Provide Financial Literacy and Appropriate Financing Practices Among Customers

(24-25J-268)

PRAVEAN P.R.I

(IT21191060)

B.Sc. (Hons) Information Technology in Information Systems Engineering

Department of Computer Systems Engineering

Sri Lanka Institute of Information Technology

Sri Lanka

August 2024

Provide Financial Literacy and Appropriate Financing

Practices Among Customers

(24-25J-268)

Project Proposal Report

B.Sc. (Hons) Information Technology in

Information Systems Engineering

Department of Computer Systems Engineering

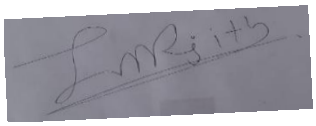
Sri Lanka Institute of Information Technology

Sri Lanka

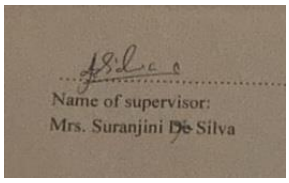
August 2024

Declaration

I declare that this is our own work, and this proposal does not incorporate without acknowledgment any material previously submitted for a degree or diploma in any other university or Institute of higher learning and to the best of our knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgment is made in the text.

Name	Student ID	Signature
P.R.I. PRAVEAN	IT21191060	

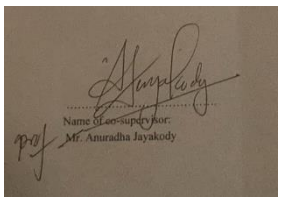
The above candidate is carrying out research for the undergraduate Dissertation under my supervision.



……

Signature of the supervisor:

(Ms. Suranjini Silva) Date: 22/08/2024



……..

Signature of the Co-supervisor:

(Dr. Anuradha Jayakody) Date: 22/08/2024

Abstract

Bank and financial institute are financing is very important to many people and small businesses. Their processes of approval, however, are quite obscure, not in real-time and non-transparent in most cases [1]. In this project, a machine learning model must be developed that will predict the eligibility of customers to various loan products and their estimated credit limit based on their financial profile. It will use historical credit bureau and application data to find the most important factors that banks consider during underwriting methodology.

These include demographic characteristics, credit history metrics like payment performance and debt levels, employment details, existing customer relationship with the bank, and collateral available of customer KYC information. The scores would indicate the likelihood of eligibility to each of the different types of loans, such as personal loans, home equity lines of credit, and credit cards. bank and financial institutes currently determine loan eligibility and credit limits.

This gives rise to a lack of transparency with associated uncertainties for the customer. To address this issue, we propose an innovative loan eligibility and predict credit limit platform designed specifically for banks and financial institutes.

List of Abbreviations

ML	Machine learning
LLM	large language model
DB	Database
SQL	Structured Query Language
UI	User Experience
KYC	Know Your Customer
IDE	Integrated Development Environment

Table 1: List of Abbreviation

Table of Contents

Introduction

Research Gap

Integration of financial education, advice, and decision support in loan eligibility prediction can help make lending more inclusive and empowering to users. Traditional models focus only on the assessment of creditworthiness based on past financial data and provide no guidance on building future financial resilience [1].

It can bridge knowledge gaps with the comprehensive development of educational content and interactive modules that deal with central ideas on personal finance, such as basics like budgeting, saving, investing, debt management, and repayment planning. Historical KYC information can be fed into it to generate customized and personalized recommendations.

Informed by data on user income, expenses, details of existing loans, and details on assets and liabilities, real-time dynamic advice on budget evaluations, repayment simulations, goal-based saving plans, and investment risk profiling can be obtained to empower the system in dispensing personalized financial counsel to users. This would foster greater responsibility and health in financial habits and decision-making.

Adding this layer of literacy and advice in an integrated manner, along with eligibility predictions, could provide an opportunity for a holistic view of the user regarding his overall financial situation and requirements [2]. This would identify the most appropriate and cost-effective products or recommendations to meet needs and help achieve financial goals.

It will unpack how educational, advice, and decision-support components can be effortlessly woven into the core prediction experience. It is about making the process of lending more empowering, inclusive, and supportive for a user base that cuts across knowledge levels toward the goal of long-term financial wellness.

