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SYSTEM ANALYSIS AND DESIGN

"FINAL REPORT"

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1.0 Introduction

1.1 Overview

In an effort to enhance user experience, operational efficiency, and streamline various procedures, our group has proposed a new online system for KADA Koperasi. Currently, KADA Koperasi uses a manual system which while functional presents inefficiencies that hinder performance and user satisfaction. The transition to a digital platform is suggested to resolve these issues, offering easier access to KADA Koperasi's services. This new online system will modernize the organization's operations, facilitating better management and more effective service delivery. The proposed platform will streamline existing procedures ensuring a more seamless and efficient experience. Ultimately this project is a significant step towards the digital transformation of KADA Koperasi positioning the organization to better serve its community.

1.2 Background Study

KADA Koperasi is an organization that supports farming, agriculture, and rural development. It currently conducts loan requests and membership applications using a manual, paper-based approach. The present KADA system entails a number of manual steps: members submit application forms, which are gathered by staff, and then meetings are held to discuss, accept, or reject the applications. Loan repayments are automatically withdrawn from the salaries of accepted members. It is difficult to maintain registered members, keep track of loan repayments, and compute profits and dividends with accuracy due to this laborious method. With five different loan options and a fixed profit percentage, KADA depends on outside audits to determine dividends. Members and employees are impacted by operational inefficiencies, mistakes, and delays brought on by the absence of a computerized system.

1.3 Problem Statement

The main problem with KADA's present operations is that the manual system is inefficient. This method is labor-intensive, prone to mistakes, and frequently causes delays in loan management and application processing. Particular issues consist of:

- **Tracking Difficulties**: Accurately tracking registered members and their loan statuses is challenging when manual records are used.
- **Administrative Burden**: Employees' attention is diverted from member services and strategic goals by an excessive amount of paperwork.
- **User Inconvenience:** Members find the present procedure burdensome, which can cause them to become frustrated and possibly disconnect.
- **Data management issues**: There is a significant chance that data input and management errors may occur, which could result in inaccurate loan and profit estimates.

1.4 Proposed Solutions

To address the inefficiencies and problems associated with KADA's manual system, the following solutions are proposed:

- **Automated Information System Implementation**: Changing from manual to automated information system will improve the management of data and its processing. This will facilitate accurate, real-time tracking of member registrations and loan statuses thus reducing difficulties in monitoring.
- **Cooperative Information System (CIS) Introduction**: Adopting a specialized CIS designed to support the unique needs of cooperative enterprises will improve overall efficiency. Membership management, financial transactions, and communication among members are among the various functions that will be integrated in the CIS enabling seamless access to information and services.

- **Digital Solutions for Reducing Administrative Burden**: The implementation of digital tools and solutions will reduce paperwork on employees thereby allowing them to concentrate more on member services as well as strategic goals. Automation increases productivity while reducing errors during administrative tasks.
- **Enhancing User Experience through Online Portal**: Developing an online portal for members simplifies the processes associated with applying for loans while providing information easily accessible by members including services offered. It also facilitates online registration, loan applications, transaction processing among others which improve convenience for members hence reducing their frustrations.
- **Improving Data Management Practices:** Implementing robust data management practices and tools will ensure accurate data input and management. This will reduce the likelihood of errors and improve the reliability of loan and profit estimates. Advanced data analytics and reporting capabilities will also support better decision-making.

1.5 Project Objectives

The development of an online system for KADA aims to achieve several key objectives:

- **Efficiency Enhancement**: By automating loan applications, membership registration, and data administration, you may cut down on processing times and administrative labor. Enhanced User Context Offer a smooth, intuitive user interface that makes navigating easier and improves the member experience as a whole.
- **Improved User Experience**: Provide a seamless, user-friendly interface that simplifies navigation and enhances the overall member experience.

- **Data Accuracy**: Reduce the possibility of errors by implementing automated systems to guarantee accurate tracking of member activities, loan statuses, and financial computations.
- **Accessibility**: To boost convenience and participation, provide members the ability to check their accounts, apply for loans, and keep track of their financial situation from anywhere.
- **Transparency and Accountability**: Maintain open lines of contact and provide members with up-to-date information about the progress of their loans and applications.

1.6 Project Scopes

The scope of the project encompasses the following components:

- **Online Registration System**: Creation of a user-friendly, safe web platform for registering members. Validation procedures will be incorporated into this system to guarantee applicants' legitimacy and guard against fraud.
- **Automated Loan Management**: Putting in place a system to automatically apply for loans and manage them, which will speed up the approval and repayment processes. This system will manage various loan kinds and give users real-time updates.
- **Financial Management Tools**: Combining many financial tools into one system to compute loan amounts, interest rates, payback plans, and earnings.
- **User Interface Design**: Creation of a user-friendly, intuitive interface that improves user engagement with the platform. The design will prioritize usability and accessibility for every participant, irrespective of their level of technical expertise.

- **Scalability**: Considering scalability throughout system design to enable future improvements and the addition of new features when KADA's requirements change.

The goal of this project is to leverage technology to improve KADA's operations by developing a system that is safer, more effective, and easier to use. Through the implementation of user feedback and the resolution of identified difficulties, the new online platform is expected to greatly enhance both member satisfaction and service delivery.

1.7 Benefits of Proposed System

By automating loan applications and membership registration, the proposed online system for KADA will greatly improve the cooperative's operations by lowering processing times and administrative workload. Members will be able to effortlessly manage their accounts and keep an eye on their financial conditions thanks to the user-friendly platform's easy navigation and round-the-clock support accessibility. Advanced security measures will guarantee secrecy and trust while protecting financial and personal data. In order to minimize errors and improve financial transparency, automated monitoring and financial management solutions will guarantee proper record-keeping and precise calculation of loans, interests, and profits. Furthermore, members will be notified about their application statuses and financial transactions through real-time updates and transparent communication channels, which will promote responsibility and confidence. In general, the new online system will improve member satisfaction, data quality, and operational efficiency, setting KADA up for long-term success in promoting rural development and agricultural development.

1.8 Summary

KADA Koperasi is still manually managed and has decided to adopt an online system to improve the interaction that customers have with the firm while improving efficiency. The issues arising from the manual approach are tracking problems, the burden on administrative structures, user inconvenience, and data management problems.

The solutions are introducing an AIS, applying the CIS concept, dematerializing work to decrease bureaucracy, developing a website for better ushers, and increasing the efficiency of data handling.

The general goals of the project include effectiveness, effectiveness from user's perspective, reliability of data sources, convenience, and accountability and transparency. In response to the needs of TCU as stated, the project's scope will entail online registration, automated loan management, financial management tools, user interface design, and scalability.

The introduced changes are intended to eliminate issues with inefficiency, inaccurate data, information leaks, and dissatisfaction at KADA that will enhance the organization's stability and sustainability to achieve its objectives regarding the development of rural and agricultural sectors.

2.0 Literature Review

2.1 Introduction

This chapter provides a comprehensive review of the literature relevant to the study, which include definitions and discussions of information systems, focusing on cooperative information systems. It also contextualizes current research by comparing it with previous studies and systems.

2.2 Information System

2.2.1 Definition of information system

Information system (IS) is a set of pieces that are co-ordinated in order to collect, process, store or pass it on for utilization purposes. Moreover, there are both human and technological factors that facilitate decision making as well as coordination, control, analysis and visualization within an organization. Information systems play a crucial role in managing businesses and optimizing all the processes taking place in them.

2.2.2 Cooperative Information Systems

Cooperative Information Systems (CIS) are specialized IS developed to cater for unique requirements of cooperatives. These systems support cooperation and effective management of cooperative benefits such as membership management, financial transactions, communication among members etc. CIS attempts to integrate many functions together in order to offer seamless access to information and services to their members as well as management.

For example, SIMASPRI is a Cooperative Information System used by Koperasi Pegawai Republik Indonesia (KPRI) Diponegoro University is used for the management of savings, loans and installment payments. It provides online registration, loan applications and transaction processing services thus improving accessibility and efficiency for cooperatives through online platforms.

2.3 Previous Researches/Systems

Study 1: Business Architecture and Information System Architecture Design

This study focused on Information System Architecture Analysis and Design for Savings Unit Payment at KPRI Diponegoro University Utilizing TOGAF framework, a blueprint for business architecture, data architecture as well as application architectures are proposed to optimize information technology usage in

cooperative operations. Key features include online registration, loan applications, and payment processing to improve accessibility and efficiency for members.

Study 2: Analysis and Development of Microservices

This research will solve the architectural issues at hand in cooperative enterprises via adoption of micro-services architecture that would be employed in developing a loan application system of PT XYZ. This study thus incorporates the Domain-Driven Design (DDD) to develop a modular scalable system that simplifies the design process and increases adaptability of a system. The microservices approach ensures independent development, deployment and scaling of different components in the system allowing for customization of the cooperative's loan application process.

2.4 Summary

Comparative analysis of these studies shows how information systems have changed over time with reference to cooperatives. In contrast to SIMASPRI which are classical, integrated monolithic systems, modern approaches such as microservices architecture provides for more flexibility and scalability. These two modes are only aimed at advancing effectiveness and efficiency in cooperatives' information systems that will ultimately result into benefits accruing to members and managers in cooperative societies.

3.0 Methodology

3.1 Introduction

This chapter outlines the methodology chosen for the development of the new online system for KADA Koperasi. It details the rationale behind the selected methodology and describes the various phases involved in its implementation. The chosen methodology ensures a structured and systematic approach to the project's development, aiming to achieve the project objectives efficiently and effectively.

3.2 The Chosen Methodology

The chosen methodology for this project is the Systems Development Life Cycle (SDLC). SDLC is a structured approach that provides a systematic process for planning, creating, testing, and deploying an information system. It ensures that all functional and user requirements are considered, and it promotes a disciplined project management approach. The SDLC methodology is well-suited for this project because it provides clear stages, detailed documentation, and a thorough validation process, ensuring the development of a high-quality and reliable system.

3.3 Phases of the chosen methodology

The SDLC methodology consists of several distinct phases, which will be applied as follows:

1. **Planning Phase:**

   Project Initiation: Define the project scope, objectives, and deliverables.

   Feasibility Study: Assess the feasibility of the proposed system in terms of technical, economic, and operational factors.

   Project Plan: Develop a detailed project plan outlining timelines, resources, and milestones.

2. **Analysis Phase:**

   Requirements Gathering: Collect detailed requirements from stakeholders, including KADA Koperasi staff and members.

   Requirements Documentation: Document the functional and non-functional requirements of the system.

System Analysis: Analyze the current system to identify gaps and areas for improvement.

3. **Design Phase:**

System Design: Develop the overall architecture of the online system, including database design, user interface design, and system interfaces.

Prototype Development: Create initial prototypes to visualize the system's functionality and gather feedback.

Design Specifications: Document detailed design specifications for developers.

3.4 Project Planning Schedule

The most crucial part of the project is assigning human resources to each phase to ensure smooth workflow. It is also important to identify the strengths of the teammates and assign tasks accordingly to complete the project at the earliest. The roles assigned to each team member in the project are as follows:

Project Planning: Responsible for making Wbs,Gantt and PERT charts to ensure the tasks are done on time with maximum output - **Anjum,Mathaba**

Information Gathering: Responsible for writing report of the interview, conducting background study, document analysis as well defining the problem statement - **Fatema**

Feasibility studies: Responsible for identifying the technical, operational and financial feasibility of the project - **Taqia,Tang**

Functional and Non-Functional Requirement Analysis: Responsible for analyzing the functional and non-functional requirements of the system

- Taqia, Tang

Designing DFD: Responsible for designing the DFD for current as well as proposed system - All

GitHub Project Management: Responsible for uploading the backlog of the project constantly - **Anjum**

UI Design: Responsible for designing a user friendly interface to enhance and escalate the process of the entire system - **All**

Process Number	Process From Logical TO-BE Dfd	Done by
1.0	Register/Login to System	Tang
2.0	Fill in Form to Apply for Membership	Fatema
3.0	Add Bank Account	Taqia
4.0	Apply for Loan	Mathaba
6.0	Manage Account	Anjum

Table 1 *Plan Schedule*

3.4.1 Feasibility Studies

Technical Feasibility

Technical feasibility is whether the currently available technical equipment can support the proposed system or whether upgrading the technology for implementation of the new system is possible. While there is no already existing system, implementing the new system will not be an issue as compared to the benefits, the cost of acquiring extra equipment will not be too high. Also, a lot of manpower is spent on manually doing all the processes, so there will not be a problem of allocating manpower to maintain the new system.

Operational Feasibility

Since all the processes of the current system are very time consuming and tedious, people and staff will be open to the idea of a system that will process

everything faster and will not object to using the new system. Hence, the project is operationally feasible.

3.4.2 Cost Benefit Analysis

Economic feasibility is whether a project is financially viable and can generate positive returns. Based on the estimated costs and benefits over the years for the project, here is the cost-benefit analysis of the proposed system, with annual increase rate of 25% for Maintenance and Salary costs, 10% annual increase for Increased Productivity, 2.22% annual increase for Increased Customer Satisfaction and a discount rate of 10%.

COSTS	Year 0	Year 1	Year 2
Development Costs			
Hardware	10000		
Software	10000		
Training	15000		
Total	35000		
Production Costs			
Maintenance and Salary		20000	25000
Present value		18182	20661
Accumulated costs		53182	73843
Benefits			
Increased Productivity		50000	55000
Increased Customer Satisfaction		45000	46000
Total		95000	101000

Present Value		86364	83471
Accumulated Benefits		86364	169834
Gain or Loss		33182	95991

Table 2 *Cost Benefit Analysis*

3.4.3 Work based Structure (Wbs)

The KADA project follows a structured methodology for system development, divided into three main phases: Information Gathering, Analysis, and Designing. Each phase consists of various tasks essential for the successful completion of the project. The following Work Breakdown Structure (WBS) outlines these tasks in detail:

Information Gathering

Background Study

- Researching the current system and environment.
- Identifying existing issues and limitations.
- Understanding the context and scope of the project.

Prepare Topics for JAD Session

- Developing a set of discussion topics and activities to guide the collaborative design sessions.
- Ensuring the session plan covers all key aspects of the system requirement and design.
- Validating the session plan with project stakeholders to incorporate their Input.

Host JAD Session

- Identifying key stakeholders for the joint application design sessions.

- Scheduling and facilitating the joint design sessions..
- Documenting the stakeholders' needs, expectations, and feedback gathered through the collaborative design process.

Document Analysis

- Collecting relevant documents and records.
- Analyzing documents to extract useful information.
- Summarizing findings to inform the project.

Feasibility Studies

- Conducting technical feasibility analysis.
- Performing economic feasibility studies.
- Assessing operational feasibility.
- Compiling feasibility reports.

Analysis

Functional Requirements

- Identifying specific functionalities required by the system.
- Documenting functional requirements in detail.
- Validating requirements with stakeholders.

Non-Functional Requirements

- Determining performance criteria such as usability, reliability, and scalability.
- Documenting non-functional requirements.
- Ensuring requirements are aligned with project goals.

Logical DFD for Current System

- Creating a Data Flow Diagram (DFD) for the existing system.
- Mapping out current processes and data flows.
- Identifying areas for improvement.

Designing

Logical DFD for Proposed System

- Designing a DFD for the new system.
- Illustrating proposed processes and data flows.
- Ensuring the new design meets functional and non-functional requirements.

Make Report for Proposed System

- Compiling all findings and designs into a comprehensive report.
- Including detailed descriptions of the proposed system.
- Reviewing the report with stakeholders for feedback and approval.

Design UI

- Creating user interface (UI) design.
- Focusing on usability and user experience.
- Developing wireframes and prototypes.

Designing the System Architecture

- Define system components, structure, and interactions
- Determine hardware, software, and network requirements.
- Create a visual representation for system architecture

The KADA project's WBS ensures a systematic approach to system development, covering all critical aspects from initial information gathering to final design. Each phase is broken down into specific, manageable tasks, providing a clear roadmap for the project team and ensuring that all requirements are thoroughly addressed. This structure not only facilitates project planning and execution but also enhances communication and alignment among stakeholders.

