

## Artificial Intelligence (AI) powered credit scoring and loan underwriting System Proposal for Savings and Credit Cooperative Organizations (SACCO) in Uganda

Jimmy Kinyonyi Bagonza \*

*School of Computer and Information Sciences, University of the Cumberlands, Kentucky USA.*

World Journal of Advanced Research and Reviews, 2025, 27(01), 2074-2088

Publication history: Received on 09 June 2025; revised on 15 July 2025; accepted on 17 July 2025

Article DOI: <https://doi.org/10.30574/wjarr.2025.27.1.2689>

### Abstract

This proposal outlines the comprehensive implementation of an AI-powered Credit scoring and loan underwriting system for Savings and Credit Cooperative organizations (SACCO) in Uganda. The system leverages alternative data sources like mobile money transactions, utility payments and behavioral indicators to build accurate and inclusive borrower risk profiles. By integrating advanced machine learning (ML) and generative pre-trained transformer (GPT) models, this system aims to overcome key challenges in traditional credit assessments like limited credit histories, collateral requirements, and subjective decisions which have led to high default rates and financial exclusion

The proposed AI model enhances operational efficiency by delivering real time risk evolutions, improving loan turnaround times and supporting proactive risk management. Human oversight is maintained through explainable AI outputs and override mechanisms, aligning with Uganda's data protection laws and SACCO values. A dedicated AI Steering Committee will oversee ethical governance while comprehensive training and stakeholder engagement will ensure smooth adoption.

Custom built for SACCOs, the system is designed for full integration with existing platforms such as the Mobis management information systems, mobile money platforms, credit bureaus and includes agentic monitoring for fraud and early warnings. Ultimately the solution strengthens financial inclusion, improves portfolio quality and empowers SACCOs to deliver faster fairer and more inclusive lending services across Uganda.

**Keywords:** AI Powered Credit Scoring; Loan Underwriting; Savings and Credit Cooperative Organization (SACCO); Financial Inclusion; Machine Learning; AI Governance and Oversight

### 1. Introduction

SACCOs in Ugandan operate as community-based member owned financial cooperatives offering savings and loan services to the underserved and rural population <sup>1</sup>. Despite their role in financial inclusion initiatives, SACCOs face challenges in credit underwriting ranging from limited access to formal credit histories, insufficient collateral and reliance on subjective decision-making processes <sup>1</sup>. Traditional loan assessments base on character reference and sparse documentation that make it difficult to effectively evaluate the risk of members with irregular income such as farmers or traders leading to inefficiencies and high loan defaults.

These challenges in credit assessment have dire consequences like SACCOs often suffer with high numbers of non-performing loans (NPL) forcing them to restrict lending, eroding trust among SACCO members and limiting growth<sup>1</sup>. Further more existing underwriting procedures tend to favor well established collateral rich members inadvertently excluding many potentially creditworthy individuals<sup>3</sup>. With only about 13.4% of Uganda's population accessing credit

\* Corresponding author: Jimmy Kinyonyi Bagonza

from formal institutions, the gap left by these traditional methods presents a significant missed opportunity for SACCOs to expand financial services equitably<sup>3</sup>.

Introducing an AI-powered credit scoring model offers a transformative solution leveraging alternative data sources such as mobile money transaction and utility payment behavior to build a more accurate and inclusive risk profiles<sup>4,5</sup>. This model enables SACCOs to evaluate applicants holistically including those with no formal credit history increasing approval rates without compromising on risk<sup>6</sup>. The proposed AI model will streamline the loan process, reduce human error and accelerate decision thereby helping SACCOs scale efficiently while enhancing member trust and satisfaction<sup>7</sup>.

---

## 2. Artificial intelligence governance

To ensure responsible and strategic oversight of the proposed AI model, SACCOs will establish a cross functional AI Steering Committee (AI Stereo) that will comprise of key leadership roles including<sup>8</sup>.

- Board representative
- IT Manager
- Head of Credit
- Head of Compliance and Risk
- Member representative

The core responsibilities for the AI Stereo, include but not limited to.

- Aligning AI use with the SACCOs cooperative values
- Revising the credit policies
- Setting usage protocols
- Monitoring compliance

The Stereo will meet frequently preferably biweekly during the development phase and monthly post launch phase to guide the project, address emerging issues and align with regulatory requirements.