Research Problem

The loan prediction system should arm the customer with a deeper understanding of his or her personal finance through engaging educative content and interactive modules on such key concepts as budgeting, saving, and investing. In addition, with integrated customers' KYC information, such knowledge, on behaviors in borrowing, like debt management and possible ways of repayment, will go a long way to encourage responsible financial choices. This product includes financial goal setting and planning, which allows users to set clear financial goals and develop strategies for reaching them.

The interactive tools and calculators in this system provide real-time assessments of the user's financial health, foreseeing potential gaps in their financial literacy and giving advice tailored to these gaps. This approach does not only qualify customers for loans but also makes them realize the consequences of their decisions on borrowing. Therefore, this system will facilitate responsible and informed borrowing by ensuring that each customer has appropriate financing options that best meet their financial goals and hence no potential mismanagement of debt leading to financial distress[2].

Through KYC data, financial institutions will be better placed to provide customized advice in view of every customer's financial situation to set feasible financial targets and ensure prudent debt management and sensible borrowing decisions. Further, interactive financial education that is inbuilt in the lending platform may raise customers' levels of financial literacy with core concepts, thus better arming them to tackle the pitfalls associated with personal finance. The tools may provide real-time financial decision support through budgeting evaluations and loan prediction calculators, allowing the customer to make informed decisions on the spot.

Research Problem: The potential of such an integrated approach to improving financial literacy and ensuring the appropriate financing solutions for better financial outcomes are provided to customers in view of a responsible lending environment.

	Integration of Financial Education	Financial Advice Using KYC Data	Real-Time Financial Decision Support
ceyloan	✗	✗	✗
CEYLON LOAN	✓	✗	✗
MoneyX	✓	✓	✗
Provide financial literacy and appropriate financing practices among customers	✓	✓	✓

Figure 1: Competitive Analysis

Objectives

Main Objective

This research has the main objective of providing an integrated platform for financial education, personalized advice, and real-time decision support to inculcate responsible financing practices amongst customers.

Specific Objectives

1. Developing detail-oriented educational modules on the concepts of personal finance, which involve budgeting, saving, investing, and repayment planning among others.

2. Use KYC data to power simulation-based, calculator-based, and other interactive tools to dynamic, context-driven suggestions in real-time about finances.

3. Collate the resources for education, individual counseling, and predictive analytics into a system that seamlessly transitions into the loan eligibility system.

Methodology

Requirement Gathering

The first phase is intended to collect detailed requirements from the financial institution, end-user, and regulatory bodies. Requirements on financial literacy needs, KYC integration, and real-time decision support will be emphasized. This phase is also responsible for outlining interactive modules and delineation of features for which tools and calculators need to be built for integration into the loan prediction system. These will come with key considerations, including different models for commercialization: Software-as-a-Service, On-Premises Licensing, Hybrid, and Partnering and Reselling.

Past Research Analysis

This phase involves a thorough review of existing literature and studies on financial education, KYC data utilization, and decision support systems. The analysis will help identify best practices, challenges, and gaps in current solutions, informing the development of an innovative system that integrates financial education, personalized advice, and real-time decision support. The insights gained from this research will also guide the selection of the most suitable commercialization model for the platform [2].

Development Methodology

It therefore calls for a critical review of the literature and studies available on three themes: financial education, KYC data utilization, and decision support systems. Analysis such as this will help in bringing out best practices, challenges, and gaps in current solutions to inform the development of a novel system that integrates financial education, personalized advice, and real-time decision support. Such findings will help in picking from the most appropriate commercialization models available for the platform.

Project Management Methodology

Jira and MS planer will be used for the planning, tracking, and management of the loan prediction platform development. We will be able to organize tasks, assign responsibilities, and monitor progress using Jira throughout the life cycle of the project.

Feasibility Study

Technical Feasibility

The technical feasibility of the loan prediction system is based upon proper evaluation of the technology stack, IT infrastructure, and depth of technical expertise that will be required during the implementation and maintenance of the system. This would hence, at its core, require advanced machine learning algorithms that should be specifically tailored for the analysis of KYC data, techniques such as LLM for text data interpretation, and supervised and unsupervised models for pattern recognition. Deep learning architectures like Convolutional Neural Networks are required to analyze complex financial data.