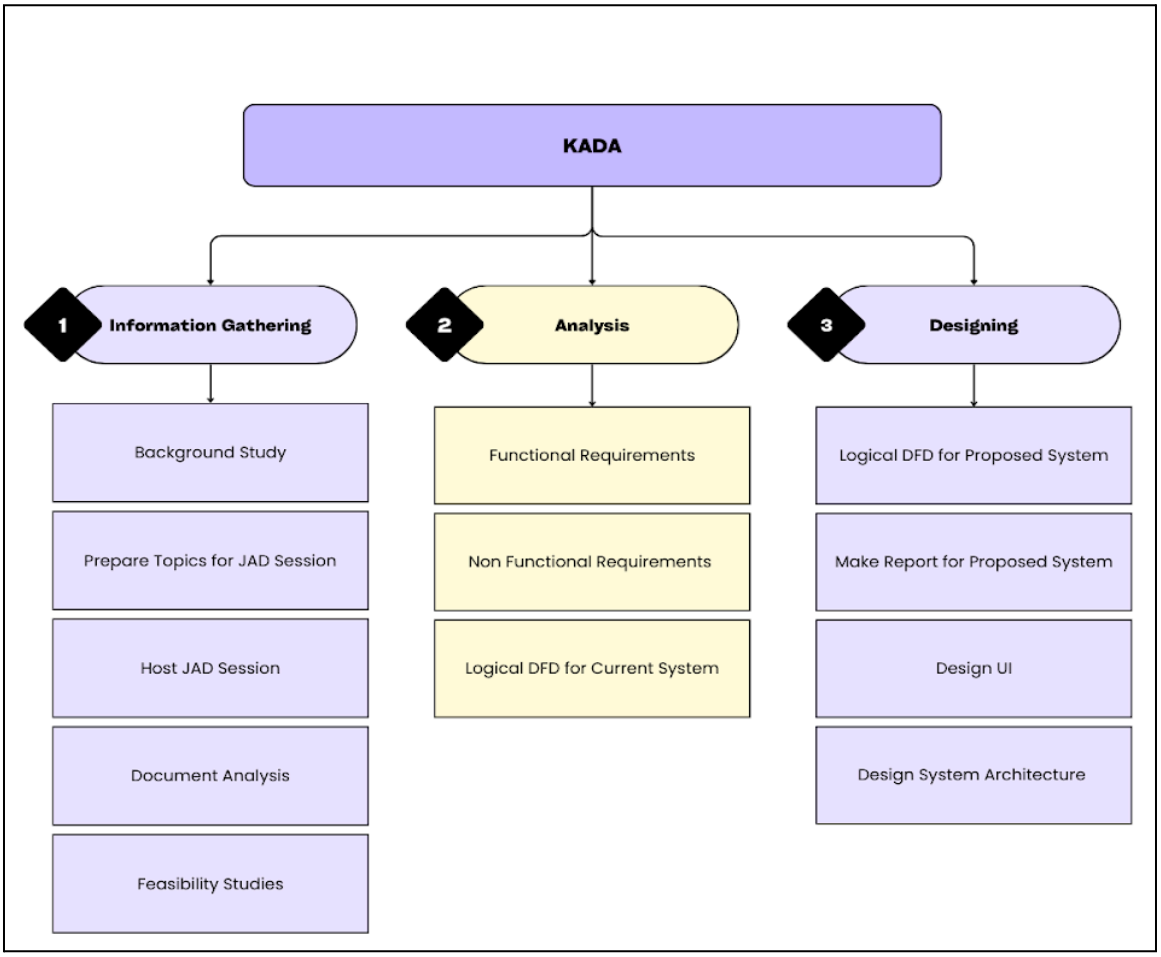


Fig 1 *Wbs chart*

3.4.4 PERT Chart (based on WBS)

The process of this project can be summarized as follows:

1. Background Research (A): The first step is to conduct background research, this task is not dependent on other tasks and is expected to take 1 day to complete.
2. Prepare the questionnaire (B): After completing the background research, prepare the questionnaire, again taking 1 day.

3. Interview with stakeholders (C): This task needs to be carried out after completing the background research and preparing the questionnaire and is expected to take 1 day.
4. Document analysis (D): Based on previous interviews, document analysis takes 2 days.
5. Feasibility Study (E): After the document analysis is completed, it is expected to take 2 days.
6. Functional requirements (F) and non-functional requirements (G): depend on the results of the feasibility study and are expected to take 2 days, respectively.
7. Logical Dataflow diagram of the current system (H): Based on the definition of functional and non-functional requirements, the logical dataflow diagram of the current system is designed, which is expected to take 2 days.
8. Logical Dataflow diagram of the proposed system (I): The dataflow diagram of the proposed system is designed based on the dataflow diagram of the current system, which is expected to take 2 days.
9. Submit the report of the proposed system (J): According to the designed system data flow diagram, write and submit the system report, which is expected to take 3 days.
10. Designing the user interface (K) and designing the system Architecture (L): These two tasks depend on the submitted system reports and are expected to take 6 and 5 days, respectively.

Task	Activity	Predecessor	Duration
A	Background study	None	1
B	Prepare Topics for JAD	None	1
C	Host JAD Session	A,B	1
D	Document analysis	C	2
E	Feasibility studies	D	2
F	Functional requirements	E	2
G	Non functional requirements	E	2
H	Logical DFD for current system	F,G	2
I	Logical DFD for proposed system	H	2
J	Present Report for Proposed System	I	3
K	Design UI	J	6
L	Design System Architecture	J	5

Table 3 *Activity and duration required*

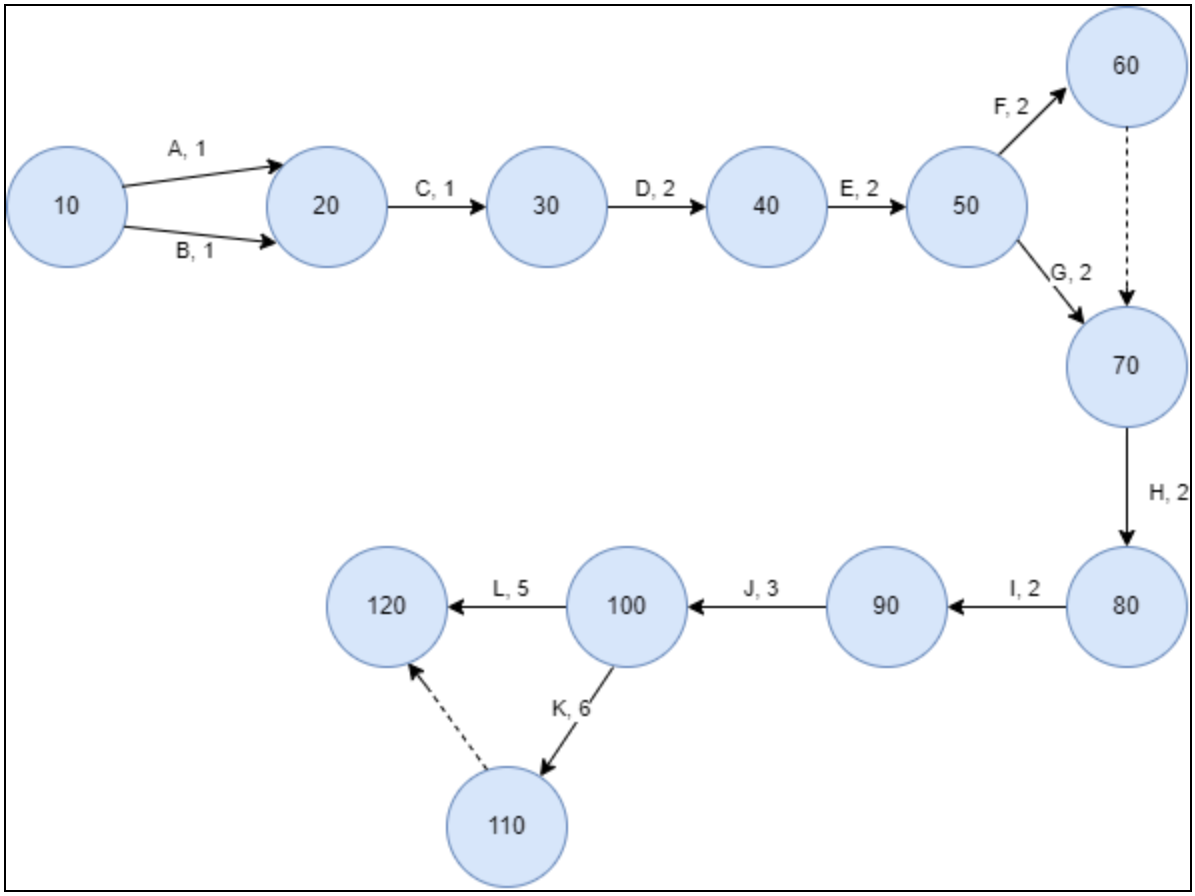


Fig 2 *PERT Diagram for the Project*

Paths:

10 20 30 40 50 60 70 80 90 100 110 120 **21 Days**

10 20 30 40 50 70 80 90 100 110 120 **21 Days**

10 20 30 40 50 60 70 80 90 100 120 **20 Days**

10 20 30 40 50 70 80 90 100 120 **20 Days**

There are two critical paths:

10 20 30 40 50 60 70 80 90 100 110 120 and 10 20 30 40 50 70 80 90 100 110 120 and it is **21 days** long

The sequence of tasks in these two paths identifies the critical schedule of the whole project, and any delay may affect the overall project completion time. Therefore,

project managers need to pay special attention to the execution and progress of these tasks to ensure that the project is on schedule.

3.4.5 Gantt Chart

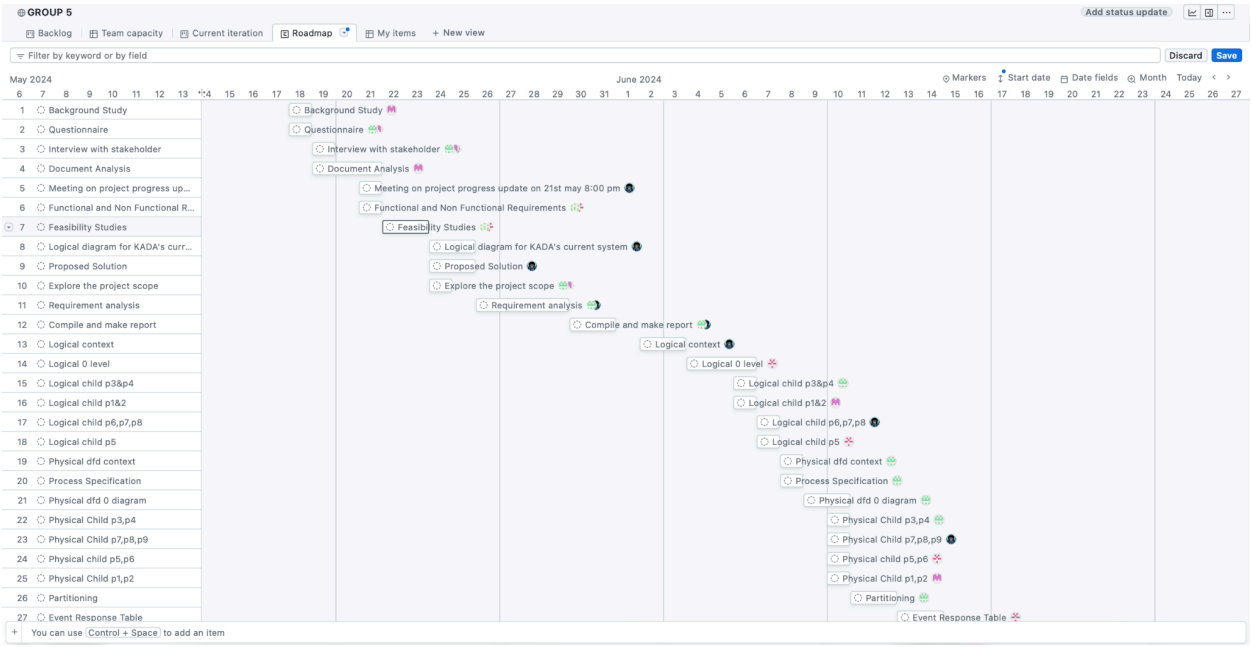


Fig 3 *Gantt Chart**

3.4.6 Project Management (Github)

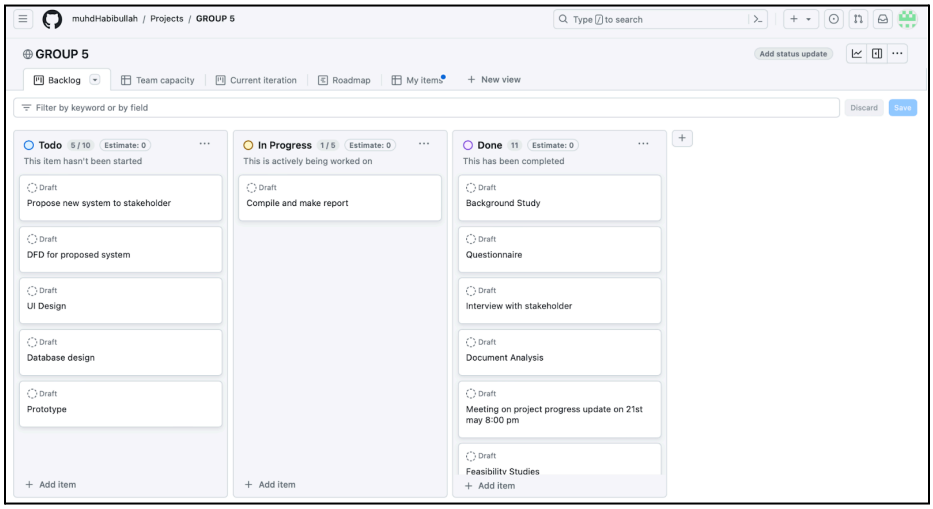


Fig 4 *Github Snapshot*

4.0 System Analysis and Design

4.1 Introduction

We examine the current manual system to identify inefficiencies and gather user requirements. This helps us understand the specific needs of staff and members.Based on the analysis, we create a detailed design for the new system, including database structure, user interface, system integration, and security measures. The goal is to build an efficient, user-friendly system that meets KADA Koperasi's needs.

4.2 System Requirements Gathering Techniques

4.2.1 Method Used: Joint Application Design (JAD)

Joint Application Design (JAD) is a structured workshop-based technique used to gather requirements from stakeholders in a collaborative manner. It involves bringing together key stakeholders, end-users, and developers to:

Identify Existing System and Environment: Research the current system and its operational environment to understand its strengths, weaknesses, and constraints.

Discover Issues and Limitations: Identify existing problems, pain points, and limitations in the current system that need to be addressed.

Context and Scope Understanding: Gain a comprehensive understanding of the project's context, scope, and objectives to align the requirements with business goals.

4.2.2 Summary from Method Used (JAD):

During the JAD sessions, the following key activities were conducted:

Development of Discussion Topics: A structured set of discussion topics and activities were prepared to guide the collaborative design sessions. These topics covered areas such as functional requirements, non-functional requirements, user interface design, data requirements, and system integration needs.

Session Planning: The session plan was meticulously developed to ensure comprehensive coverage of all essential aspects of system requirements and design. It was validated with project stakeholders to incorporate their input and ensure alignment with their expectations.

Hosted JAD Sessions: Key stakeholders, including end-users, managers, and technical experts, were identified and invited to participate in the JAD sessions. Sessions were scheduled and facilitated to encourage open communication and collaboration among participants.

Documentation of Stakeholder Input: Throughout the collaborative design process, detailed documentation was maintained to capture stakeholders' needs, expectations, and feedback. This documentation served as a valuable resource for validating and refining the gathered requirements.