### 2.1. Artificial Intelligence Policy Framework

SACCOs will adopt a structured AI policy framework that is grounded in fairness, transparency, human oversight, privacy and continuous improvement<sup>4</sup>. Measures will be taken to

- Prevent bias in AI outputs by excluding sensitive attributes and conducting fairness audits.
- The system will offer clear explainable reasons for each AI recommendation supporting transparency and member trust.
- Human in the loop approach will be embedded tasking loan officers or a committee to review for significant decisions to maintain accountability and allow human judgment where needed.
- In accordance with the Uganda data protection and privacy act 2019, ethical data use is prioritized with informed consent required from members and strict protocols for data minimization and encryption.
- The committee will Continuously monitor the systems performance using parameters like default rate, fairness, approval accuracy, conduct quarterly reviews and organize annual AI audit.
- These measures will ensure the model evolves responsibly, remains compliant and aligns with SACCOs mission of member trust and financial empowerment.

---

## 3. Proposed AI Solution Overview

### 3.1. Member and User Experience

The proposed AI model is designed to enhance the existing loan process without removing the human interaction members value<sup>9</sup>. Members can apply for loans through familia channels either in person at the SACCO office or digitally via app or USSD code<sup>10</sup>. Once the application is submitted, the model instantly evaluates the members data and generates real time credit risk assessment significantly speeding the decision-making process<sup>5,7</sup>.

In office applications loan officers receive AI generated scores and recommendations within minutes allowing them to discuss loan terms with the member almost immediately. For mobile app or USSD applicants the system can prequalify

members or fully approve low risk loans automatically with friendly clear message. Even with automated decisions, the SACCO will maintain human contact points to handle questions and appeals ensuring transparency and trust<sup>11</sup>.

For loan officers, the model serves as a decision support tool embedded in their loan management system. It provides a credit score, confidence level, recommendation action, and a natural language explanation of key risk factors. Loan Officers retain the authority over final decisions and can override AI outputs when needed with reasons logged for continuous learning. This setup ensures a faster, more data informed yet still personalized lending experience.

### 3.2. Artificial Intelligence Architecture Model and Data Pipeline

At the heart of SACCOs AI solution is a specialized Generative Pre-trained Transformer (GPT) model designed to enhance credit underwriting through data driven insights<sup>12</sup>.

#### 3.2.1. Data Ingestion Layer

The architecture begins with a robust Data Ingestion Layer pulling in diverse sources including SACCO core banking data, mobile money transactions, utility bill payments, credit bureau reports and SACCO specific behavioral indicators. This multisource approach ensures a comprehensive view of each members financial reliability and is managed through secure APIs or batch integrations with real time or near real time updates<sup>10, 13</sup>.

#### 3.2.2. AI Credit scoring Engine

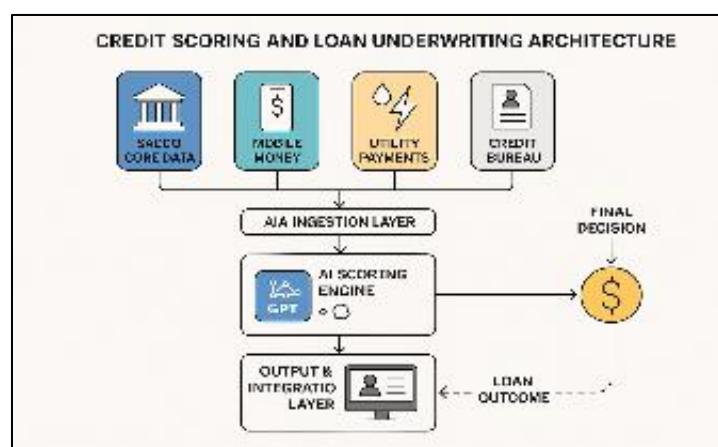
The core AI credit scoring engine blends traditional Machine Learning (ML) lie gradient boosting models with GPT capabilities. While the ML model identifies quantitative risk patterns and generates raw credit scores, the GPT component interprets this structured data to produce narrative risk assessments and loan recommendations (OpenAI, 2023).

This hybrid approach allows for both predictive accuracy and human readable explanations. The GPT is fine-tuned on past SACCO loan decisions enabling it to mirror real life lending outcomes and improve reasoning<sup>2,12</sup>.

#### 3.2.3. Output And Integration Layer

This layer ensures that AI generated insights are seamlessly embedded within existing SACCO systems. Loan officers interact with the AI model through their Management Information System (MIS) dashboard viewing scores, recommendations and explanations directly within the application interface. These outputs are stored for audit and analytics and can trigger further processes such document preparation or credit bureau reporting.

Security is reinforced at every point of integration ensuring data privacy and regulatory compliance. This architecture empowers faster, fairer and more informed lending decisions while continuously learning from outcomes to improve future predictions



**Figure 1** AI Credit scoring and loan underwriting data flow diagram

#### **4. Justification for the AI Generated Credit Risk scoring over Manual**

Artificial Intelligence especially GPT based models surpass manual credit scoring through several advantages.