Besides, predictive analytics models will be set up using time series forecasting, regression analysis, and probabilistic modeling for evaluating and predicting financial behaviors of customers related to creditworthiness and risk factors. These models will be developed in high-level languages such as Python and R, with the support of machine learning libraries like TensorFlow and among with others.

Controls over data management form one of the major parts, which shall require setting up and implementing a robust, highly scalable, and secure database infrastructure. A hybrid model most probably will be used to include if relational databases like MySQL for structured data, and NoSQL DB like MongoDB for unstructured data, which will ensure efficiently stored and retrieved large amounts of sensitive customer information.

This will further require a microservices architecture, which will enable modular development, and financial analytics modules. Adopting containerization technologies like Docker, combined with orchestration tools like Kubernetes, will be important in gaining resilience, scalability, and fault tolerance for the system.

An effective user interface must be developed, which is responsive and intuitive, providing maximum satisfaction to the user. There will be a user interface using the most modern front-end frameworks supporting run-time on different platforms and also performance optimization among different devices. On the other hand, the back-end services will be supported by handling all business logic.

Schedule Feasibility

Schedule feasibility includes assessing the development, testing, and deployment time for the loan prediction system. Requirement gathering, system design, development, testing, and deployment could be bifurcated phases of the project with some tools with Google Colab Pro. In view of the complexity involved in integrating financial education, real-time data analysis, and predictive algorithms, the estimated time required to build the fullness of the system is approximately 6 to 9 months. This timeline is achievable if sufficient resources, from the very beginning, are being put into skilled developers, financial experts, and project managers. Of course, such delays may be related to iterative testing and refinement, but a well-structured project management plan may help minimize such risks.

Economic Feasibility

Economic feasibility is the careful consideration of a project's financial viability by balancing costs of development, implementation, and related on-going support against expected benefits. Development of sophisticated software, high-level data encryption/cybersecurity protocols, adhering to rigorous regulatory compliance, and financial industry standards, along with comprehensive staff training programs, all constitute major capital outlay. Many commercialization models, such as Software-as-a-Service, On-Premises Licensing, and Hybrid models offering quite different opportunities to make a revenue stream can defray these upfront costs.

Strategic partnering and reselling relationships would move the product to broader market penetration, increasing these revenue streams. This additional ability of the system to reduce loan default rates, by offering personalized loan solutions and better financial literacy, adds great economic value. Such risk reduction ensures that profitability is boosted, and with it, the long-term economic viability of the projects is consolidated, that is, justifying the investments in financial technology and analytics tools.

Knowledge on Tools

Each member should have a full understanding of the project management, additional supporting tools, and development tools to build up the proposed system. Current Jira board and MS teams planner regarding the project management plans

Data collection Knowledge

Data collection and preprocessing are essential tasks.

1. Data collection:

   Data sets collections of personal Information, financial Information of the user, Loan Details of the user, Property Information of the user, External Data Sources of the user and other Future financial plans

2. Data-Preprocessing:

   Data set clenching

System Analysis

Software Solution Approach

The loan perdition platform will follow a structured approach to efficiently handle and process literacy and appropriate financing and user values. Here's a detailed approach to the solution:

1) Requirement Gathering:

- Identify user needs about personal financing education and real-time advice system.
- Identify required KYC data inputs to create personalized financial predictions
- Specify the interactive tools needed and needed simulators.

2) Interactive Modules and Tools Development:

- Develop dynamic content in relation to financial literacy on budgeting, saving, and investing.
- Build out-of-the-box, fully interactive, real-time tools for things like calculators.
- Design simulation tools that are LLMs-powered in their ability to provide contextual personalized advice.

3) Interactive Module and Tools Development:

- Develop dynamic content on financial literacy relating to budgeting, saving, and investment.
- Produce in real time, user-friendly interactive tools—for instance, gap analysis calculators.
- Design simulation tools powered by LLMs to deliver context-aware, personalized advice

4) User experience and interface design

- Develop an intuitive interface that makes it easy for users to interact with the system.
- Make the accessibility and ease of navigation more available through the integrated provision of financial education tools and loan prediction.
- Personalized dashboards give each user a display of their financial insight and recommendations.

5) Testing and Iteration:

- Test all system components, including LLM outputs, data processing, and user interfaces.
- Implement iterative development cycles to continually improve the solution.