4.2.3 Current business process (scenarios, workflow)

- Apply to be a KADA member
- Apply for a loan if you are a KADA member
- Specify which type of loan preferred
- Calculate profit percentage

- Do monthly salary deduction

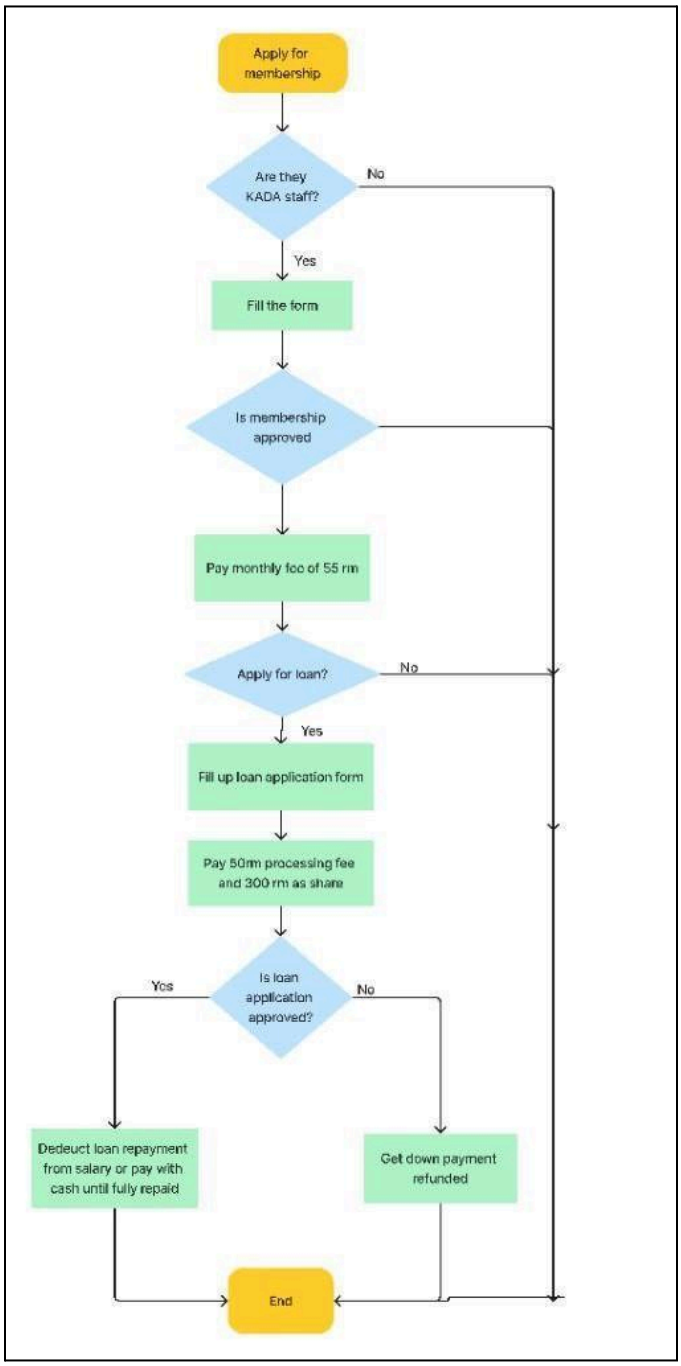


Fig 5 *Flowchart for KADA's Requirement Analysis**

Requirement Analysis (based on AS-IS analysis)

The steps to apply for membership are as follows:

First, make sure they are KADA staff. If not, you cannot apply. If so, fill the form first. Then determine if membership is approved. If it is not and still cannot be applied, if it is, pay a monthly fee of 55 RM. Next, determine whether to apply for a loan. If not, it is still unable to apply. If it is, fill up the loan application form first, and then pay 50 RM Processing fee and 300 RM as share.The final decision is whether the loan application is approved. If so, deduct loan repayment from salary or pay with cash until fully repaid. If not, get a down payment refunded.

4.2.4 Company (Cooperative of KADA)

The Kada Koperasi is an agricultural cooperative that leverages the collective resources and expertise of its farmer-members to support sustainable and profitable farming practices.

4.2.5 Logical DFD AS-IS system (Context Diagram, Diagram 0)

Context Diagram

This diagram shows the interactions between different entities and the registration system:

1. Customer

- Provides information, applies for membership and loans, and makes payments.

2. KADA's Registration System

- Manages customer information, membership and loan applications, payments, and approvals or rejections.

3. KADA Officer

- Approves or rejects membership and loan applications, and handles cancellation requests.

4. Audit Dividend

- Processes payments and calculates profit percentages, including refunds.

Each diagram illustrates different levels of interaction and data flow within the loan application and registration system.

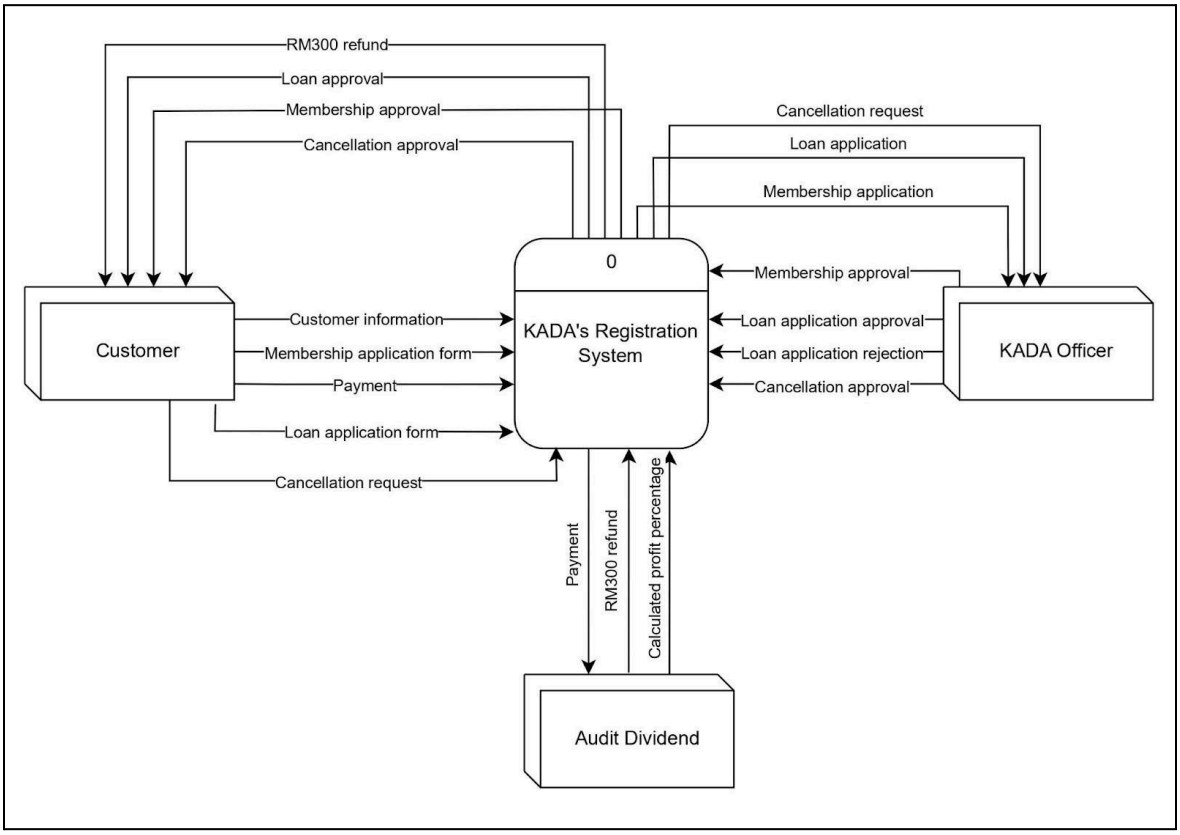


Fig 6 *Context Diagram for KADA's Registration System**

Level 0 Diagram

The provided Data Flow Diagram (DFD) for the KADA membership system highlights several key processes and data interactions. Customers start by applying for membership, which is then reviewed and approved by a KADA Officer. Upon approval, customers pay the necessary membership fees. They can also submit loan applications, which are processed by the KADA Officer who either approves or rejects them. In addition, customers pay share and processing fees, and the system

calculates profit percentages. If a customer decides to cancel their membership, the system processes the cancellation and refunds any applicable share fees. Data involved in these processes is stored in the KADA Members Database and the KADA Member Bank Information store. The main entities interacting with the system are the Customer and the KADA Officer, facilitating various processes and data flows throughout the system.

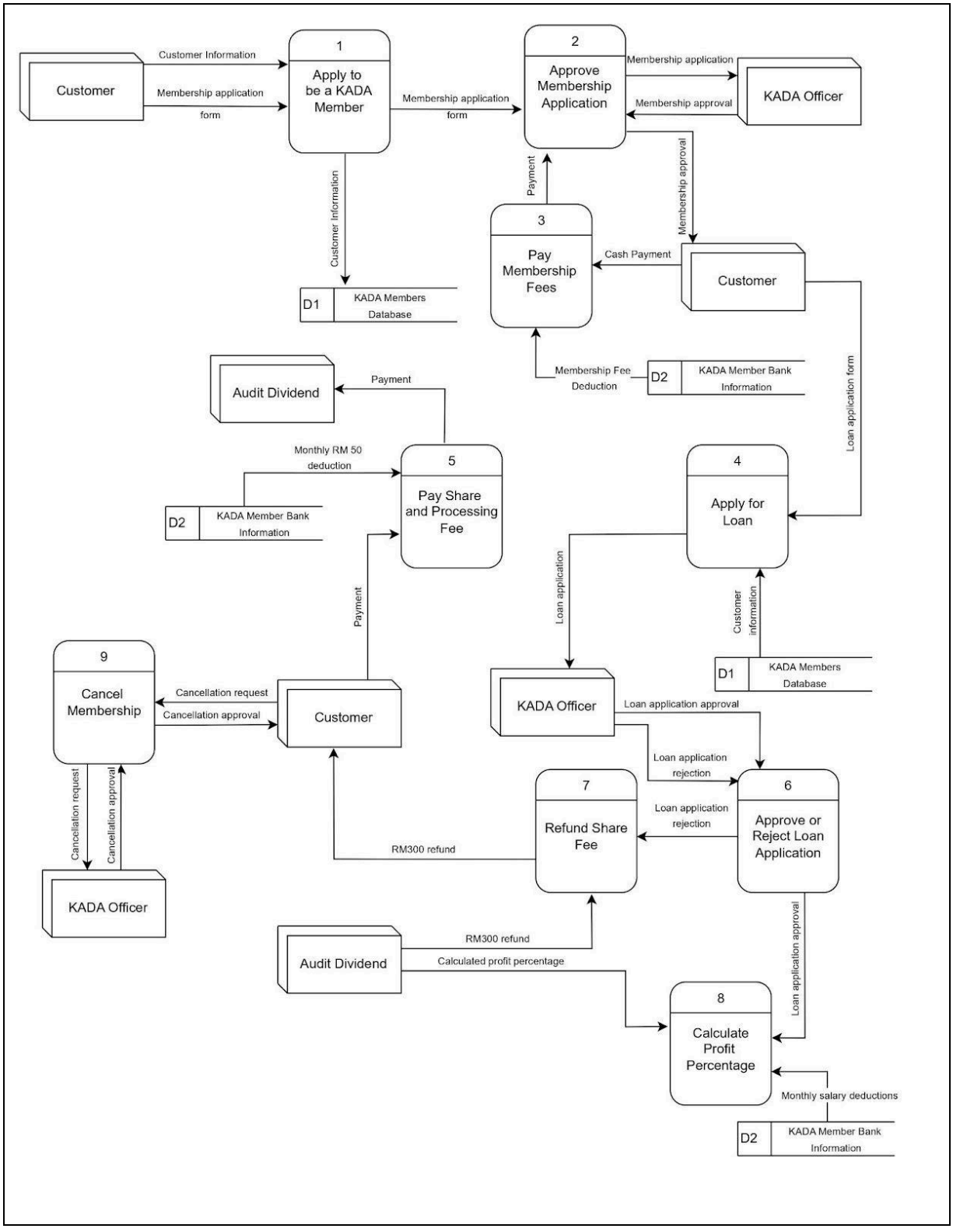


Fig 7 *Level 0 Diagram for KADA**

4.3 System Requirements

4.3.1 Functional Requirement (input, process and output)

Input

To apply for membership, customers need to fill in the membership form and provide documents to show that they are an employee at KADA. If they become a member and decide to take loans, they need to submit an application after selecting from the types of loans available.

Process

The KADA Koperasi board holds meetings where they accept or reject membership applications and decide which loan applications to approve. If loans are approved, the monthly loan repayment is calculated and the customers can choose the method of payment.

Output

The users are notified through email about the results of the membership/loan application.

4.3.2 Non-functional Requirement (performance and control)

The non-functional requirements for the current system include the speed, security, and usability of the current system.

Speed

The current system processes are very time consuming as every step takes a long time. For example, to be selected as a member or to get a loan application approved, the person needs to wait for it to be reviewed at the meetings and get the

result back. This affects the efficiency of the system and can cause user dissatisfaction.

Data Storage

Since information is all processed and handled manually, there is risk of data loss or inaccuracies.All the information is stored manually, which makes data processing tedious, and data retrieval is difficult.Data stored manually is also susceptible to damage.

Usability

As the system processes are lengthy and time consuming, this might turn away potential users from using the system if they find it too tedious and not worth their time.As the processes are manual, notifications might reach current users late and affect their experience of the system.

4.4 System Design

4.4.1 Proposed system: Logical DFD (TO BE) System

Context Diagram

Customer provides customer information membership or loan application and bank information to KADA Koperasi System, then the KADA Koperasi System will give customer loan deduction notification, share money refund, membership or loan approval notification and payment successful notification,then the KADA Koperasi System will provide the loan application to the KADA board, and the KADA board will provide the loan approval or rejection to the KADA Koperasi System.The KADA Koperasi System will also provide customer information and member information to the admin, and then the admin will provide the account login information, customer information and application approval or rejection to the KADA Koperasi System.

Process	Entity	Input	Output
KADA Koperasi System	Customer	1. Customer information 2. Membership 3. Bank information	1. Membership/Loan approval notification 2. Loan deduction notification 3. Share money refund 4. Payment Successful notification
	KADA board	1. Loan approval or rejection	1. Loan application
	Admin	1. Account login information 2. Customer information 3. Application approval/rejection	1. Customer information 2. Member information

Table 4 *Dataflow*

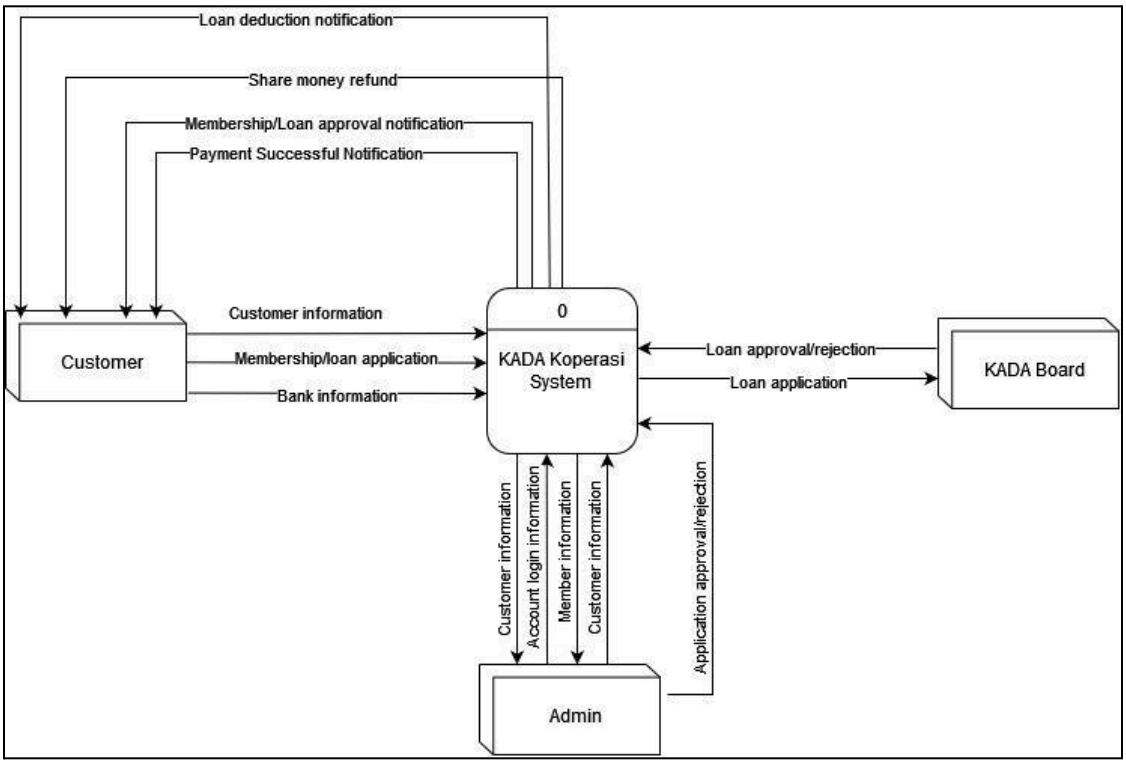


Fig 8 *Logical TO-BE Context Diagram**

Diagram 0

Process	Entity	Input	Output
Register/login to system	Customer	Customer's name,phone number,email	Success message sent and access to system
Fill in the form to apply for membership	Customer, Admin	Customer information,Kada staff identification documents	Application approval/rejection notification
Add bank account	Customer	Bank information	Payment deduction notification, Member bank info
Apply for loan	Customer, KADA Board	Loan Application, Share money	Loan approval /rejection notification, Share money refund
Pay back loan	Customer	Customer bank information	Loan deduction notification
Manage Account	KADA Admin	Account login information	Member information
Produce Report	KADA Admin	Customer information	Generated Report