##### **4.1. Holistic Data Analysis**

processing hundreds of traditional and alternative data points rapidly to uncover trends that humans may miss. This allows for richer credit profiles using sources like mobile money activity and utility payments which are often overlooked in manual assessments. By drawing on diverse inputs, the model creates a more comprehensive and accurate view of the member risk <sup>3</sup>.

##### **4.2. Consistency and objectivity**

By eliminating human biases and decision variability between officers. It applies standardized criteria uniformly increasing fairness and compliance with lending regulations <sup>14</sup>.

Additionally, AI models have Superior Predictive Power identifying complex nonlinear patterns in borrower behavior that traditional models or intuition may not detect. This reduces both false approvals and unjustified rejections thereby improving portfolio quality and reducing defaults <sup>7</sup>

##### **4.3. Speed and efficiency**

delivering real time assessments and reducing loan processing times from days to minutes. GPT models also support adaptive learning that improves performance as new outcomes are incorporated over time.

Finally, GPTs natural language generation enables personalized educational feedback to members strengthening engagement and helping members improve their credit worthiness. Overall, the model transforms underwriting into faster fairer and smarter process aligned with the SACCO mission of inclusive and efficient service delivery <sup>12</sup>.

---

#### **5. Build Vs Buy Considerations**

SACCOS must weigh whether to build a custom AI credit scoring model solution or buy an off the shelf product. A custom-built model offers critical advantages in aligning with the SACCO unique member base, data environment, and values. Unlike generic models, custom development allows SACCOs to incorporate localized insights such as member participation, rural behavior patterns and loyalty metrics while tightly integrating alternative data sources like mobile money and utility payments. this tailored approach enables more accurate and culturally relevant credit assessments that reflect SACCO specific risk appetite <sup>11</sup>.

From a governance and compliance perspective, building in house offers better control over data privacy and model transparency. SACCOs can ensure that the model adheres to ethical standards, explainability requirements and Uganda's data protection laws by retaining data locally and designing the system for interpretability. In contrast commercial vendors may provide opaque "black box" models that are harder to audit or adapt and may expose sensitive member data to third party risks <sup>14</sup>.

While off the shelf solutions offer speed and ease of deployment they often come with recurring costs and limited flexibility. External scores may supplement the process like credit bureau checks but won't harness the full power of SACCO specific data. A hybrid strategy of buying tools like cloud infrastructure or GPT APIs while building custom integration and logic may provide a balanced approach.

Given strategic importance of credit scoring and the opportunity to leverage local alternative data the preferred route is custom development possibly using open-source AI frameworks and partnering with local developers to ensure long term adaptability and member centric outcomes <sup>6</sup>.

---

#### **6. Integration With SACCO Management Information System (MIS) and External Platforms**

A successful credit scoring model must seamlessly integrate with existing systems to effectively ingest data and deliver intended outcomes.

Core SACCO MIS. The model will plug into the SACCOs core banking management system Mobis. The model will connect via APIs or direct database access while ensuring security. This integration allows the model to fetch member profile data like savings balances, loan records etc. automatically whenever a credit scoring is needed <sup>6</sup>.

It also allows writing back the model results including scores, recommendations, reason codes into the MIS as part of the member profile data. The user interface can be extended to show the model outputs.

### 6.1. Mobile Banking and payments

Many SACCOs now enable transactions through mobile money integrations<sup>10</sup>. They use MTN mobile money and Airtel Money to allow members deposit or receive loans. The model will integrate with these mobile money platforms as data sources through an aggregator service or direct APIs provided by Telecoms. Integration may also occur through the SACCO mobile App or USSD code for loan applications where the front end calls for the model scoring API to get instant decision. Thus consequently, the model becomes part of the mobile banking workflow.

### 6.2. Credit Bureaus

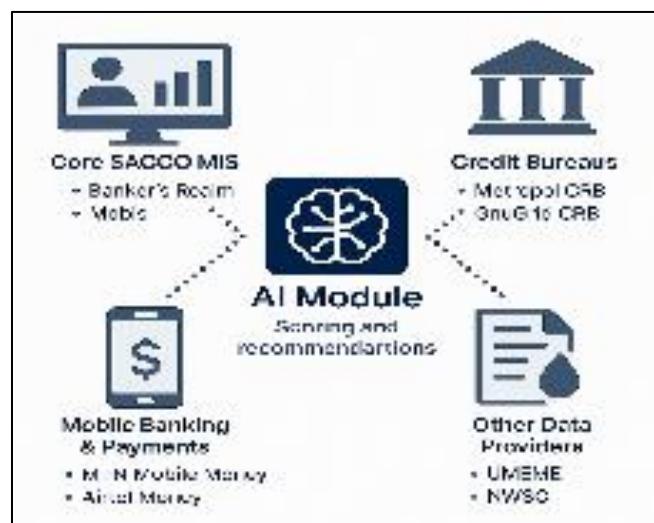
Integration with Metropol CRB and Gnu Grid CRB is planned in a way that when a scoring a loan, the system can automatically query the bureaus database using the members National Identification Number (NIN) as the key to retrieve any existing credit history score or report (Gnu Grid CRB, 2022). This requires a memorandum of understanding with the bureau to use their API or web service.

