Chapter One: Introduction

This chapter introduces the need for an AI-driven system in the banking and financial sector to address rising customer churn, analyze sentiment, and provide personalized recommendations. It outlines:

Background: Traditional methods in customer retention are ineffective. AI and ML can provide proactive, data-driven solutions.

Problem Statement: Challenges include:

Inability to predict churn accurately.

Limited understanding of real-time sentiment.

Lack of personalized financial recommendations.

Objectives:

General: Develop an integrated AI system for churn prediction, sentiment analysis, and recommendations.

Specific: Improve churn prediction accuracy, perform real-time sentiment analysis, implement hybrid recommendation systems, and integrate these into a single AI platform.

Scope and Limitations: Focuses on Kenyan financial institutions; challenges may include data quality, privacy issues, and high computational cost.

Risks & Mitigation: Addresses issues like data security, model bias, and implementation complexity.

Budget & Resources: Lists hardware/software requirements, personnel, and estimated costs.

Project Schedule: Includes a timeline and network diagram for implementation.

Chapter Two: Literature Review

This chapter explores existing work related to the project components:

Churn Prediction Models: Overview of machine learning techniques like Random Forests and deep learning. Notes limitations in accuracy and adaptability.

Sentiment Analysis: Discusses NLP applications in analyzing customer reviews and social media, highlighting the importance of real-time processing.

Recommendation Systems: Focuses on hybrid models that combine collaborative and content-based filtering for better personalization.

AI Integration: Emphasizes the benefit of combining AI techniques for a unified customer engagement strategy.

Evaluation Metrics: Mentions metrics like precision, recall, and F1-score used to measure system performance.

Chapter Three: Methodology

This chapter details the methods and tools to be used in building the system:

Data Collection: Uses customer feedback, transaction data, and social media content.

Data Analysis Tools: Includes Python libraries like pandas, NumPy, Scikit-learn, and NLP tools.

Implementation Tools: Frameworks like TensorFlow, Flask, and React for backend and frontend development.

System Testing: Describes procedures for functional and performance testing.

Cost Estimation: Provides a breakdown of expected project costs.

Summary: Concludes with a statement of readiness to proceed with system development.

CHAPTER FOUR: SYSTEM ANALYSIS AND REQUIREMENT MODELING

Objective: Analyze the current system and propose an AI-based solution for customer churn prediction, sentiment analysis, and personalized recommendations in banking.

Key Points:

Current System Limitations: Manual data processing, basic churn prediction, feedback-based sentiment tracking, and generic recommendations.

Modeling Tools Used: Flowcharts, Data Flow Diagrams (DFDs), UML diagrams, and Use Case Diagrams to illustrate workflows.

Data Collection Methods:

Surveys & interviews (for sentiment & churn prediction)

System logs & transactions (to track engagement)

Social media sentiment analysis (public perception)

Historical data (churn pattern recognition)

Preprocessing: Data cleaning, feature engineering, and labeling.

Requirements:

Functional: Real-time churn prediction, sentiment analysis, personalized recommendations, dashboard.

Non-functional: Performance, scalability, security, and usability.

CHAPTER FIVE: SYSTEM DESIGN

Objective: Lay out the structural and functional design of the AI system.

Key Components:

Architecture Overview: Modular structure managing churn prediction, sentiment analysis, and recommendation tasks.

Design Stages:

Conceptual design: Define key system entities and relationships.

Logical design: Data structure and flow between components.

Physical design: Actual implementation of databases, APIs, and AI models.

System Interfaces: User dashboard, analytics reporting tools, and data input modules.

CHAPTER SIX: SYSTEM IMPLEMENTATION AND TESTING

Objective: Describe how the system was implemented and tested.

Key Highlights:

Technology Stack: Python (for AI modeling), Flask/Django (for backend), JavaScript/HTML/CSS (for frontend), MySQL (database).

Implementation Strategy:

Trained ML models for churn prediction and sentiment analysis.

Integrated modules into a unified system.

Testing:

Unit testing: Verifying individual modules.

System testing: Validating overall workflow and data integration.

User testing: Ensuring ease of use and accuracy of outputs.

CHAPTER SEVEN: RESULTS, CONCLUSIONS, AND RECOMMENDATIONS

Objective: Present the outcomes, evaluate project success, and suggest future directions.

Results:

Accurate churn predictions and sentiment categorization.

Effective personalization of recommendations.

Real-time dashboards provided actionable insights.

Conclusion:

The system significantly improves efficiency, accuracy, and user satisfaction in banking operations.

Overcomes limitations of manual systems.

Recommendations:

Extend to other sectors like insurance or retail.

Enhance models with deeper NLP techniques.

Integrate voice sentiment analysis in the future.