Table 5 *Level 0 Specification*

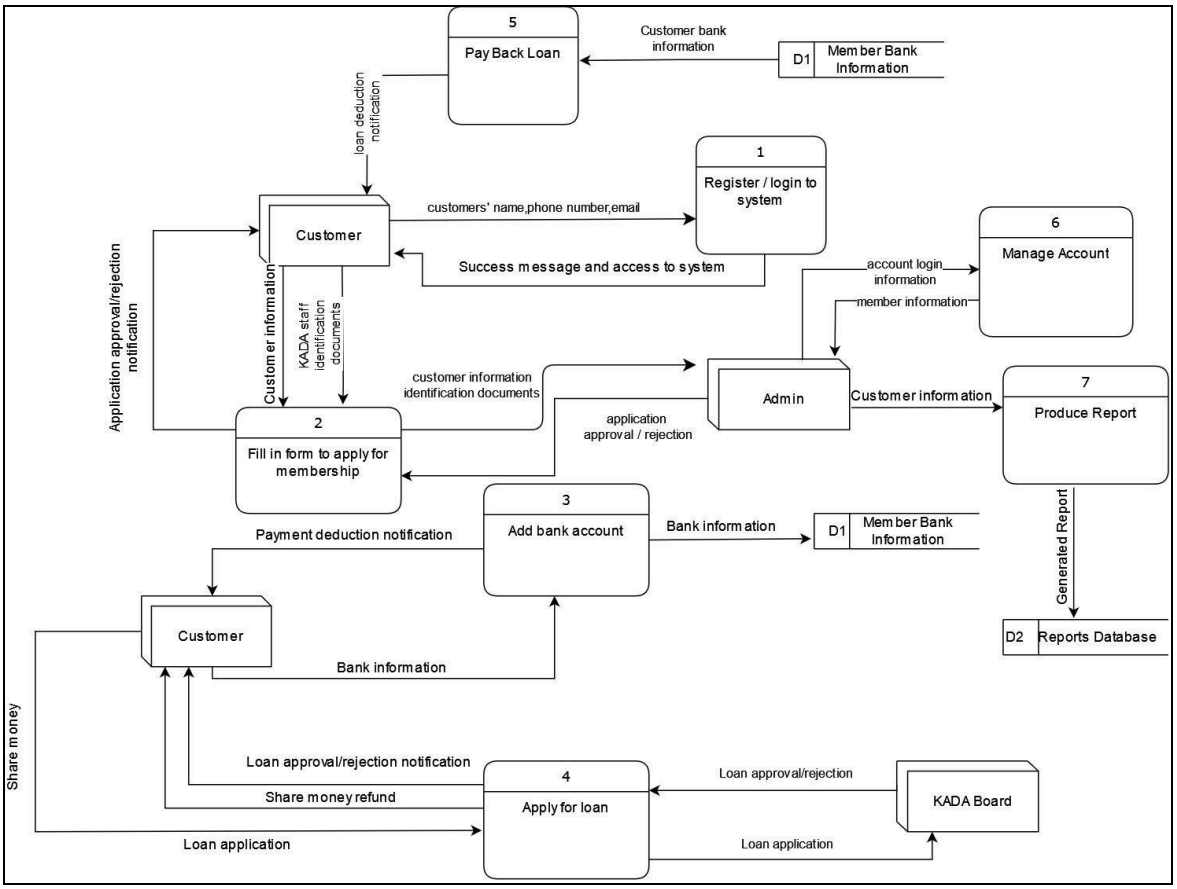


Fig 9 *Level 0 Diagram*

This diagram represents the overall logical flow:

1. Register/Login to System

- Customers register or log in to the system.

2. Fill in Form to Apply for Membership

- Customers fill out a membership application form, including personal information and identification documents.

3. Add Bank Account

- Customers provide their bank information.

4. Apply for Loan

- Customers apply for a loan.

5. Pay Back Loan

- Customers repay the loan.

6. Manage Account

- The system manages customer accounts.

7. Produce Report

- The system generates reports.

Additional interactions include admin approvals, customer information handling, and interaction with the KADA Board for loan approvals.

Child Diagram

1. Register/Login to System

First enter customer name, phone number and email, Then put in details, then enter the same content to verify details,then save the customer login information to customer records.Provide access to details after success message,Then the success message will appear and access to system.

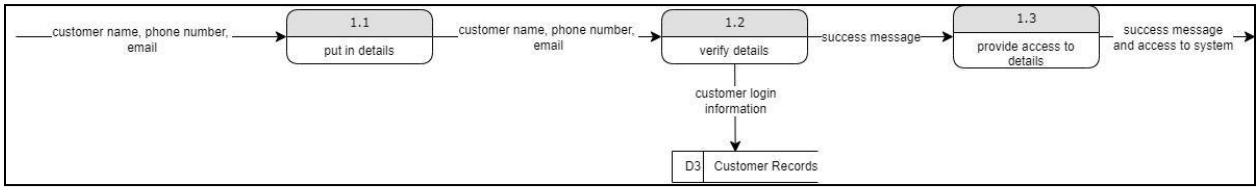


Fig10 *Register/ Login to System Child Diagram*

2. Fill in Form to Apply for Membership

First, you need to fill in the customer information and KADA staff Identify documents into the online membership form, then submit an application, and then submit the membership form to review the application.

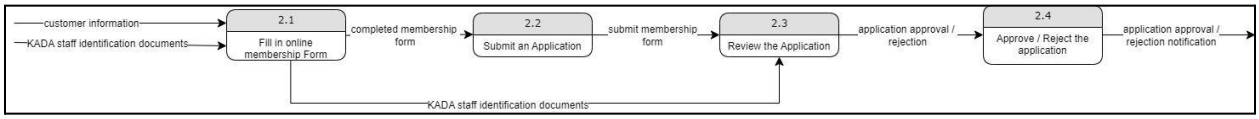


Fig11 *Fill in Form to Apply for Membership Child Diagram*

3. Add Bank Account

First, add bank information,this information will be saved in member bank information,and then pay the monthly fee,eventually receive a deduction notice.

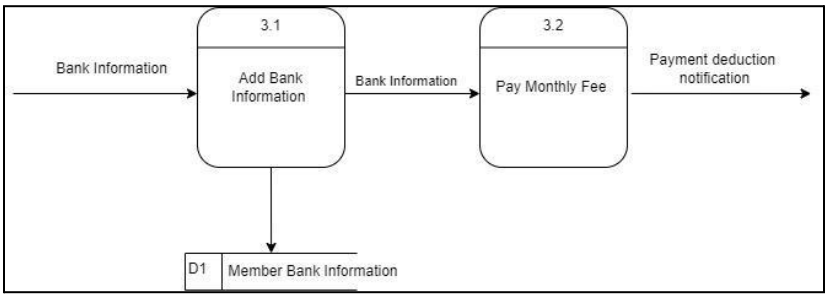


Fig12 *Add Bank Account Child Diagram*

4. Apply for Loan

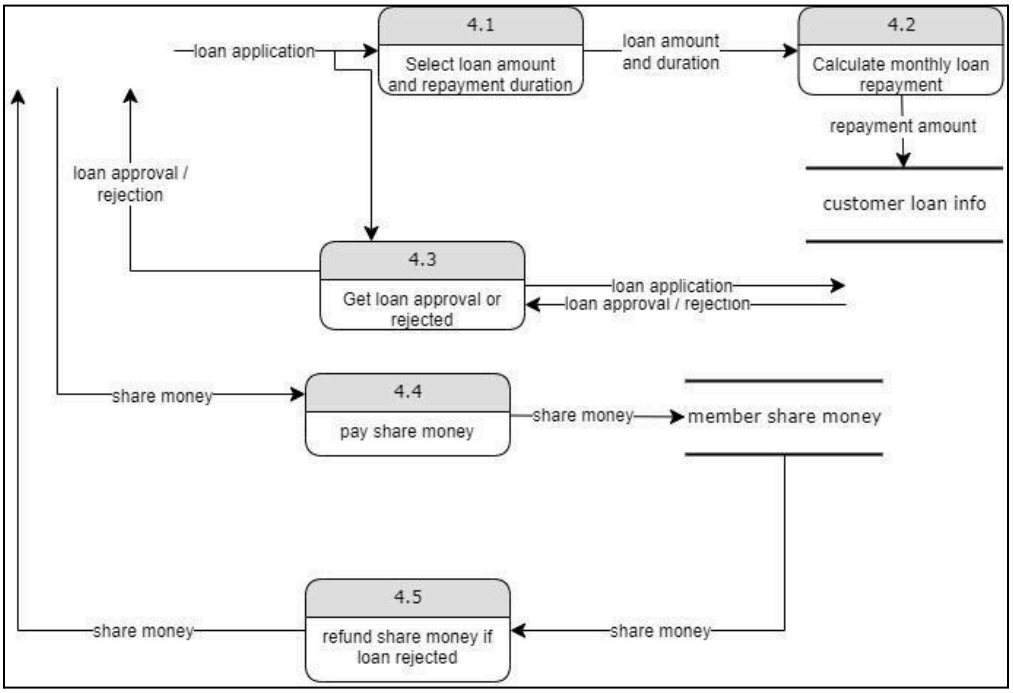


Fig13 *Apply for Loan Child Diagram*

This diagram represents the detailed process of applying for a loan:

4.1 Select Loan Amount and Duration

- The customer selects the desired loan amount and repayment duration.

4.2 Calculate Monthly Loan Repayment

- The system calculates the monthly repayment amount based on the loan amount and duration.
- Customer loan information and repayment amount are generated.

4.3 Get Loan Approval or Rejected

- The loan application is either approved or rejected.
- If approved, the process moves to paying share money.
- If rejected, the share money is refunded.

4.4 Pay Share Money

- If the loan is approved, the customer pays the share money, which is transferred to the member.

4.5 Refund Share Money if Loan Rejected

- If the loan application is rejected, the share money is refunded to the customer.

5. Pay Back Loan

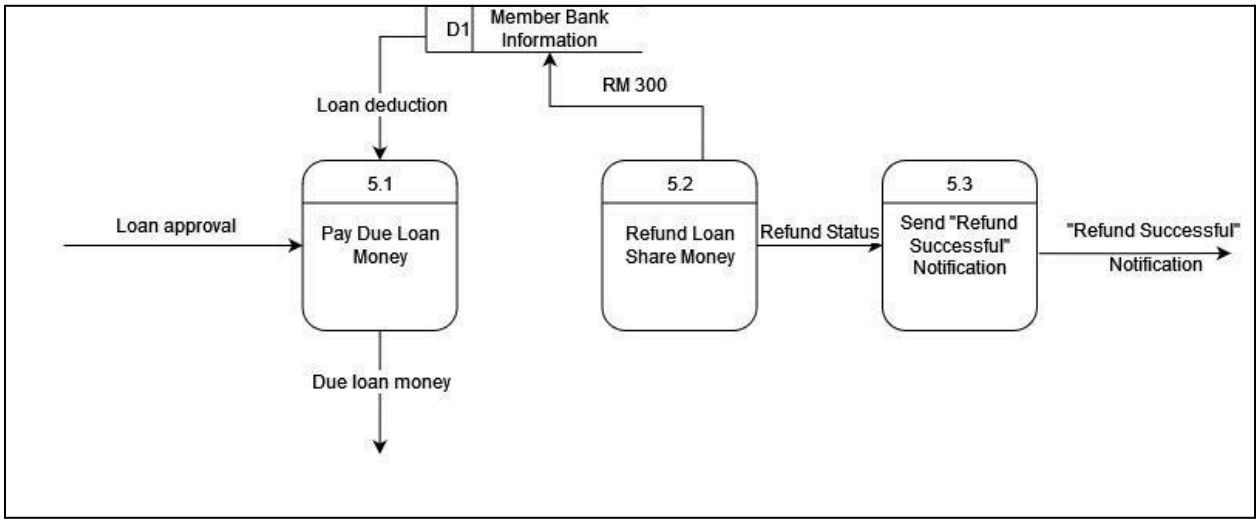


Fig14 *Pay Back Loan Child Diagram*

5.1 Payment Due Loan

The user deducts the loan from the bank account.

5.2 Refund Loan amount

The system refunds the loan balance to the user.

5.3 Sending refund notification

The system sends a refund notification to the user.

6. Manage Account

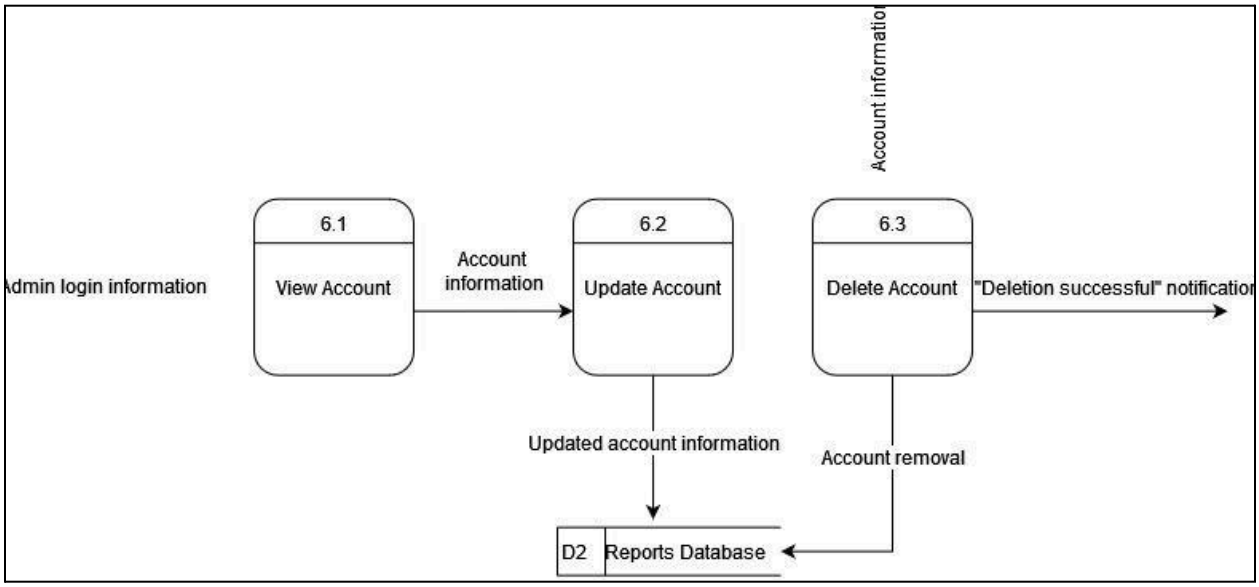


Fig15 *Manage Account Child Diagram**

6.1 Viewing Accounts

The administrator uses the login information to view the account.

6.2 Update Account

Admin updates account information.

6.3 Deleting an Account

The admin deletes the account and sends a "deleted successfully" notification.

Process Specification (based on Logical DFD TO-BE)

Register/login to system

```
WHILE Customer register
    READ Customer Details  P1
    VERIFY Customer Details
    BEGIN IF
    IF Customer Details Verified
        PRINT Successful Registration
    ELSE
```

GO TO P1
END IF
SHOW Login Page
READ Login Details
PRINT Successful Login
END WHILE

Fill up form to apply for membership

WHILE Customer select Membership Application
READ Application Details
VERIFY Application Details
ADD Verification KADA Staff Document
BEGIN IF
IF Verification done successfully
SEND Application Approval or Rejection Notification
END IF
END WHILE

Add Bank Account and Pay Monthly Fee

WHILE Pay Membership Fee
READ Bank Details
VERIFY Bank Details
BEGIN IF
IF Bank Details Verification done successfully
ADD Bank Information in Database Record
ENABLE Autopay
END IF
SUBTRACT Fee from Customer Account Monthly
SEND Monthly Deduction Notification
END WHILE

Apply for Loan

WHILE Customer Select Apply for Loan
READ Application Details
VERIFY Application Details
BEGIN IF
IF Verification done successfully

SUBTRACT Share money and Processing Fee from Customer's Bank
SEND Application Approval or Rejection Notification
BEGIN IF
IF Application Rejected
ADD Share money to Customer's Bank
END IF
END IF
END WHILE

Pay Back Loan

IF Customer Borrowed Loan
CALCULATE Loan Repayment money
SUBTRACT Monthly Due from Customer's Bank
SEND Loan Deduction Notification and Remaining Repayment
END IF

Manage Account

WHILE Kada Admin Login
BEGIN IF
IF need to edit customer Information
READ Edited Information
PRINT New Edited Information
END IF
END WHILE

Produce Report

WHILE Kada Admin Login
COMPILE All data available
PRODUCE Reports
ADD Reports to Data Store
END WHILE

4.4.2 Physical DFD TO-BE system

Diagram 0

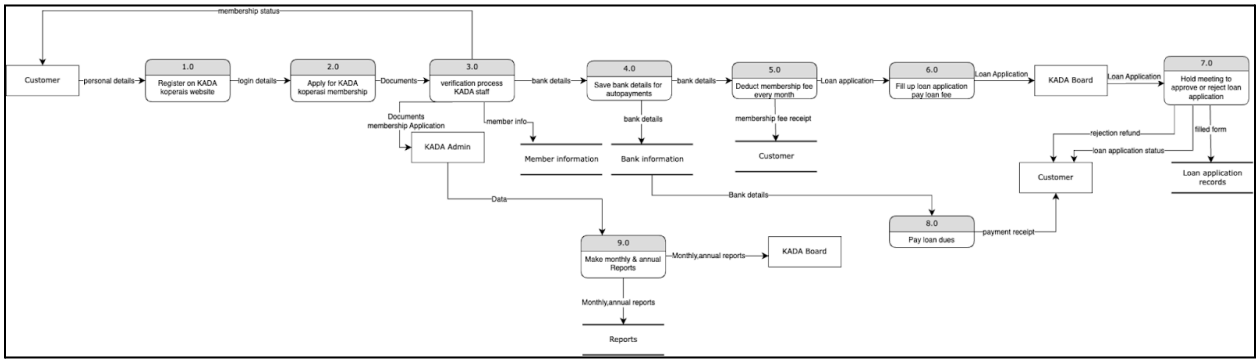


Fig16 *Physical (TO-BE) Level 0 Diagram**

Here is a detailed description of the flow chart:

1. Customer

- The process starts with the customer, who provides personal details.