The model will incorporate the report from the bureau into assessment. Conversely, the SACCO can report back to the bureau thereby contributing to the members external credit history. This two-way integration ensures that the model is not working in isolation from the broader financial ecosystem.

### 6.3. Other Data Providers

If available, integration with utilities like electricity company Uganda Electricity distribution Company Ltd (UEDCL) database or National Water and Sewerage Cooperation (NWSC) for water provided bill payment verified data. Realistically integration with utility companies may not exist via APIs in Uganda yet but the SACCO can urge members to upload proof of payment for recently cleared utility bills and then use optical character recognition (OCR) to read the member payment history and feed that into the model <sup>6</sup>.

The model can also integrate with the National ID verification systems to prevent fraud ensuring the person is who they say they are and KYC databases as part of the loan processing life cycle. To ensure all these systems talk to each other, the SACCO will involve a middleware or integration platform that handles data formatting, encryption and errors gracefully.



**Figure 2** Data sources and Integration

## 7. Proactive risk management AI agent

Beyond just scoring loans at application time, the model will have agentic capabilities of acting like an agent to continuously monitoring and taking limited initiatives in risk management.

### 7.1. Portfolio Monitoring and Early Warning alerts

The model will run periodic scans of the SACCOs loan portfolio. By analyzing ongoing data like current loan repayment trends, any new transactions of borrowers, changes in savings balances, it can detect anomalies or signs of risk in real time. For example, if borrowers' mobile money inflows drop significantly for two consecutive weeks or if a usually active saver suddenly stops saving, the model can flag this as potential early risk indicator<sup>5</sup>.

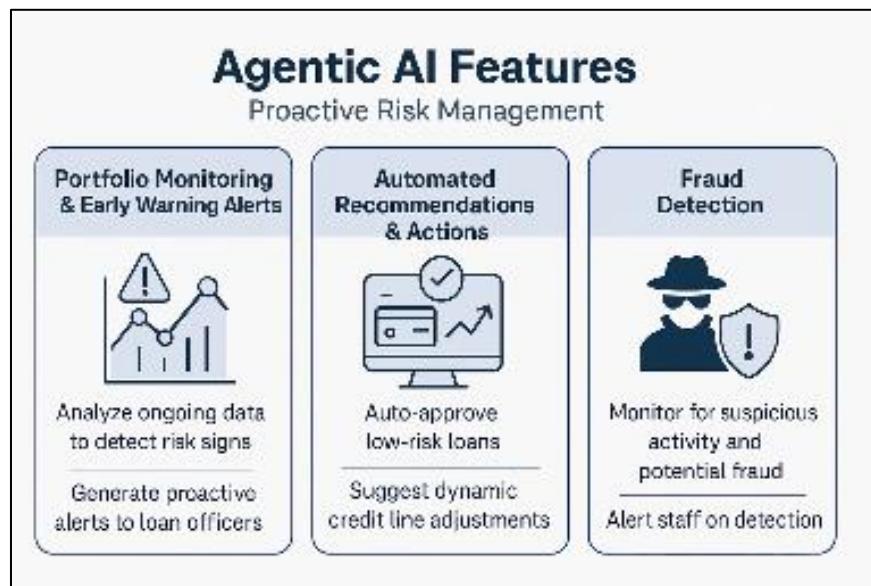
The model would proactively generate an alert message to the loan officer or the credit risk manager e.g. "alert: Member RM005 income appears to have dropped by 40% this month, consider reaching out to assess any issues". Similarly, if a member starts to miss small payments even before formal defaults the model will highlight them for follow up. By catching problems early, the SACCO can intervene through loan restructure or providing financial counselling to prevent defaults. This is a shift from reactive to proactive credit management.

### 7.2. Automated Recommendations and Actions

In some cases, the model agent might be allowed to take limited actions on its own under predefined rules. For instance, the SACCO might authorize the model to auto approve very low risk small loans say below Ugx 500,000 for top rated members without waiting for a human to deliver instant credit for small needs or the model could automatically decline applications that fall below certain thresholds with a message the member should for example build more savings first to reduce workload. Any such autonomous actions will be carefully governed and fall back to human review should the member appeal or if certain uncertainties are present. Another agentic feature could be dynamic credit line adjustment, for example if a member risk profile improves over time, the model might suggest increasing their eligible credit limit and notify them or the loan officer of this opportunity<sup>11</sup>.

