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MAKERERE UNIVERSITY BUSINESS SCHOOL

DEVELOPING AN INTEGRATED LOAN MANAGEMENT SYSTEM TO ENHANCE OPERATIONAL EFFICIENCY AT TWEZIMBE MICROFINANCE LIMITED, MPIGI

By

Student Name	Registration Number	Phone Number
STEPHEN MALIRO	23/U/11016/EVE	+256-786162566
AGNES NAMUGUMYA	23/U/14774/PS	+256-705629370
KENNEDY YIGA	23/U/18682/EVE	+256-757379418
DENIS SSEWAGUDDE	23/U/23311/EVE	+256-761000143
SUZAN ABBO	23/U/04803/EVE	+256-766000555
IVAN SSEMPEBWA	23/U/24511/EVE	+256-776517531

Supervised By

Mr. Francis Byabazaire



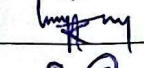

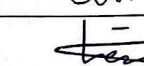
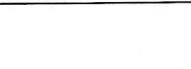
Department of Computer Science & Engineering

**A Project Proposal Submitted to the Faculty of Computing & Informatics of Makerere
University Business School in Partial Fulfillment for the Award of the Degree of
Bachelor of Business Computing
of Makerere University**

November, 2025

DECLARATION

We, the undersigned, declare that to the best of our knowledge, this proposal is our original piece of work, and has never been published and/or submitted for any award in any other University or Higher Institution of Learning.

Student Name	Registration Number	Signature
STEPHEN MALIRO	23/U/11016/EVE	
AGNES NAMUGUMYA	23/U/14774/PS	
KENNEDY YIGA	23/U/18682/EVE	
DENIS SSEWAGUDDE	23/U/23311/EVE	
SUZAN ABBO	23/U/04803/EVE	
IVAN SSEMPEBWA	23/U/24511/EVE	

Date: 23/11/2025

APPROVAL

This project proposal has been submitted with my approval as supervisor and my signature is here appended:

Signed: 

Date: **22.11.2023**

Name: **Mr. FRANCIS BYABAZAIRE**

Makerere University Business School

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SECTION ONE

1. INTRODUCTION

1.1 Project background

Microfinance institutions (MFIs) are important in local communities for providing access to financial services. Individuals and small businesses that have limited access to traditional banking can get loans from MFIs. The growth of digital technologies has transformed how MFIs operate. Globally, financial institutions are adopting digital financial systems to ensure smooth operations. In the case of MFIs, digital loan management systems are being adopted to facilitate key functions like: processing loan applications, ensuring compliance with regulations, tracking loan repayments and generating accurate reports. Effective loan management drives growth of a microfinance institution and it directly impacts risk management, customer satisfaction and profitability. However, in Uganda, many MFIs including Twezimbe Microfinance still use manual systems. This has resulted into poor service to the customers, inaccurate data and operational inefficiencies. Such challenges can be addressed by developing digital loan management systems for MFIs. These systems improve loan repayment tracking, application processing and reporting. Therefore, integrating digital loan management systems improves operational efficiency to support decision-making in MFIs.

Twezimbe Microfinance is a growing institution serving Small and Medium Enterprises (SMEs) and low-income individuals in Mpigi district. However, the Microfinance faces challenges in tracking repayments, meeting reporting deadlines and managing loan records. This is because Twezimbe uses paper-based procedures, manual calculations and tracking using Excel spreadsheets. As a result, the organization experiences operational inefficiencies in form of human errors, poor customer service, difficulty in monitoring loans and delayed disbursements. These challenges highlight the need to develop an Integrated Loan Management System (ILMS) to automate client registration by cutting manual entry by 60%, produce real-time dashboards to monitor portfolio risk and speed up loan approvals from 3 days to 1 day.

The research team proposes to build an ILMS for Twezimbe Microfinance. The purpose of the proposed system is to resolve operational challenges caused by Twezimbe's use of manual loan management methods. The system will enable staff to capture client documents and records digitally, monitor automate credit scoring, simplify loan application using guided user input

forms and support generation of reports. The above improvements in operations will minimize data-entry errors, reduce loan processing time by 60% and enable loan officers to monitor real-time repayments on the dashboard.

Overall, the implementation of the proposed ILMS for Twezimbe Microfinance will greatly reduce errors, lower operational costs, improve the customer experience and support data-driven decision-making. This will support Twezimbe's business goals and contribute to digital transformation in Mpigi.