2. Register on RADA koperasi website

- The client registers on RADA koperasi website using personal details and gets login information.

3. Apply for KADA koperasi membership

-The client submits an application for KADA koperasi membership and provides the required documentation.

4. Verification process by KADA staff

- KADA staff performs membership verification and obtains bank details.

5. Save bank details for autopayments

- Save the customer's bank details for automatic deduction.

6. Deduct membership fee every month

-Deduct the membership fee from the customer's account every month and generate a receipt for the membership fee and send it to the customer.

7. Fill up loan application and pay loan fee

-Customers fill up loan applications and pay loan fee.

8. Hold meeting to approve or reject loan application

- The KADA Board of Directors holds a meeting to consider the loan application, \ which
may result in an approval or rejection.
- If the loan application is rejected, the client will receive the status of the loan application and the reason for rejection.

9. Pay loan dues

- The client pays the loan dues and gets a receipt for the payment.

10. Make monthly & annual reports

- KADA makes monthly & annual reports and generates report files.

The flowchart shows the entire process from when a customer registers as a member, to applying for a loan and paying fees, and finally generating monthly and annual reports.

Child

1. **Register on KADA Koperasi Website**

First enter Customer details, then verify details, and save customer login information to customer records, then send success message and provide access details, and then output login details.

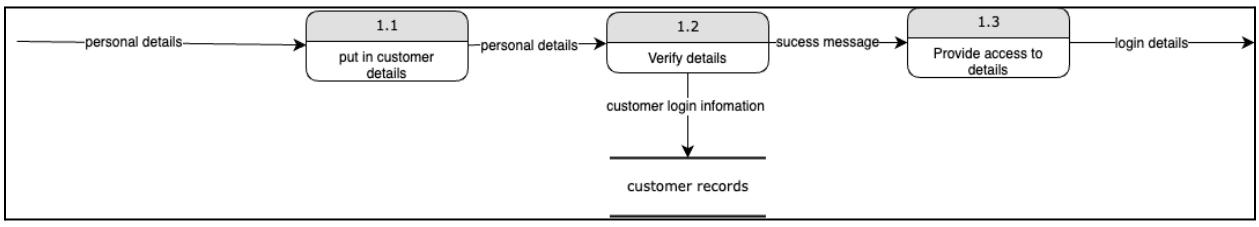


Fig17 *Register on KADA Koperasi Website Child Diagram**

2. Apply for KADA Koperasi Membership

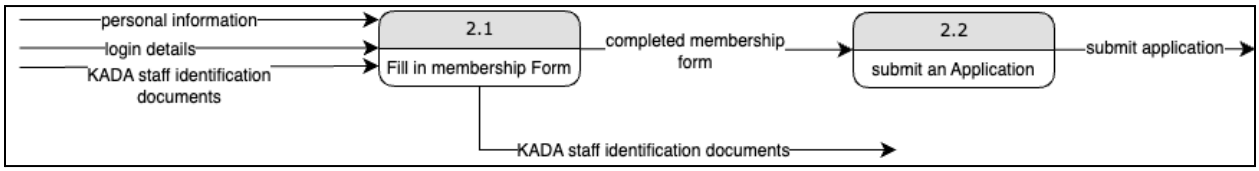


Fig18 *Apply for KADA Koperasi Membership Child Diagram**

The user provides personal information, login details and KADA employee identification documents and then fills out the membership form.The user submits the completed membership form and application.

3. Verification Process KADA Staff

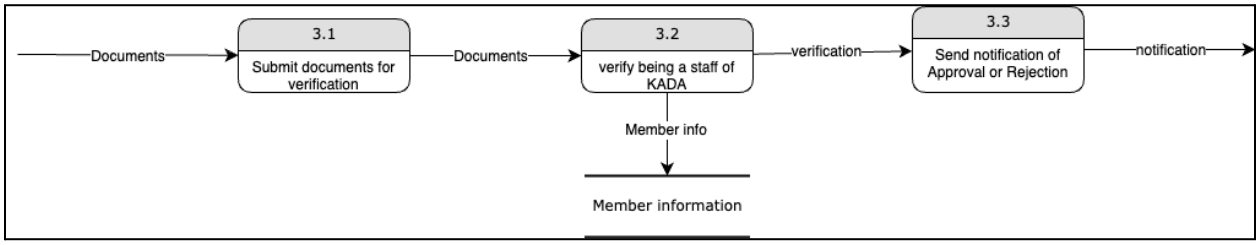


Fig19 *Verification Process KADA Staff Child Diagram**

The user submits the required files for validation.The system checks the file submitted by the user to verify whether the user is a KADA employee.Based on the verification result, the system sends a notification informing the user of the approval or rejection status of the application.

4. Save Bank Details for Autopayments

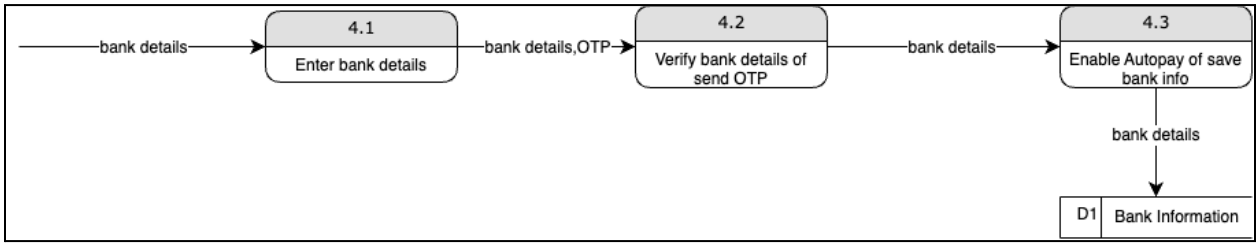


Fig20 *Save Bank Details for Auto Payments Child Diagram**

The user enters the bank details.The system verifies bank information or sends One-time Password (OTP) for verification.Once the verification is passed, the system enables automatic payment and saves bank information.

5. Deduct Membership Fee Every Month

Bank details are provided, and the monthly membership fee is deducted from the bank.The system generates a receipt for the membership fee and provides it to the member.

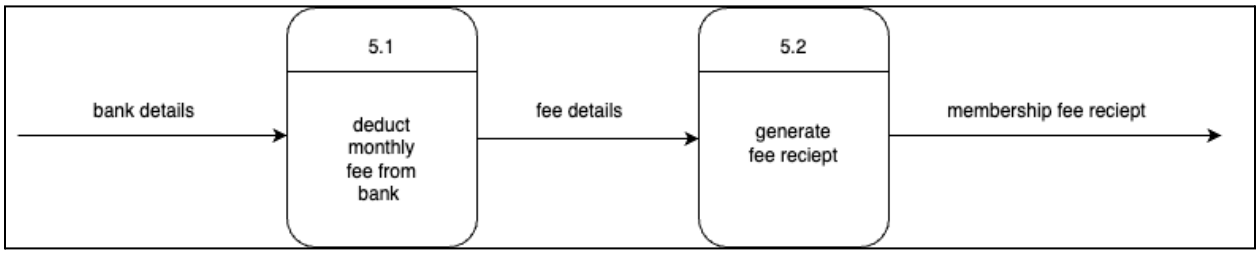


Fig21 *Deduct Membership Fee Every Month Child Diagram**

6. Fill Up Loan Application, Pay Loan Fee

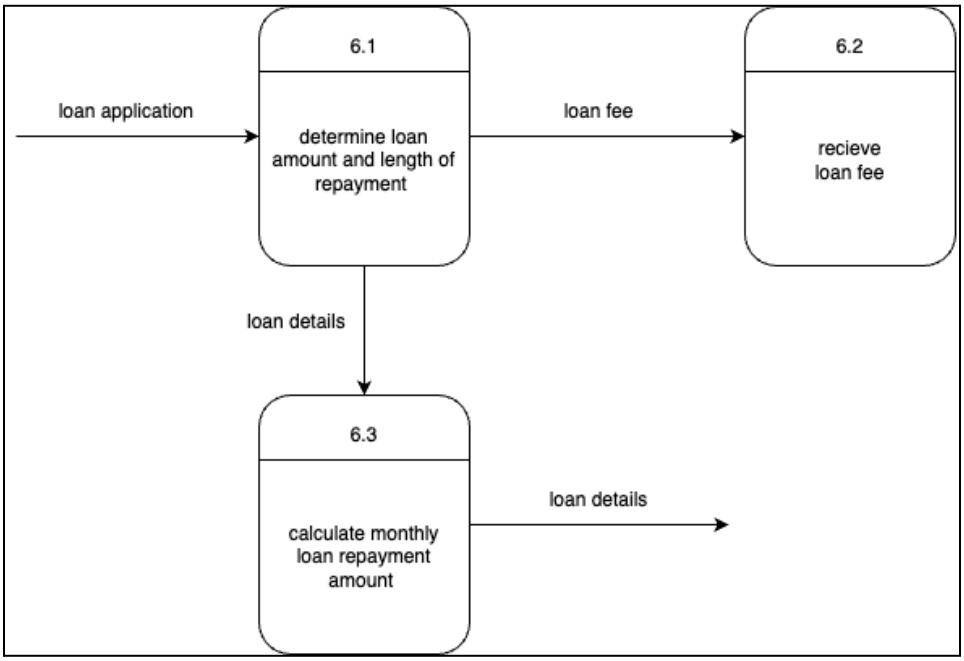


Fig22 *Fill Up Loan Application, Pay, Loan Fee Child Diagram**

Starts with the loan application, determining the amount and repayment length.The loan fee is received based on the determined amount. Calculates the monthly repayment amount and provides the loan details.

7. Loan Approval or Rejection

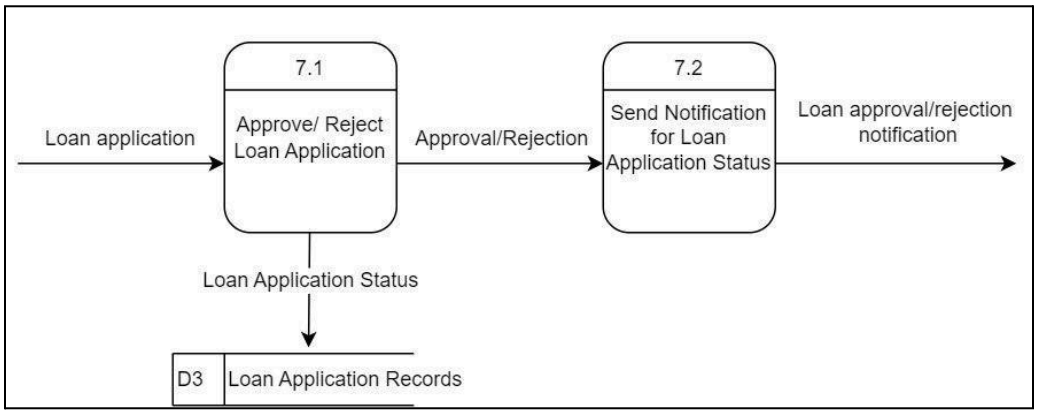


Fig23 *Hold Meeting to Approve or Reject Loan Application Child Diagram**

The process begins with a loan application. The application is reviewed, leading to either an approval or rejection.Based on the approval or rejection, a notification is sent to the applicant. The loan application status is recorded in D3 Loan Application Records.

4.4.3 Partitioning

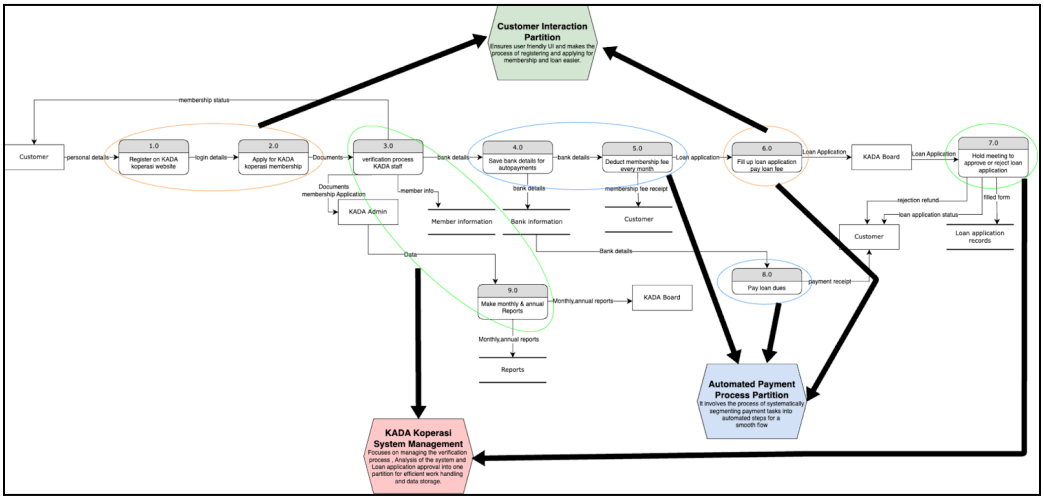


Fig24 *Partitioning Diagram*

Customer Interaction Partition

- Register on KADA Koperasi Website (Process 1)
- Apply for KADA Koperasi Membership (Process 2)
- Fill up Loan Application (Process 6)

Reasons for Partitioning

1. **Same user groups:** The above mentioned processes come under human computer interaction since the user directly interacts with the websystem. Partitioning them into one part enables efficient user friendly interface design suitable for the majority age group of the users.

2. **Similar Tasks:** The tasks are also similar to one another because they all require the user to enter their Personal information and upload identification process.

Automated Payment Process Partitioning

- Save bank details for Auto Payment (Process 4)
- Deduct membership fee every month (Process 5)
- Pay Loan Fee (Process 6)
- Pay Loan dues (Process 8)

Reasons for Partitioning

1. **Efficiency:** The tasks above are partitioned together to optimize data retrieval and storage, improving system performance.

2. **Consistency:** By grouping these tasks we can ensure that if the data is edited, the changes will be reflected everywhere and all the information will be updated.

3. **Automation:** The processes are automated ensuring a hassle free Payment method and allowing them to be grouped together. This improves smooth money flow and the need for manual intervention can be reduced.

KADA Koperasi System Management

- Verification process KADA Staff (Process 3)
- Hold meeting to approve or reject Loan (Process 7)
- Make monthly and annual report (Process 9)

Reasons for Partitioning:

1. **Similar Tasks:** The tasks can be grouped together since there is a need to verify or analyze data and it is manually done by the Admin and Board.

2. **Consistency of Data:** Ensuring that verification and approval processes are tightly integrated helps maintain data integrity.

3. **Data Organisation:** Ensures that the data for reporting and analysis purposes are organized systematically.