### 7.3. Fraud Detection

The model can also act as a guard through using pattern recognition it can watch for fraudulent behavior e.g. if multiple loan applications come in with the same national ID or phone number or if a members data pattern matches known fraud cases perhaps the account suddenly shows large deposits before loan applications could be borrowed just to inflate statements<sup>15</sup>. On detecting possible fraud, the model can freeze the process and alert staff for investigation. The agentic monitoring continuously runs in the background<sup>12</sup>.



**Figure 3** Proactive risk management AI agent

## 8. Human In the Loop Controls and Feedback Mechanisms (HITL)

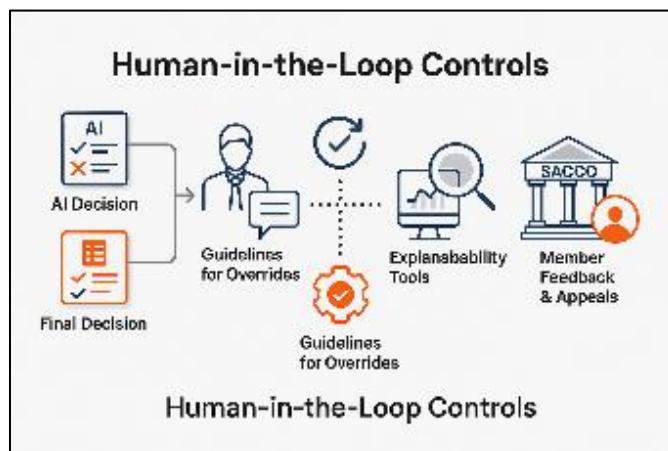
The SACCO will implement a robust human in the loop protocols to ensure model credit decisions are guided by human judgment and accountability<sup>1,14</sup>. In the initial phases, all significant model generated recommendations will be reviewed by loan officers or the credit committee. If the staff overrides the model decision, they must provide a justification thereby feeding valuable insights into the system refinement. Guidelines will govern when overrides are appropriate such as cases of limited data or exceptional circumstances.

To improve the model, overtime the system will log every decision and its outcome forming a feedback loop for retraining. Analysts will periodically review mismatches between model predictions and actual results.

For example, defaults or accurate overrides to identify gaps, retrain the model and enhance performance. Explainability tools like SHAP or LIME will be included to help officers understand which data features influenced each AI recommendation building trust and enabling informed overrides.

Members will also have the right to appeal decisions. If denied, they can provide additional documents or context to support their case prompting reevaluation by staff.

This ensures the model supports and not replacing the SACCOs commitment to fairness, transparency, and member centered service. As the model matures and proves reliable, some routine decisions may be automated, but humans will always retain the final say in critical credit determinations.



**Figure 4** Human in loop controls

## 9. Implementation plan

### 9.1. Project phases and timelines

Implementing the Credit Scoring model system will be approached in structured phases. A proposed timeline with an assumption of kick starting the project in the second quarter (Q2) of the financial year is shown below.