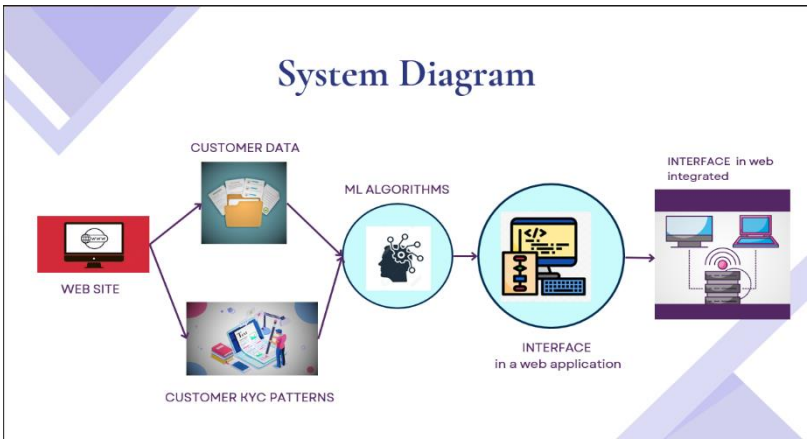


Figure 2: System Diagram

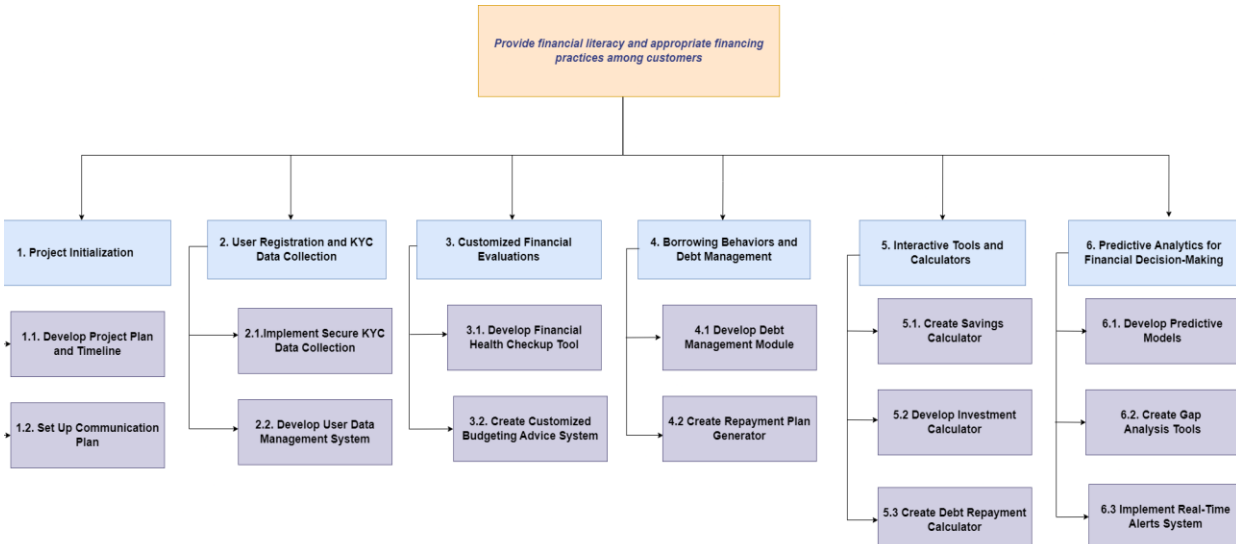


Figure 3: Work Breakdown Structure

Tools & Technology

- Programming Languages – Python
- Database Systems – MongoDB and MySQL DB
- Web Development Frameworks – React JS (Front End Development), Python
- UI Design Implementation – Figma
- Diagramming Tool – Draw.io and Figma
- IDE – Visual studio code and Google collab
- Version Control System– Git (GitHub)
- Collaboration Tools – Microsoft Teams and WhatsApp group.
- Testing Tools - Postman (API Testing)
- Unit test – Unit Testing tool for Python
- Deployment Tools

  Docker - Containerization

  Ansible - Configuration
- Code Quality Assurance tool – SonarQube
- Project Management – Jira and MS planner

Project Requirements

Functional Requirements

- KYC data integration:

It should be able to collate and analyze customers' KYC information so as to review their borrowing behaviors and financial profiles.