4.4.4 CRUD Matrix

Activities	Membership Application	Member Information	Bank Information	Loan Application Records	Reports
Register on KADA Koperasi website					
Apply for KADA Koperasi Membership	C				
Verification Process KADA Staff	U	C			
Save Bank Details for Autopayments & Deduct Membership Fee Every Month			CR		
Fill Up the Loan Application & Pay the Loan fee			R	C	
Hold a Meeting to Approve or Reject Loan Application				U	
Pay Loan Due			R	U	
Make Monthly & Weekly Annual Reports				R	C

Table 6 *Crud Matrix based on Physical DFD (To Be)*

4.4.5 Event Response Table

Event	Source	Trigger	Activity	Response	Destination
Customer registers on website	Customer	Personal details	Create an account on website for customer	Login page	Customer
Customer logs in to the website	Customer	Login details	Allow customer to have access to main page contents	Main page	Customer
Customer applies for membership	Customer	Membership application	Store customer documents for verification	Pending membership application	Admin
Admin verifies customer membership	Admin	Membership status	Show customer whether application was accepted	Accepted/Rejected membership If accepted, Bank Details page	Customer
Customer adds bank details	Customer	Bank details	Store customer's bank info and deduct monthly fee	Fees deduction notification	Customer
Customer applies for loan	Customer	Loan application	Process customer's loan application	Loan application sent	KADA Koperasi Board
Customer pays share money	Customer	Proof of physical payment or online payment	Verify payment	Payment page	
Loan application status is updated	KADA Koperasi Board	Loan status	Notify customer of loan application status	Loan accepted/rejected notification page	Customer

Table 7 *Event Response Table based on Physical DFD (TO-BE)*

4.4.6 Structure Chart

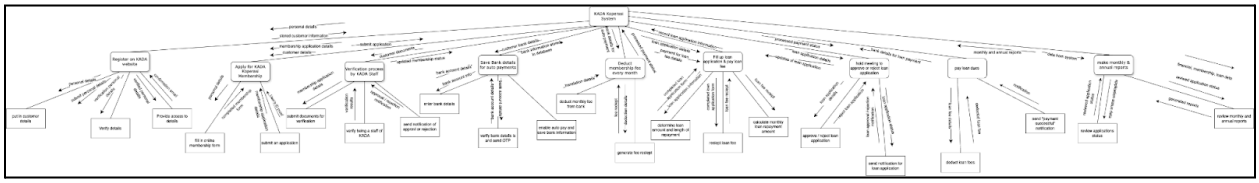


Fig25 *Structure Chart based on Physical DFD (TO-BE)**

4.4.7 System Architecture

1. **User Interface (UI) Layer**

Website/Web Application:

Platforms: Chrome, Mozilla Firefox, Safari/Windows, Linux, MacOS

Features

- User sign up for KADA membership
- User KADA members login
- User apply for loan
- User view loan application status
- User choose payment method (cash/ card)
- User add banking details
- Notification panel
- Admin login as admin
- Admin view/update/delete accounts

2. **Application Layer**

Microservices

- **User Management Service:** Handles user profiles.
- **Registration Management:** Handles users sign up and verifies membership status.
- **Notification Service:** Sends notifications for successful membership applications and loan applications.
- **Payment Services:** Integrates with payment gateways like credit/debit cards.

3. **Data Aspect Architecture Layer**

- **Database Management System:** MongoDB

- **Member database:** Member profile, Loan application status, Banking details
- **Admin database:** Admin profile, Membership status, Members report
- **Site database:** Loan applications status, User sessions

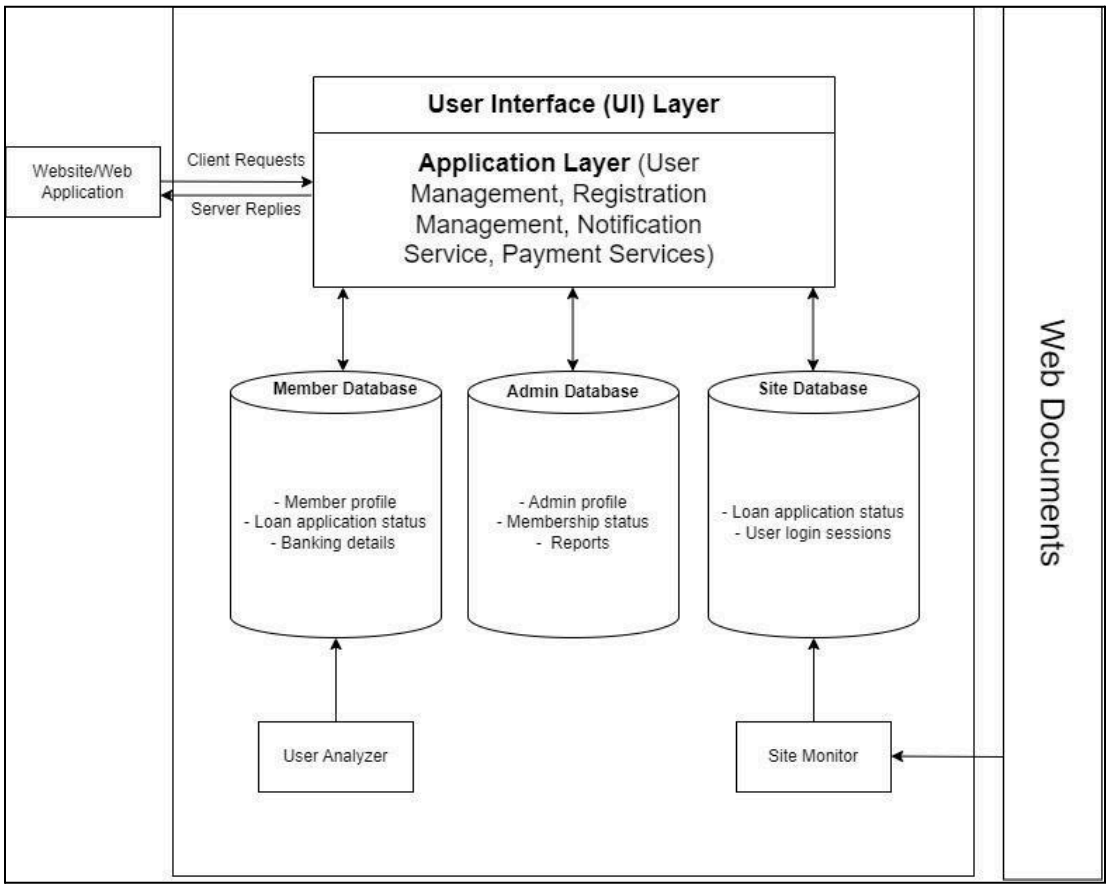
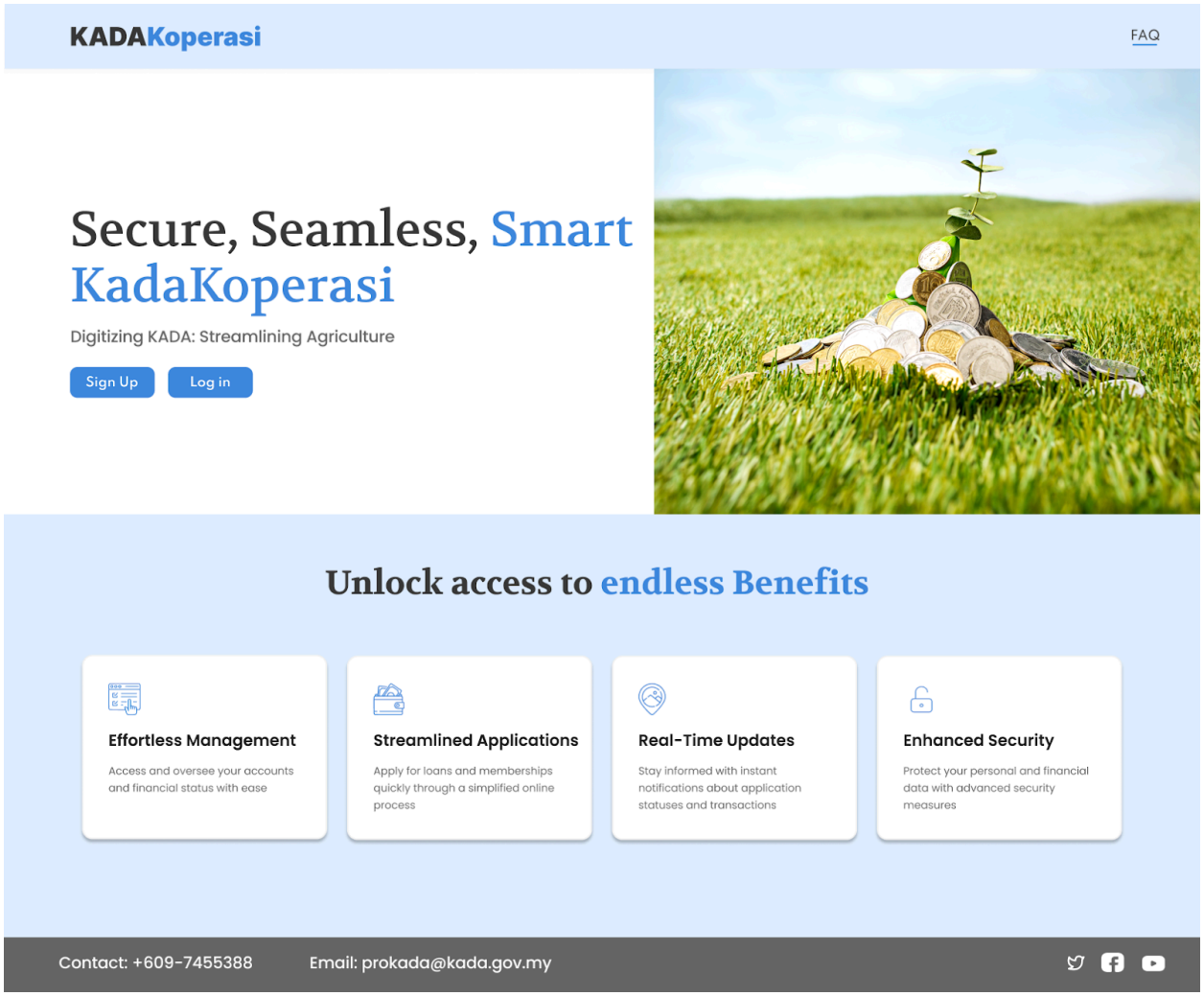


Fig26 *System Architecture for KADA Koperasi System*

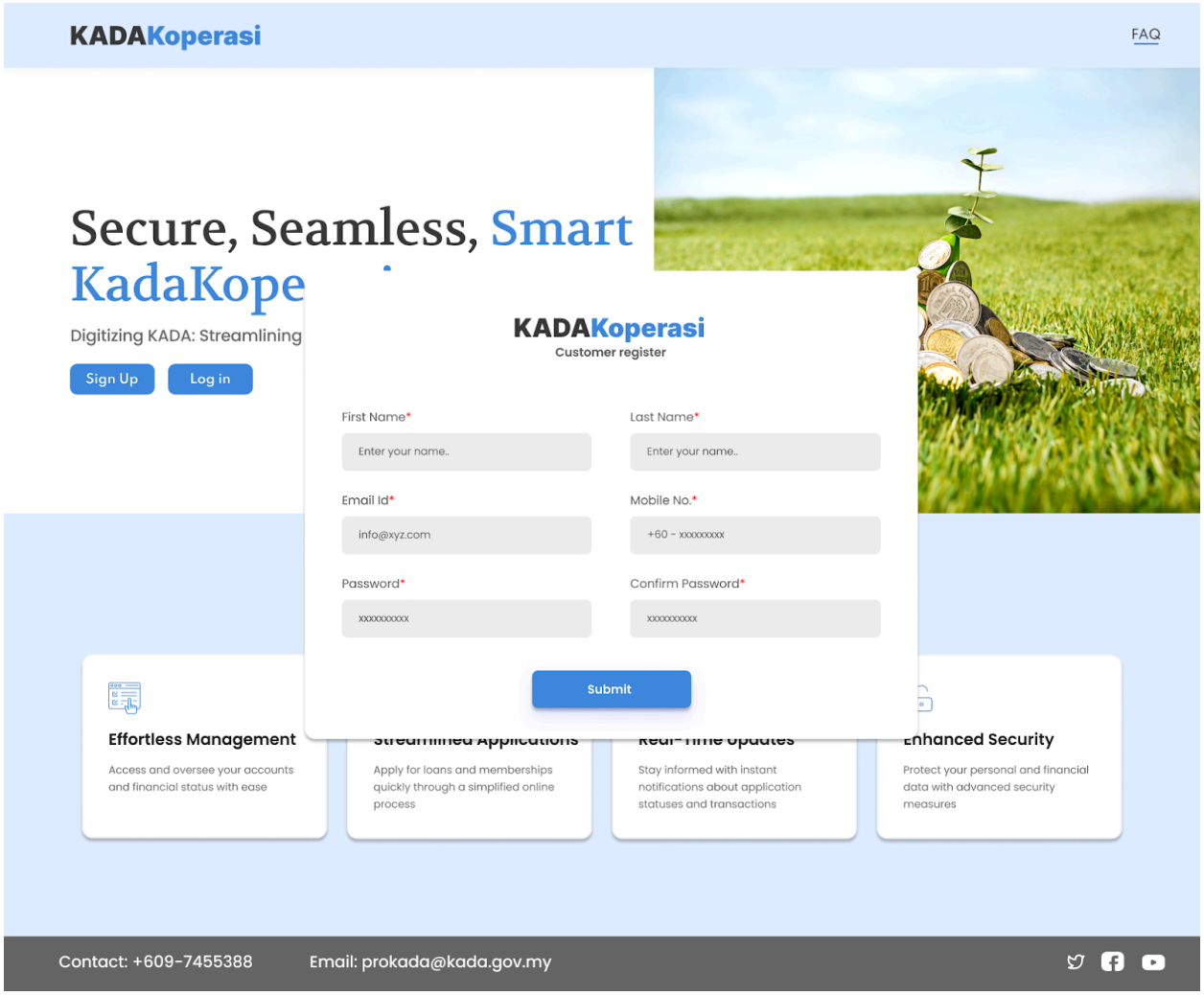
4.4.8 System Wireframe (Input Design, Output Design)

Home



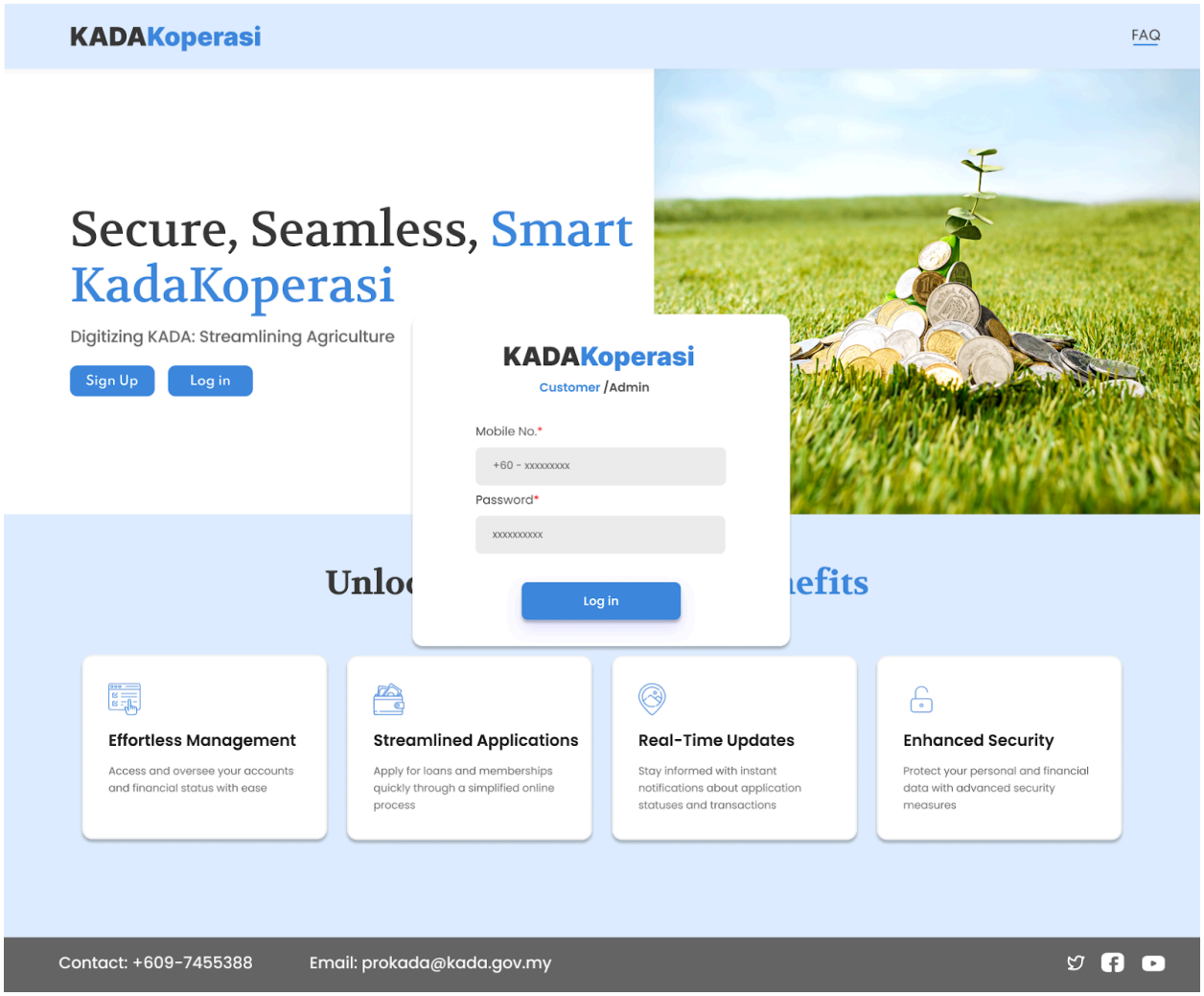
This is the landing page for KADAKoperasi. It showcases the main features and benefits of the service, with the signup and login options.