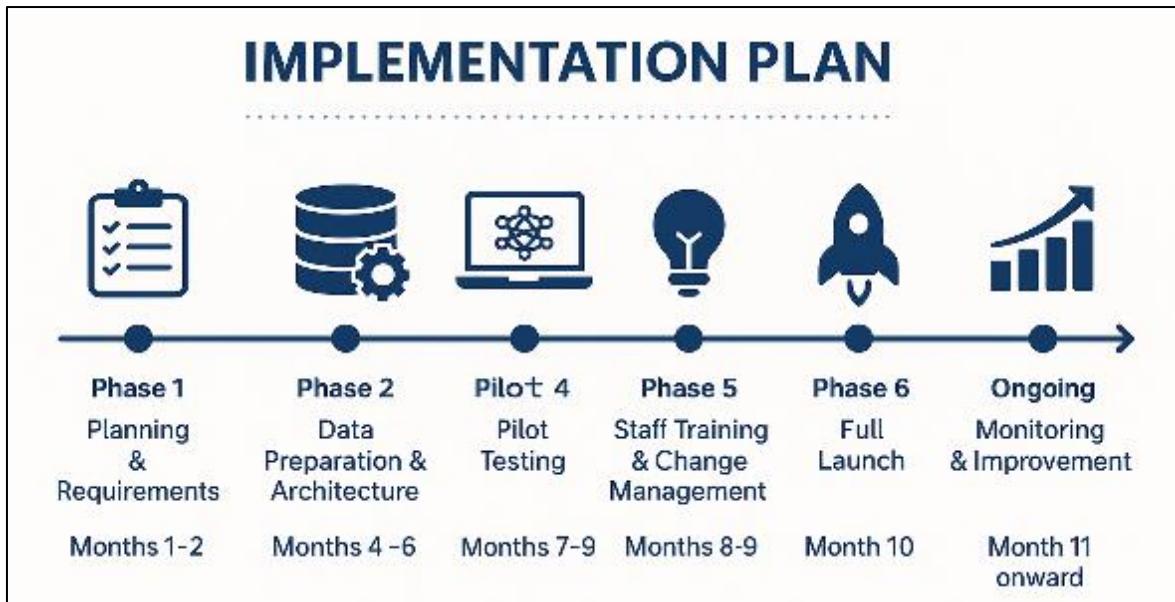


Figure 5 Phased implementation timeline

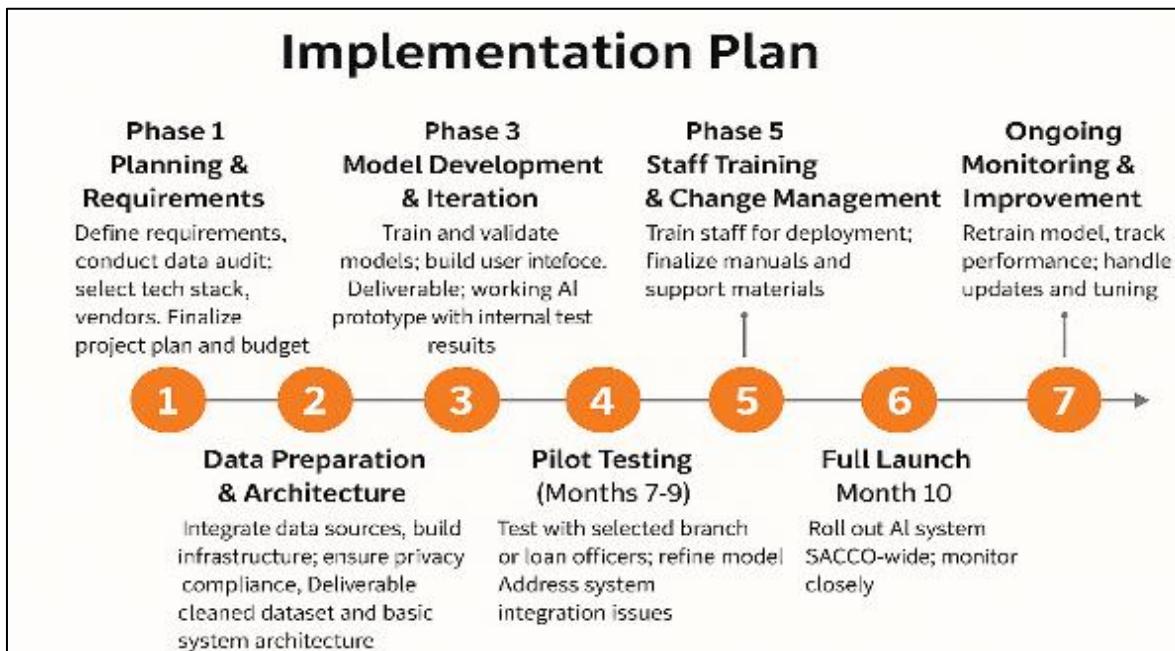


Figure 6 Detailed implementation framework

Overall, the above timeline estimates the project to be complete between 9 – 10 months from project initiation to full deployment. This can however be adjusted based on resource availability and having built buffers for iteration since getting the model right may take multiple tries. Key milestones like prototype ready, Pilot success criteria met will be used to decide transition from one phase to the next or reviewing timelines.

### 9.2. Team Structure and Roles

Implementing and AI solution requires a multidisciplinary team whose role is so critical to the overall project success and their responsibilities will be tracked with clear deliverables under the Project Managers coordination with periodic reviews by the AI Steering committee. i.e.

#### *9.2.1. Executive leadership*

most likely the SACCO General Manager or Deputy who is charged with championing the project, secure funds, aligns with strategic goals and interfaces with the Board and AI Steering Committee.

#### *9.2.2. Project Coordination*

taken on by the Project Manager to coordinate progress, manage timelines, and acts as a bridge between the technical team and the business units. he also manages vendor relations and requirements translation

### **9.3. Technical Team that includes**

- Machine Learning Engineers to build credit risk models, finetune GPT and evaluate model performance and Data Engineers to set up ETL pipelines, data cleaning and anonymization
- Software Developers to build MIS user interface and backend logic and handle system integrations and present model results
- Cloud Engineers to ensure secure environment for the model processing and API calls through to management of servers/ cloud infrastructure, security, backup and scaling.