1.2 Statement of the problem

An Integrated Loan Management System (ILMS) should ease customer interactions, enable fast processing of loans and support accurate reporting. Omokhoa noted that data management in microfinance institutions (MFIs) that rely heavily on manual processes is usually inadequate (Omokhoa, 2024). The manual systems in these institutions increase the likelihood of errors which makes it difficult to extract useful insights from financial data. Twezimbe Microfinance currently uses a paper-based system in its loan management operations. The institution is burdened by challenges including: delays in loan processing, difficulty in monitoring overdue loans, inconsistent client records and financial losses. Twezimbe risks stunted growth, regulatory non-compliance and customer dissatisfaction if it continues to use the manual method of operation.

To resolve these challenges, the study recommends developing an Integrated Loan Management System (ILMS) for Twezimbe Microfinance. The system will maintain digital records for each loan cycle, ensuring storage of accurate data and providing useful information to management to support decision-making.

1.3 Project Goals and Objectives

1.3.1 Project Goal

This project seeks to develop an Integrated Loan Management System for Twezimbe Microfinance in order to improve its internal loan management operations.

1.3.2 Project objectives

- a) To analyze the current loan management system used by Twezimbe Microfinance and identify major challenges faced by its stakeholders.
- b) To build an Integrated Loan Management Application for Twezimbe Microfinance Limited
- c) To evaluate the Twezimbe Loan Management Application that will developed.

1.3.3 Project Scope Summary

The project involves creating a web-based loan management application for Twezimbe for Twezimbe Microfinance. The project Team will complete the work in four months. The key activities include: requirements gathering, data collection and analysis, system design, implementation, testing and deployment. The system is expected to have the following key features:

- a) The system will integrate loan products, application workflows and client profiles.
- b) The system will automatically calculate interest, fees and amortization schedules.
- c) Management and clients will be able to generate reports via the system.

1.4 Anticipated significance of Project

The following are the expected benefits of the project to Twezimbe Microfinance:

- a) The system will significantly reduce paperwork and administrative tasks.
- b) The system will improve the accuracy of financial calculations and records.
- c) The system will speed up loan disbursement and customer service.
- d) The system will enable management to monitor loan performance in real time.
- e) The team also expects top benefit by applying computing design theory to creating a real-world financial IT solution.

1.5 Project Assumptions

Assumption 1: The team assumes that all software required in developing, testing and deploying the system. All hardware such as personal computers, and internet access will be available.

Assumption 2: The team assumes that the programming languages, frameworks and relevant tools will support system requirements and will be compatible with the project goals, including secure handling of financial data.

Assumption 3: The team assumes that during the development, testing and deployment of the system, there will be no compromise of the security and confidentiality of sensitive client financial data.

Assumption 4: The team assumes that the management and staff of Twezimbe Microfinance Limited will provide timely feedback and necessary domain expertise during the analysis and testing phases.

SECTION TWO

2. LITERATURE REVIEW

2.1 The Loan Concept

A loan is a form of debt. According to Otuonye et al in (Otuonye et al., 2022), a loan represents a transfer of funds from a lender to a borrower. In the lending business, a lender provides a principal sum to the borrower who then, repays in scheduled payments, usually including interest. Interest is the main incentive for lenders to issue loans. The borrowing conditions are legally binding. The borrowing contract includes measures to reduce risk to the lender. Microfinance Institutions (MFIs) primarily act as lenders. This lending relationship enables borrowers to meet their goals while providing lenders with a return on their investment which may include: interest, fees and penalties. The partnership between lender and borrower is the core function of an MFI.

2.2 Loan Management in Microfinance Institutions (MFIs)

Loan management is the key business for a Microfinance Institution. It spans the entire loan lifecycle and involves operations such as: onboarding clients, processing applications, disbursing funds and monitoring repayments. Mwangi and Brown in (Mwangi & Brown, 2021) reported that many MFIs in Uganda rely on manual systems which encounter various challenges including: lost customer records, tiresome tracking of paper loan documents, lengthy approval steps for loan applications and increased risk of calculation errors. These challenges usually result into high default rates, slow institution growth and dissatisfied customers. Therefore, transitioning to integrated digital loan management systems is an important strategy to manage risk and retain customers by MFIs.