Registration



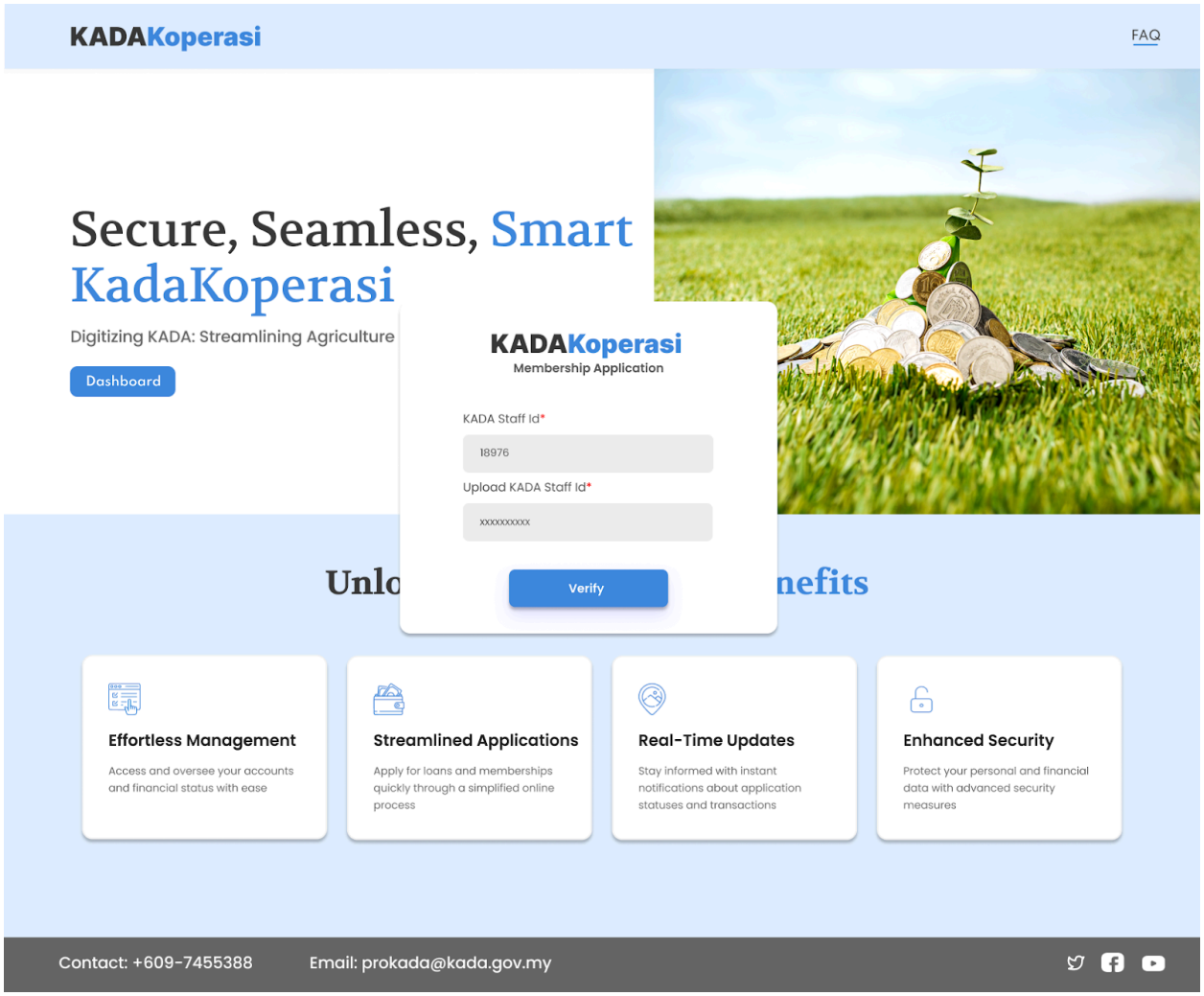
This screen displays the customer registration form for KADAKoperasi. It requests basic user information like name, email, mobile number, and password to create an account and register as a member.

Login customer



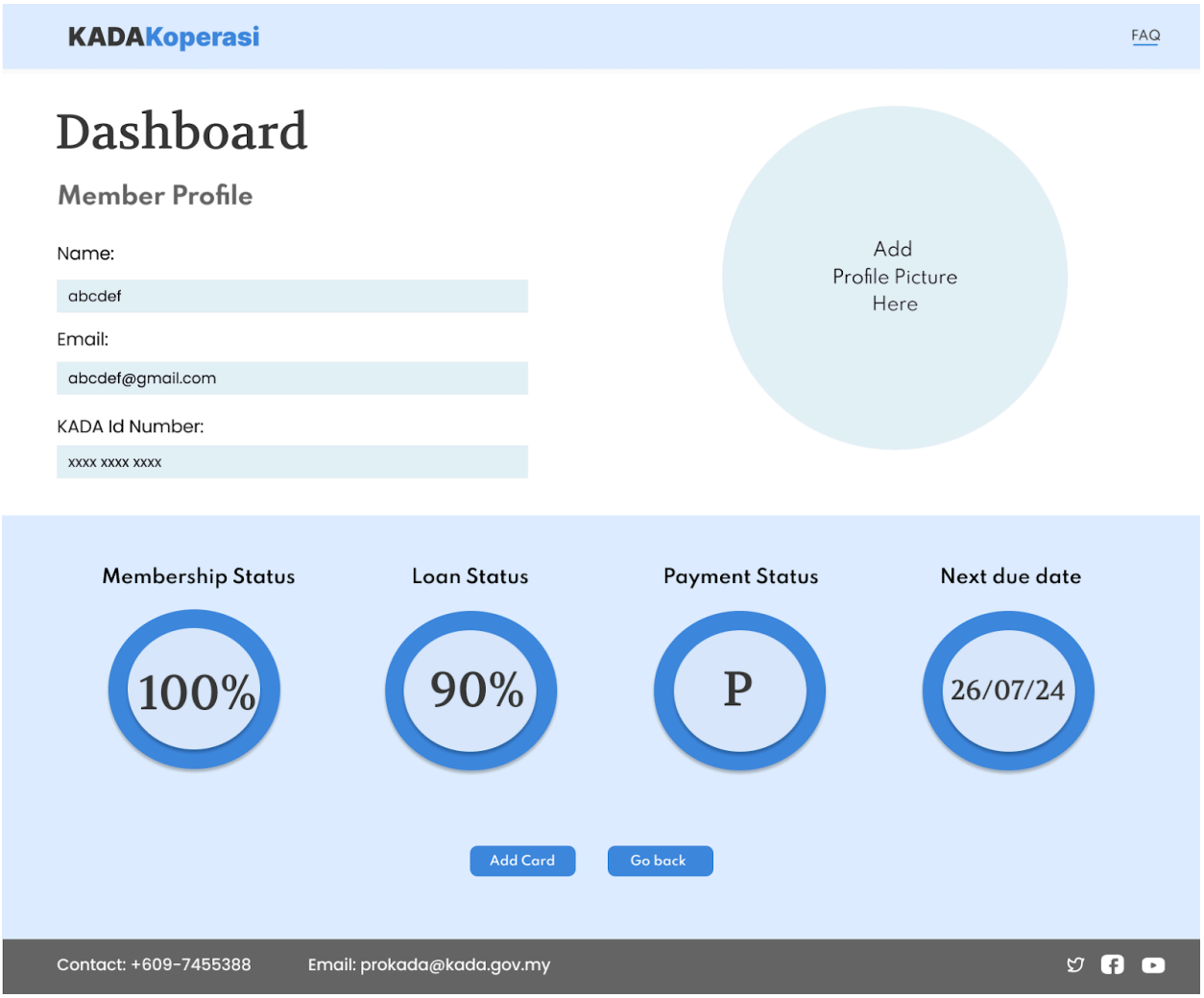
This image shows the login screen for KADAKoperasi customers. It requires a mobile number and password for authentication.

Membership



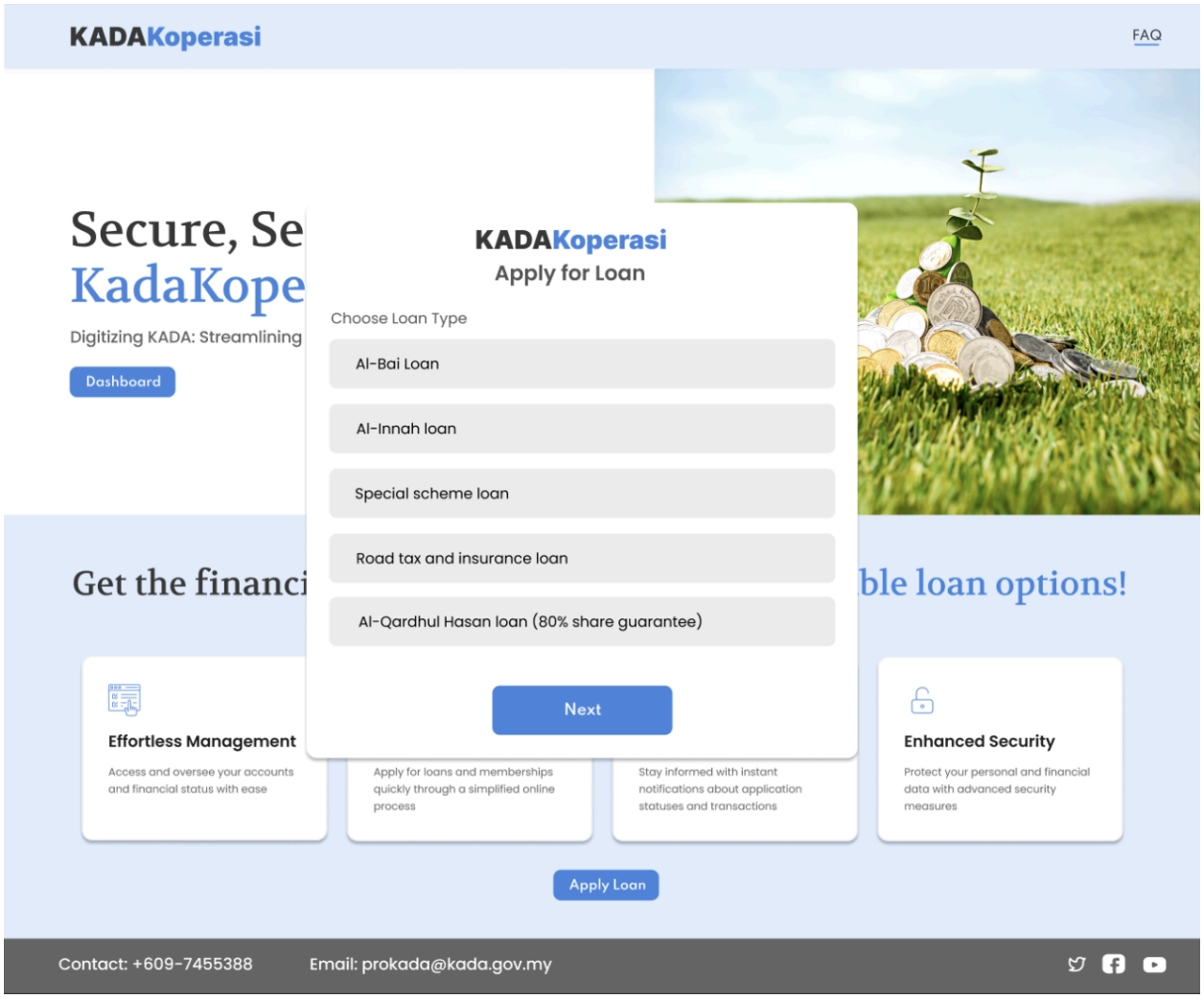
This screen is for verifying KADA staff membership applications. It asks for a KADA Staff ID and an upload of the ID for verification purposes.

Dashboard



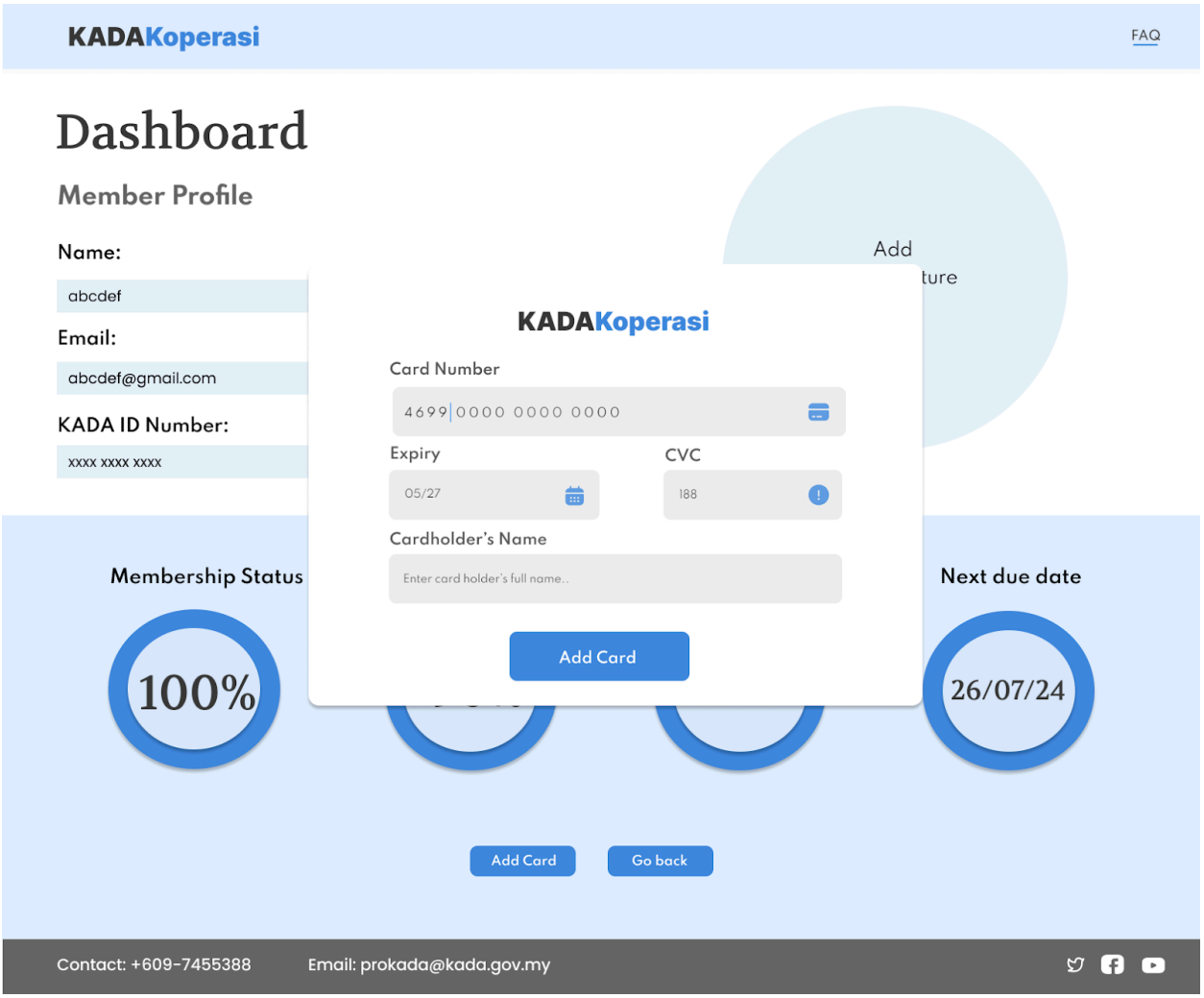
This is the member dashboard displaying the user's profile and key account information such as name, email, and ID number. It shows membership status, loan status, payment status, and next due date. It also displays an add card and go back button.