- Collateral Valuation Module:

It should have an in-built module that identifies all the assets a user holds, such as savings, fixed deposits etc., so that all suitable collateral options are available to fill in the gap.

- Interactive Educational Content:

This makes it important that the platform has interactive modules of education through which the user can learn the basics of personal finance, like budgeting, saving, and other similar topics

- Real-Time Financial Advice:

It should provide real-time financial advice about a set of user financials, leading the person and financial planning

Non-Functional Requirements

Non-Functional Requirements are as follows:

- Scalability
- Usability
- Reliability
- Performance

Project Scope

Project In Scope

- Integration of comprehensive modules on financial education concerning budgeting, saving, and investment.
- Extraction of KYC data to be analyzed for borrowing behaviors and financial profiles.
- A gap analysis tool will be implemented to recommend suitable collateral options.
- Real-time financial decision support based on personal financial data.

Project Out of Scope

- Development of services related to investment advisory.
- Personalization of learning material for niche markets or specialized financial situations.
- Financial institutions inclusion for direct loan processing.

Timeline

The proposed timeline for the project as follows.

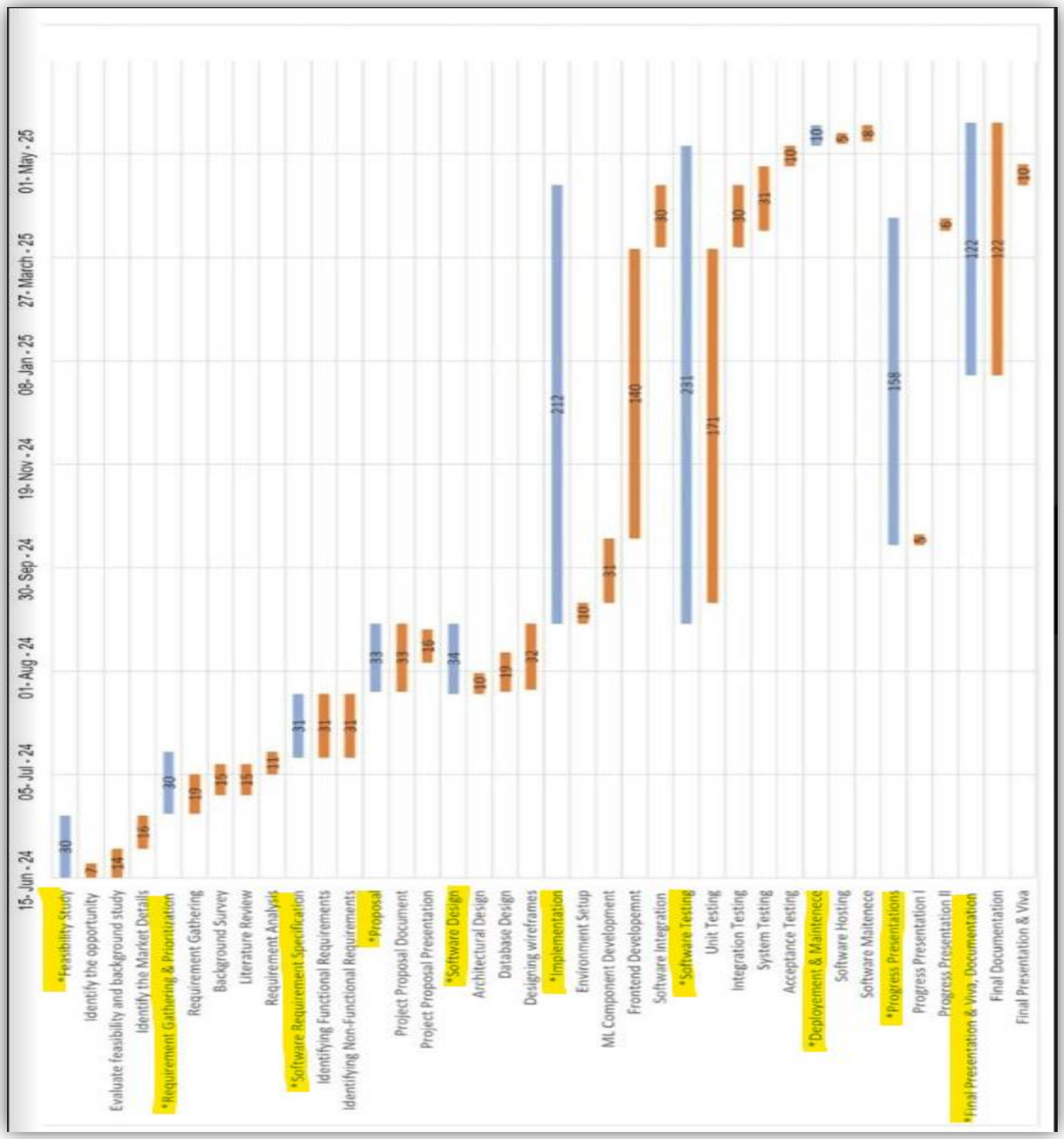


Figure 4: Grantt Char

Risk Management Plan

Identification of risk	Risk level	Probability for occurrence of risk	Mitigation plan
Access to sensitive customer KYC information and financial data without valid authorization.	High	High	Ensure that users' data security and integrity are fully protected through the implementation of highly efficient protocols, multi-factor authentication techniques, and regular security.
Technical issue and bugs in development	High	High	Get the expert assistance and guidance to avoid the failures in development
Wrong/Error data input or system miscomputation on loan eligibility predictions.	High	Medium	In this view, ensure rigorous testing of the prediction algorithms; also, provide options to users for manual verification and adjustment of their inputs.
Loss of dataset or hardware damage	High	Medium	Take a multiple storage backup

Table 1: Risk Management Plan

Commercialization

Several models can be utilized in commercializing the integrated financial education and decision support platform based on differing market needs and customer segments:

- **Software-as-a-Service Model:**
  In this model, the platform is given as a subscription-based service wherein one can access the modules of financial education, personalized advice, and decision support tools through a Web-based system.

- **On-Premises Licensing Model:**