2.3 Application of automated Financial Technologies (FinTech) in Microfinance

The growth of Financial Technologies (FinTech) has greatly transformed global finance. Digital innovations reduce cost of access to automate services. A recent World Bank report (World Bank, 2023) indicated that adoption of digital technologies was a key advantage to financial institutions that aim at growing in the competitive global market. FinTech solutions are essential in promoting financial inclusion in the Microfinance sector by making services accessible to the underserved population at low-cost. These technologies improve operations

like: credit scoring, loan repayment tracking and loan application processing by automating essential loan management activities that previously relied on paper documentation. According to Chen and Rasmussen (Chen & Rasmussen, 2022) adopting digital loan management systems is essential for improving operational efficiency and data accuracy. A good loan management system according to Smith citation should ensure efficient processing, comprehensive reporting, accurate accounting and seamless customer interaction to minimize risks.

2.4 The state of Digital Financial Services in Uganda

The Microfinance sector in Uganda plays an important role in making financial services accessible to Small and Medium Enterprises (SMEs) and low-income individuals who find difficulty in accessing traditional banking services. Bank of Uganda reported that digital finance in Uganda shows promise but MFIs have not fully automated their internal processes (Bank of Uganda, 2022). Regulatory authorities like Uganda Microfinance Regulatory Authority (UMRA) are increasingly stressing the importance of robust reporting and compliance, which is difficult to achieve with fragmented systems. This situation therefore highlights the need for integrated digital solutions by MFIs to counter their operational, regulatory and customer-service challenges.

2.5 Challenges of Financial Technologies in Microfinance Institutions in Uganda

The Microfinance sector in Uganda is regulated by both the public and private sector. The Government actively supports the industry and oversees Microfinance Institutions including Twezimbe Microfinance. As described by Hilary and Christian (Hilary & Christian, 2024), since the 1970s, the main objective of Government support to MFIs has been to assist the poor in transitioning from poverty to prosperity by providing access to affordable microcredit. However, MFIs have been slow in adopting modern digital tools. Many MFIs are still relying on basic applications, for example, Microsoft Excel which is inadequate for managing loans transactions. Other challenges like human error, slow verification processes and incomplete information records hinder accurate financial reporting. According to Yulianto and Wahyudi (Yulianto & Wahyudi, 2024), integrating a reliable accounting application with a robust database reduces recording errors and improves financial management.

2.6 Core components of Integrated Loan Management System

An Integrated Loan Management System (ILMS) serves as a centralized digital platform for managing the entire loan lifecycle. Arunkumar and Privietha (Arunkumar & Privietha, 2023), explained that a user-friendly computerized system must be developed securely store data, reduce errors and rapidly process information to improve loan management in MFIs. The ILMS handles core functions such as: manage and issue loans, adjust loan rates, retrieve, edit and add customer information.

The ILMS comprises modules for specific functions to reduce turnaround times, for example, loan processing module, disbursement module, application tracking module and approval module. Gitman And Zutter in (Gitman & Zutter, 2021), stated that automating calculations for fees, amortization schedule and interest is important in maintaining transparency and accuracy in accounting. Reporting and analytics modules give management real-time insights into loan risks and other Key Performance Indicators (KPIs) to support decision-making. These components are typically designed using object-oriented design, which facilitates creating modular, reusable and secure code structures, for example, modelling 'Client' and 'Loan' as separate objects.

2.7 Design and Implementation approaches for Financial Systems

The method used to develop a financial system is just as important as its features. Design Science Research (DSR) is a common framework for building IT artifacts to address organizational and business problems. Vom Brocke et al describe that DSR combines theoretical depth with practical application, guiding researchers through a cycle of problem identification, objective setting, design, development, demonstration evaluation and communication (vom Brocke et al., 2020). This method applies to the Twezimbe loan management project, ensuring that the system is built gradually with ongoing feedback from stakeholders. To support DSR, an iterative development model builds the system in manageable cycles. As explained by Almeida and Monteiro in (Almeida & Monteiro, 2022), each cycle results into a prototype which is evaluated by the users to align the final product to their needs. As proposed by Rilwan et al in (Rilwan et al., 2022), the suggested solution will comprise the SQL Server database at the backend and PHP, CSS and HTML at the front end.

2.8 Challenges in implementing FinTech Solutions in Microfinance

Although implementing FinTech solutions in Microfinance Institutions provides clear benefits, it also raises certain implementation challenges. Dranev et al observed that the most critical technical issues were maintaining data security and accurate complex calculations accurately (Dranev et al., 2021). Organizational challenges, for example, staff resistance to moving away from manual processes and the need to comply with strict regulations, can slow down adoption. Resource limitations such as tight budgets, limited time for thorough testing and uncertain stakeholder availability emerge as common implementation challenges. Almeida and Monteiro argue that change management, a phased approach to implementation and stakeholder engagement reduce resistance by creating ownership of the project (Almeida & Monteiro, 2022).