Apply for loan



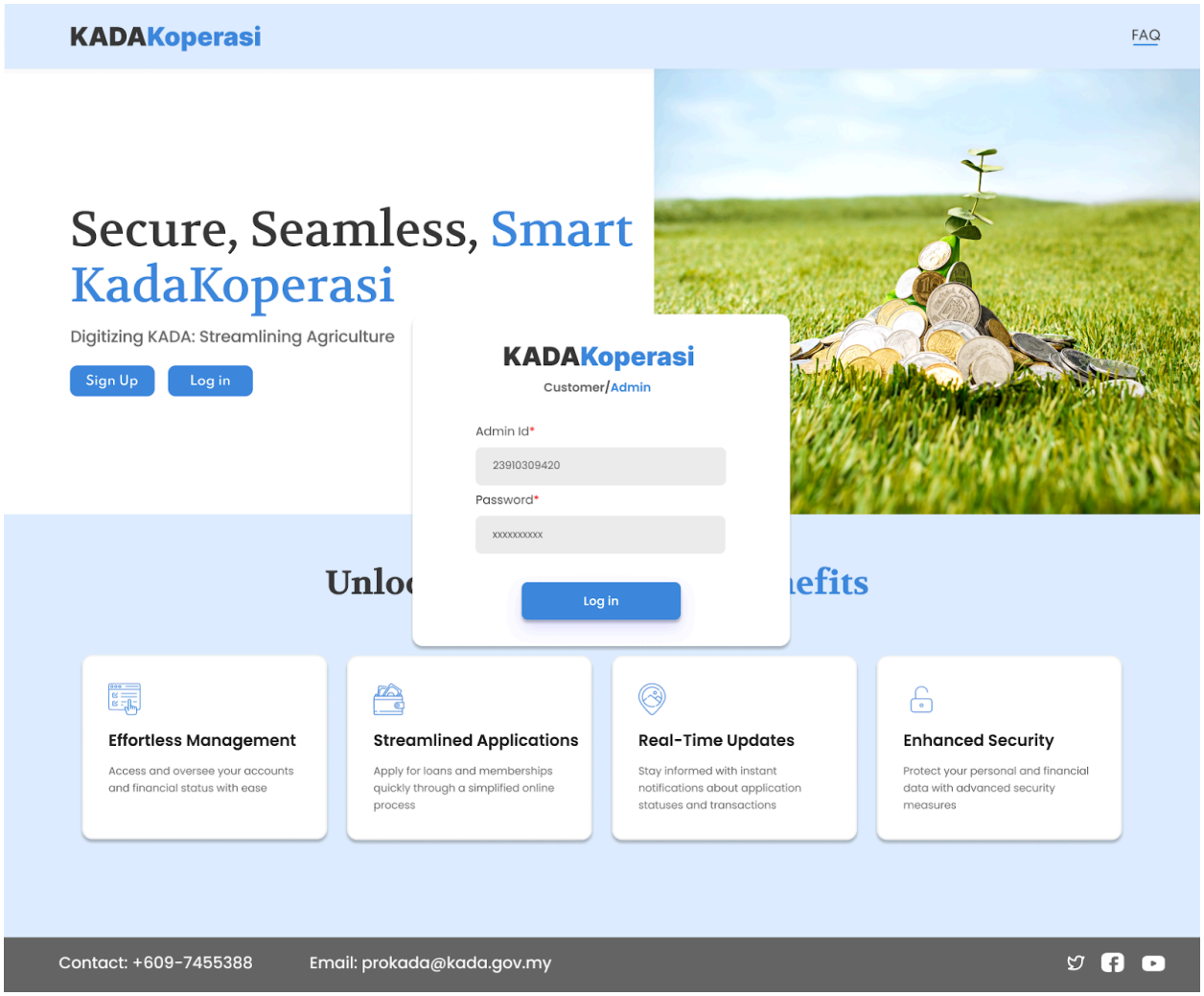
The Apply for loan page provides a user friendly interface where the user can select the type of loan they wish to apply to and select the repayment period. The apply for loan page becomes a one-click easy to apply system where the user can apply and the shares and processing fee will be automated through the previously saved bank information. The status of the loan application will be automatically sent to the user once the status is known.

Add Card



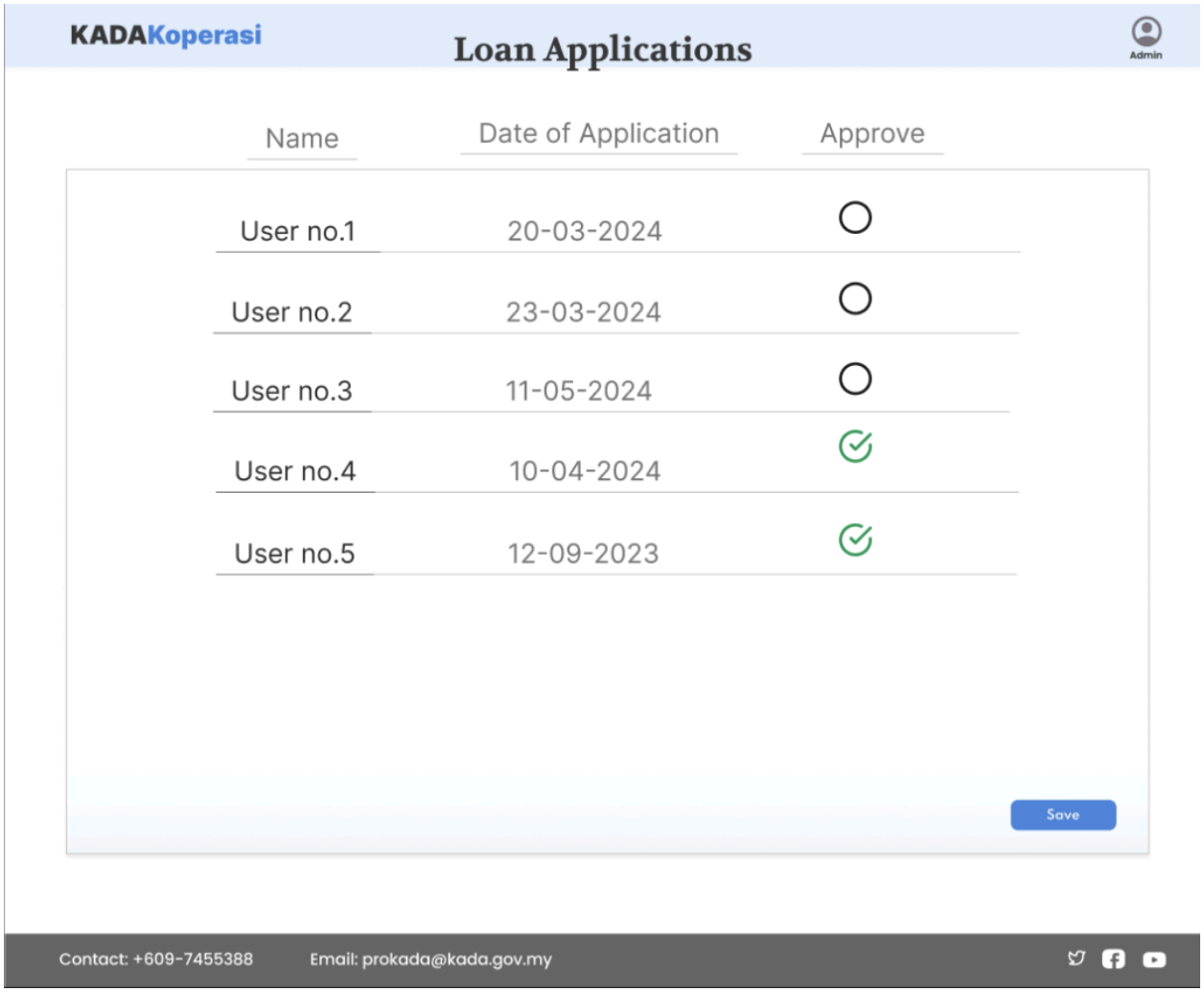
This page displays a card registration form to allow members to add a bank card to their account for automatic transactions. It asks for the card number, CVC number, and the cardholder's name.

Login admin



The image shows a login page for KADAKoperasi admins. It asks for the admin ID and password.

Admin Loan view

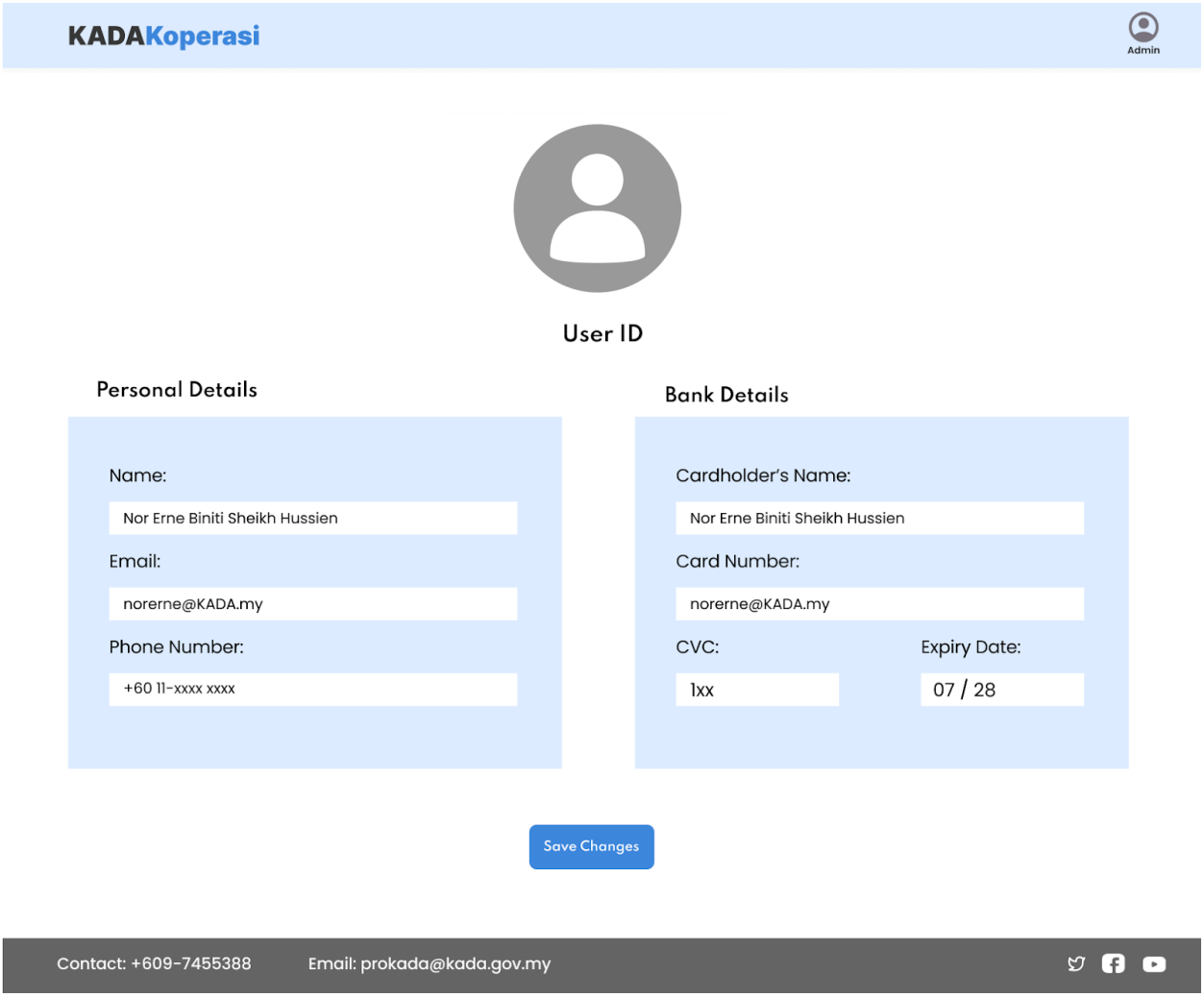


This page displays a list of loan applications for KADAKoperasi admins to view. It shows user numbers, application dates, and document icons with a save button at the bottom.

Admin Dashboard

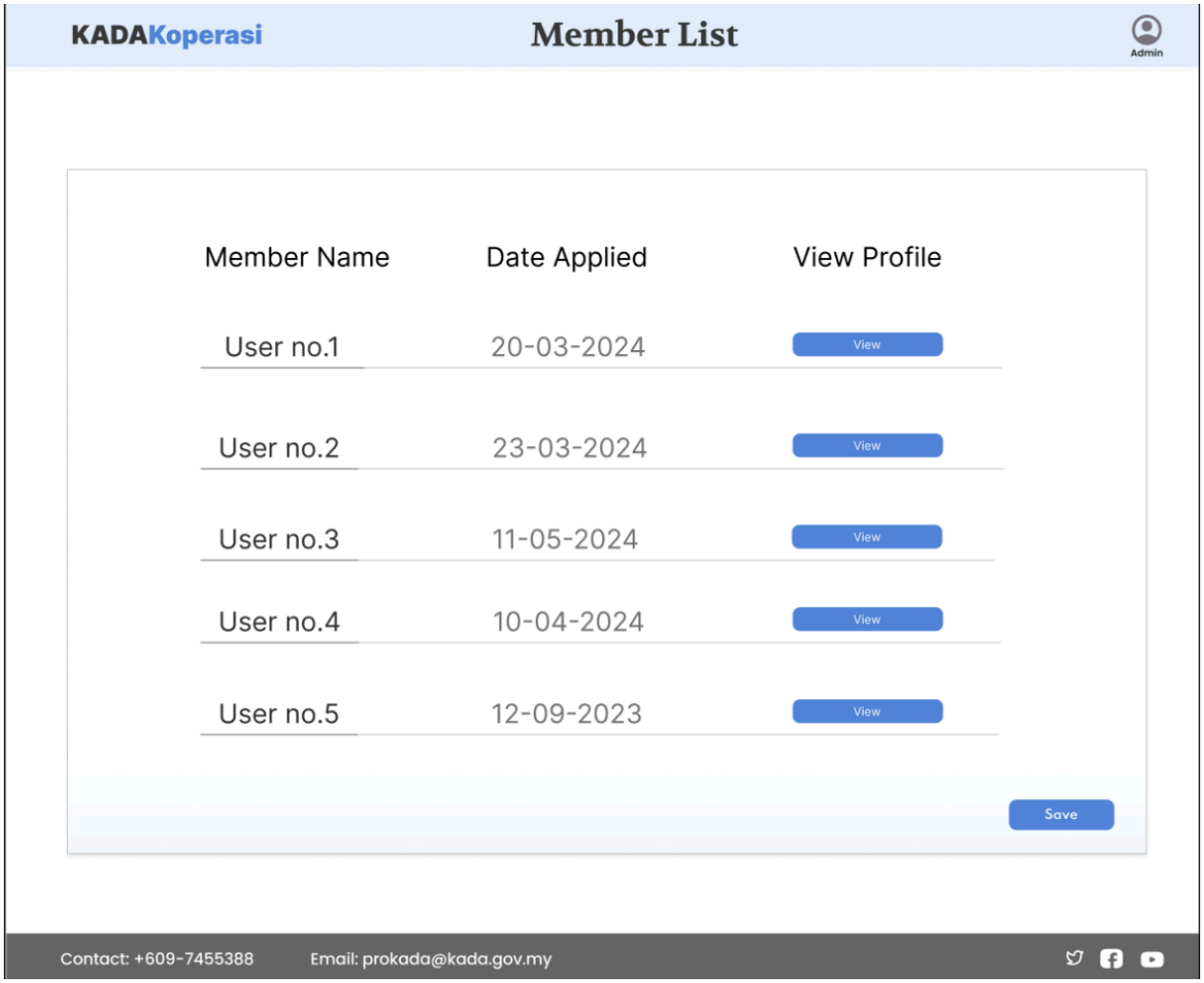
This page shows an admin dashboard for KADAKoperasi showing monthly and annual report graphs. Below are circular widgets displaying membership requests, loan requests, and options to view unpaid dues and edit member information.

Edit Member information



The page shows the admin the user/ customer profile page for KADAKoperasi members. It is split into personal and bank details sections. It allows admins to view and potentially edit customer information with a save changes button at the bottom.

Member List



This page displays the member list for KADAKoperasi members for admins to view. The columns contain member names, application dates, and profile view buttons.

4.4.9 Summary

The system design for the proposed online system for KADA Koperasi focuses on enhancing efficiency, usability, and service delivery through a comprehensive approach. This new system involves creating logical and physical Data Flow Diagrams (DFDs) to map out processes and data flows, ensuring a thorough understanding of data movement

both conceptually and in practice. The design also includes partitioning the system into manageable modules, allowing for streamlined development and focused implementation.

To manage data operations effectively, a Create, Read, Update, Delete (CRUD) matrix is established, outlining all necessary interactions with the system's data. An event response table is compiled to identify potential system events and plan appropriate responses, ensuring the system's resilience and adaptability. A structure chart is developed to visualize the hierarchical structure of system components and their relationships, providing a clear design blueprint.

The system architecture is meticulously detailed, encompassing the required hardware, software, and network components to support the new platform. Additionally, wireframes are designed to create a user-friendly interface, focusing on input and output designs to enhance user experience. This comprehensive system design aims to transition KADA Koperasi from a manual to a digital system, significantly improving operational efficiency, streamlining procedures, and enhancing service delivery for members and stakeholders

4.5 Appendix

- https://drive.google.com/drive/folders/16K575_pAaevc3EbFW-lm7tDx10kCPFeg
- https://github.com/users/muhdHabibullah/projects/9/views/4?sortedBy%5Bdirection%5D=asc&sortedBy%5BcolumnId%5D=87951689
- KADA_UI
  https://www.figma.com/design/SXgqJK21sainTdU1xi4FLt/KADAKoperasi?m=dev&node-id=17-2&t=Z1xLPSOFuNrsvt1x-1
- Business architecture and information system architecture.pdf
- ANALYSIS AND DEVELOPMENT OF MICROSERVICES.pdf