### **9.4. Business and Domain experts**

like Credit officers to provide training data labelling, interpret model outputs, validate business relevance and contribute to user adoption. While compliance officers will ensure data privacy, legal compliance, ethical AI usage and align the solution with the SACCO bylaws and regulatory standards.

### **9.5. External support**

teams to offer technical guidance like the Makerere University AI Lab, Fintech companies like Ensibuko to offer support with system integration and development partners like the world bank to offer financial support.

---

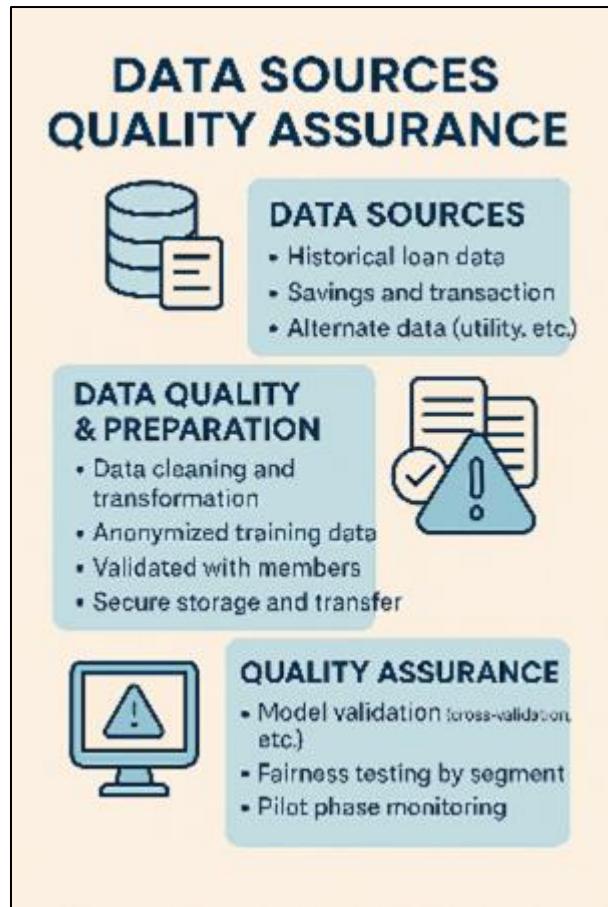
## **10. Data sources and Quality Assurance**

To ensure a robust and reliable AI powered credit scoring system, the project emphasizes rigorous data quality and preparation. Historical loan data from SACCO, forms the core training dataset capturing details like loan amounts, terms and conditions, repayment outcomes and member profiles. This data will undergo cleaning processes such as handling missing values, correcting errors, and ensuring consistent labeling of outcomes e.g. defining “Default”. Personally Identifiable Information will be anonymized to maintain privacy and focus the model on behavioral patterns rather than individuals.

Additional data sources include member savings behavior and mobile money transaction logs. These will be transformed into useful features like average balances, transaction frequency and carefully crossmatch with loan records to maintain consistency. Outliers and missing or incomplete mobile money data will be addressed by validating with members and standardizing inputs. the project also plans to use alternative data like utility bill payment and external credit data which will be verified through random sampling and reconciliation with member reported information to ensure integrity<sup>3</sup>.

Ongoing quality assurance spans from pre-deployment model validation using cross validation and performance metrics like AUC and precision / recall to fairness testing across demographic segments<sup>2</sup>. Post deployment, the pilot phase will continue monitoring AI recommendations against real outcomes to catch discrepancies or data integration issues.

With strong data governance, encrypted storage, secure transfers and compliance oversight, the project ensures that data quality is not a one-time task but a continues process forming the foundation of a trustworthy AI solution<sup>7, 13</sup>.



**Figure 7** Quality assurance framework

## 11. Technology stack and Tools

The AI solution will be built primarily using Python due to its mature ecosystem for AI/ML development. Key libraries include Pandas, scikit-learn, Boost, TensorFlow, Porcha and Hugging face transformers for GPT fine tuning. Development will start in Jupiter notebooks and transition into production scripts or services. For GPT tuning, Hugging Face's Trainer framework may be used possibly leveraging open-source models if OpenAI's APIs are not suitable due to data privacy requirements<sup>12</sup>.

The infrastructure strategy balances cloud scalability with data privacy. Initial model training may use AWS SageMaker, Google Cloud AI or Azure ML while sensitive final training could occur on premises. Data will be stored in PostgreSQL or MySQL for structured records and optionally a NoSQL or document store for logs, and explanations.