  The platform can be on-premises for larger banks or institutions that need more control over their data and operations. In this model, software is installed on and run from the institution's own servers for deeper integration with existing systems and more stringent measures of data security.

- **Hybrid Model:**

  It's a hybrid model, seeking to offer institutions flexibility by taking the best of both worlds: SaaS and on-premises. This would mean that some institutions may want to keep sensitive data pertaining to customers on-premises while enjoying benefits from cloud-based services in terms of other functionalities. The above strategy gives the institution a customized solution whereby it is possible to have some features, such as financial education and interactive tools, run via the cloud while KYC data and personalized advice modules are kept on-premises. The hybrid model will, therefore, appeal to those institutions that need to balance flexibility with security and control.

Budget

Since the deliverable of the proposed model is a software-based solution, there are no Hardware components connected to the implementation. The biggest source of the cost will be for the personnel costs, hardware and software for the computing power of the machine system.

However, there will be some other costs expected that will be given in the table below.

Type	Cost
Personnel Costs	300 000
Hardware and Software Cost	100 000
Model Development and Training	50 000
Integration and Deployment	60 000
Project Management and Administration	40 000
Total Project Budget	**550 000**

Table 2: Cost Management Plan

Summary

In this platform will offer an integrated platform that marries financial education with the provision of advisory services based on individual needs and decision support in real time to promote responsible financing practices. Principally, the main aim shall be to offer a holistic system that will educate the users about personal finance concepts such as budgeting, saving, and investing, while utilizing customer KYC data for tailored financial guidance. The interactive modules and tools will provide dynamic, context-driven suggestions on how gaps in their finances can be solved and how the loan eligibility score could be maximally optimized.

It will use real-time data to enhance financial literacy and provide actionable insights into debt management and financial planning. Such a system would smoothen the transition from learning to application of finances through the integration of education resources, individual counseling, and predictive analytics. It would ensure accuracy and personalization of advice to suit users' different financial needs.

References

[1] Natasha Robinson and Nidhi Sindhwani, "Loan Default Prediction Using Machine Learning," [online]https://ieeexplore.ieee.org/document/10522232, [Accessed 14 May 2024]

[2] H. K. Sarisa, V. Khurana, V. C. Koti, and N. Garg, “Loan prediction using machine learning,” [online] https://ieeexplore.ieee.org/abstract/document/10466049 [Accessed 20 May 2024]