2.9 Conclusion of the Literature Review

In conclusion, the literature shows a need for Integrated Loan Management Systems (ILMS) and explains how they address problems caused by manual systems. The literature also describes the key features of a good ILMS and applies Design Research Science (DSR) methods for system development. Additionally, the literature identifies typical technical, organizational and resource problems that need to be addressed for successful implementation. This review provides a strong theoretical and practical foundation for this project. It justifies the need to develop a customized ILMS for Twezimbe Microfinance Limited.

SECTION THREE

RESEARCH METHODS

3. PROJECT METHODS

3.1 Research Design

The Project Team will use a Design Science Research (DSR) approach for developing the Loan Management System. The DSR approach was chosen it focuses on creating practical solutions to real world problems which helps researchers design, test tools and systems that solves specific challenges. According to (vom Brocke et al., 2020), DSR combines theoretical foundations and relevance practical guidelines for developing an Information Technology artifact.

The DSR methodology involves six key stages that will guide our system development.

Below is the illustration of Design Science Research process for development.

DSR Stage	Research Objective to be addressed	Proposed Methods	Expected Results
1. Problem Identification	a) To analyze current loan management challenges	Stakeholder interviews with Twezimbe staff and Management. Study of existing paper-based and semi-automated processes.	A summary of the strengths and weaknesses of the existing loan management system at Twezimbe Microfinance.
2. Objective Definition	a) To identify system requirements for the loan management System	Group Discussions. User Meetings to gather functional and non-functional requirements.	A list of well-defined, achievable objectives and a detailed requirements specification for the system.

DSR Stage	Research Objective to be addressed	Proposed Methods	Expected Results
3. Design and Development	a) To design and develop the system prototype	Appropriate software tools including UML tools like lucidchart, MySQL Workbench, and IDEs for the appropriate programming technologies.	Logical Design (Use case diagrams, Data Flow Diagrams (DFDs), Entity Relationship diagrams (ERDs). Physical design interfaces. A functional prototype of the LMS.
4. Demonstration	a) To validate system functionality and usability	Stakeholder presentations. Usability testing with loan officers. Feedback collection.	Validated prototype that meets core business requirements.
5. Evaluation	a) To assess system effectiveness, accuracy, and performance	Performance and stress testing. Accuracy testing of financial calculations. User feedback collection.	Successful evaluation and defense of the system to the Supervisor. A robust and reliable system.
6. Communication	a) To document and present results	Documentation preparation. User manual creation. Stakeholder presentations.	Completion of project report, approval by supervisor, deployment of the System online, and a comprehensive user manual.

The stages are explained as analyzed below;

1) Stage 1: Problem Identification

The researchers will interview Twezimbe's stake holders such as management, loan officers, and accountants to know the existing procedures, what problems they face and regulatory requirements. We will also analyze the current records, spreadsheets and forms to document workflow gaps and identify areas for automation and improvement.

2) Stage 2: Objective Definition

In this step the team will define and state the objectives of the project. The four main objectives identified will guide the requirement collection process, ensuring the system is designed to find solutions for the specific problems faced by Twezimbe Microfinance.

3) Stage 3: Design and Development

The project team will create system architecture diagrams, design database schema, build core modules, namely, client management module, accounting module, loan processing module and reporting module. The team will also implement strong security controls, for example, login authentication.

4) Stage 4: Demonstration

The team will present a working prototype to the staff of Twezimbe to evaluate whether user needs were met.

5) Stage 5: Evaluation

The team will conduct tests to assess whether system requirements were met. These tests include: performance tests, penetration testing and usability tests.

6) Stage 6: Communication

The team shall submit a user manual for the system to Twezimbe Microfinance and a project report to Makerere University Business School.

3.2 Project Organization

The project owner shall be the Management of Twezimbe Microfinance Limited. The target system users shall be Twezimbe's loan officers, accountants, branch managers, and senior management.

3.3 Sources of Project Data

The project team shall collect both primary and secondary data about the project problem:

- 1) Primary Data Sources shall include interviews with Twezimbe's staff (Management, loan officers, accountants) and observations of processes to provide insights into workflows and pain points, and analysis of existing loan application forms, repayment ledgers, and financial reports.
- 2) Secondary Data Sources shall include academic literature on financial software and loan management systems, industry reports on microfinance software solutions, and online resources detailing regulatory requirements for MFIs in Uganda.

3.3.1 Data collection Techniques

The project team will study the existing system carefully and in detail. This will help the research Team to come up with a new system that will enable the organization to improve the management of loan operations. The researcher will use observation, interviews, Focus Group Discussions and surveys to collect requirements for designing and developing the Twezimbe Loan Management system.

