties the login form's username

and password sections. The next challenge involves attempting to log in with the incorrect username and password. To successfully check-in, use the input as the username and password. Table 1 shows the outcomes of our testing of a login system for mobile apps.

Table 1. Login System Testing

Skenario	Test Case	Target Hasil	Hasil
Field pada form login dikosongkan	User dan password kosong	Login gagal	Login gagal
Input data salah	User dan password salah	Login gagal	Login gagal
Input data akun benar	User dan password benar	Login berhasil	Login berhasil

In this study, we tested the mobile application's account activation process in three different situations: when the form fields were empty, when incorrect data was entered, and when accurate data was inputted. The first test involved leaving the login credentials, namely the user and password, empty, which led to a failed login. In the second test, incorrect user input and password were entered, resulting in a failed login. However, we entered the correct user and password in the third test, resulting in a successful login. The outcomes of testing the mobile account activation login system are presented in Table 2.

Table 2. Mobile Account Activation Test

Scenarios	Test Case	Yield Targets	Results
Blank Field in application form	Username, password, no. account (blank)	Login failed	Login failed
Incorrect data entry	User (which is in the database); password (password); account number (account no.)	Login failed	Login failed
	User (user); password (password); no. rekening (salah)	Login failed	Login failed
	Users (users); passwords (passwords); account number (wrong)	Login failed	Login failed
Correct data entry	User, password, account number are correct	Login failed	Login successful

Our investigation included evaluating member registration under three conditions: empty form fields, incorrect input data, and accurate input data. During the first scenario, the login credentials, consisting of the user and password, were vacant, which led to a failed login. In the second scenario, the appropriate user and password were inputted, leading to a successful login. Table 3 displays the results obtained from testing member registration.

Table 3. Member Registration Test

Scenarios	Test Case	Yield Targets	Results
The fields on the member registration form are blanked	Identity type, Identity ID, Full name, Place of birth, Date of birth, Gender, Religion, Address, Telephone number, Email, Status of residence, Occupation, Last education, Spouse's name, Birth mother's name, Name of heir, Relationship of heir , Office name and address, Position, Income,	Membership application rejected	Membership application rejected

	Mandatory Savings (empty all)		
Correct data entry	Identity type, Identity ID, Full name, Place of birth, Date of birth, Gender, Religion, Address, Telephone number, Email, Status of residence, Occupation, Last education, Spouse's name, Birth mother's name, Name of heir, Relationship of heir , Office name and address, Position, Income, Deposits are mandatory (All forms are filled in correctly)	The system stores member submission data	The system stores member submission data

Our research involved conducting mudarabah submission tests in three scenarios: blank form fields, incorrect input data, and correct input data. In the first scenario, the login form fields for the user and password were left empty, resulting in a failed login. The correct user and password were entered in the second scenario, resulting in a successful login. The mudarabah submission test results are presented in Table 4.

Table 4. Mudarabah Submission Test

Skenario	Test Case	Target Hasil	Hasil
Blank Field in application form	Estimated price, murabahah item, time period, ability to repay, guarantee, down payment (blank)	The mudarabah submission process was rejected	The mudarabah application process was rejected
Correct data entry	Estimated price, murabahah item, time period, ability to repay, guarantee, down payment (all forms are filled in correctly)	The system stores data on mudharabah submissions	The system stores mudarabah submission data

4. CONCLUSION

Our research shows we have developed a successful mobile-based Murabahah Contract Information System Application for Mudarabah Financing Investment Clustering. This application includes member registration, savings balance checking, Murabahah financing management, and Mudarabah investment management. We found that the member registration and activation processes were successful, and the system effectively stored member data for verification by the BMT. Additionally, the system stored and verified Mudarabah submission data entered via the Mudarabah submission form, as confirmed by the BMT.

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