3.4 System Analysis and Design Approaches

The project will employ an Object-Oriented Design (OOD) approach. According to Pressman and Maxim, OOD is ideal for complex, modular systems like a Loan Management System because Objects, for example, Client, Loan Account, Transaction, can be reused across the system, reducing redundant code (Pressman & Maxim, 2020). For the system to be useful, the state of these objects for example, a client's details, and a loan's balance must be stored permanently in a database. Based on the Class Diagrams, we will design a relational database schema in MySQL. Each class for example Client, typically becomes a table in the database, and the attributes of the class for example ClientID, name, become the columns of that table.

Sensitive data and critical methods, for example, calculate Interest are encapsulated within objects, promoting security and integrity. New specifications such as new document types can be added as building blocks without tampering with the existing functionality.

The development process will follow an Iterative development model to ensure the system is built sequentially and aligns closely with user expectations. Instead of building the entire system in one linear sequence we will use an iterative approach. This means the project will be separated into small and manageable phases called iterations. Each iteration is a mini-project that includes planning, requirements analysis, design, coding, testing, and evaluation for a specific set of features. Each phase produces a functional prototype that incorporates feedback from the previous phase.

3.4.1 Design Techniques

A variety of design techniques will be applied by the research team to model and analyze the Loan Management System for example Use Case Diagrams to illustrate the interactions of different users for example clients and loan officers with the system thereby helping to define functional requirements like applying for a loan, approving a loan and making repayments. The Entity-Relationship Diagrams (ERDs) will model the data structure of the system, displaying entities like Client, Loan, Transaction and their relationships. This is essential for designing the database. Data Flow Diagrams (DFDs) will display how data moves through the system by identifying processes such as calculating interest, generating statements and updating Accounts and showing how data is input, processed, and output. Cross-Functional Flowcharts will map out workflows across different functional roles such as client registration, Loan application and review, Loan disbursement, repayment and reporting.

3.5 Anticipated Project Constraints

- a) The Client, that is, Twezimbe Microfinance may not easily disclose financial data to analyze areas of improvement.
- b) The project timeline is so narrow and will not enable thorough implementation of the stages of the system development lifecycle.
- c) The project team will have to bear with limited financial resources due to a lack of funding for the project.

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APPENDICES

I: Proposed Project Budget

Category	Sub-Category	Amount (UGX)	Percentage	Timeline Alignment	Justification
Software and Tools	Development Software (VS Code, XAMPP, Git)	20,000	6.35%	Entire project	Basic development environment setup
	Design Tools (Lucidchart - UML diagrams)	20,000	6.35%	Aug-Oct 2025	System design and architecture planning
	Database Management (MySQL Workbench)	10,000	3.17%	Aug-Dec 2025	Database design and management
	Testing Tools (BrowserStack, Postman API)	20,000	6.35%	Nov 2025	Comprehensive system testing
	Security Tools (SSL Certificate, Encryption)	20,000	6.35%	Nov-Dec 2025	Financial data protection requirements
Development & Testing	Prototype Development (4 weeks)	40,000	12.70%	Nov 2025	Main programming and coding work
	System Testing & Debugging (2 weeks)	20,000	6.35%	Nov 2025	Quality assurance and bug fixing
	User Acceptance Testing	15,000	4.76%	Nov 2025	Final validation with Twezimbe staff
Data Collection & Fieldwork	Travel to Mpigi	30,000	9.52%	Sep-Oct 2025	On-site data collection and interviews
	Interview Materials and Equipment	15,000	4.76%	Sep 2025	Recording devices, questionnaires

Category	Sub-Category	Amount (UGX)	Percentage	Timeline Alignment	Justification
	Focus Group Discussions	20,000	6.35%	Oct 2025	Refreshments, venue, participant costs
Communication & Internet	Internet Data (5 months × 90,000)	30,000	9.52%	Aug-Dec 2025	Research, collaboration, online tools
Printing and Documentation	Proposal Printing (6 copies)	10,000	3.17%	Sep 2025	Initial project documentation
	Final Report Printing (6 copies)	10,000	3.17%	Dec 2025	Comprehensive project reporting
	User Manuals (3 copies)	5,000	1.59%	Dec 2025	System operation guides
Contingency	Unforeseen Expenses	30,000	9.52%	As needed	Price fluctuations, additional requirements
Grand Total	ALL CATEGORIES	315,000	100%	Aug-Dec 2025	Complete project implementation

II: Schedule of Activities / Gantt chart