Large datasets such as mobile money logs may reside in a cloud-based data lake. the system will use Restful APIs built with Flask or Fast API for integration with the SACCOs MIS, external APIs like credit bureau or mobile money platforms and internal tools

Deployment will be cloud based or hybrid using Docker and possibly Kubernetes or on prem application server for mission critical uptime. Security is a priority with encryption, role-based access and potential penetration testing pre-launch. Testing will include unit scenario and synthetic data stress tests. Agentic components will use schedulers to trigger portfolio risk analysis and generate alerts through dashboards or SMS/email.

The entire stack emphasizes open source, modular tools to avoid vendor lock in and ensure SACCO IT team can manage the system independently after rollout

## 12. Risk and Compliance Considerations

Implementing an AI credit scoring carries inherent risk such as algorithmic bias, lack of transparency and data privacy concerns. The system may unintentionally reinforce historical biases for example against women and youth making fairness a top priority. To mitigate this the model will avoid sensitive variables, use fairness aware machine learning techniques and undergo regular audits including human oversight by loan officers and the AI Stereo.

Explainability is also essential where tools like SHAP and GPT generated narrative will ensure decisions can be interpreted and defended if challenged by regulators or members<sup>12</sup>.

Data protection and Cybersecurity are fundamental. The SACCO will strictly adhere to the Uganda's Data Protection and Privacy Act 2019 securing explicit member consent for alternative data use, enforcing role-based data access, encrypting sensitive information and applying data minimization principles. Any cloud deployment will adhere to cross border data transfer rules<sup>13</sup>.

The SACCOs compliance officer will ensure all practices meet financial regulations, lending limits, and Uganda Microfinance Regulatory Authority (UMRA) requirements. SACCO bylaws will be updated to integrate AI tools responsibly without undermining existing governance processes<sup>11</sup>.

Operational risks like downtime, model drift or fraudulent gaming will be addressed through redundancy fall back mechanisms, continuous monitoring and periodic model retraining.

Fraud detection will include behavior pattern analysis and agentic monitoring through documentation, conducting Data Protection Impact Assessment (DPIA) and respecting member rights. Overall SACCOs aim to lead with a responsible ethical AI deployment that promotes innovation without compromising trust fairness or legal compliance.

---

## 13. Stakeholder and Change Management

The implementation of the AI model by the SACCO marks a transformative shift making proactive stakeholder engagement and structured change management critical to ensure smooth adoption trust and minimal disruption. By involving all relevant parties early and providing clear training education and feedback mechanisms, SACCOs can ensure a smooth transition to AI assisted credit decisioning while preserving trust and regulatory compliance.

### 13.1. Internal Stakeholders

- **Board of Director.** strategic decision makers and most likely members of the AI Steering Committee. Early engagement ensures alignment with ethical and risk governance priorities.
- **Management Team.** Includes the General Manager, Head of Credit, Head of IT and Finance Manager responsible for operational leadership system changes and financial oversight.
- **Loan officers and Credit Committee.** Primary users of the system whose workflows will evolve and thus their buy in, trust and feedback are crucial for adoption
- IT Staff who will maintain and support the AI system require training in system operation troubleshooting and updates
- **Risk and Compliance Team** for oversight of the AI system decisions to ensure adherence to policies and regulatory framework and requirements
- **SACCO Members**, who are indirect stakeholders, impacted by the AI driven decision require transparent communication and education to maintain trust.

### 13.2. External Stakeholders

- **Regulators (UMRA and Bank of Uganda)** must be informed and involve ensuring compliance and gain potential endorsement and guidance.
- **Credit Bureau Partners.** These are key data providers whose collaboration is vital for accurate credit evaluation and issue resolution.
- **Mobile Network Operators (MNOs).** Partners in data access were memorandum of understanding agreements for secure and reliable integration
- **Apex Bodies** like Uganda Cooperative Savings and credit union (UCSCU) and Association of Microfinance Institutions of Uganda are important for industry alignment and potential advocacy or support for broader adoption.

- **Community Leaders** in rural settings who can help in building local trust in the AI system and preempt resistance.
  - **Development Partners /NGOs.** Only if they are involved in funding or support, they require updates and outcome tracking to ensure continued engagement.
- 

## 14. Engagement and Training Strategy

### 14.1. Early involvement and clear communication

Staff engagement begins at project inception. The SACCO team especially loan officers will be informed of the AI systems purpose and benefits emphasizing that it's a supportive tool not a replacement. Demos using historical cases will be used to demystify AI, reduce fear and position the tool to improve service speed and decision accuracy. Framing it positively helps foster openness.

### 14.2. Practical Training Workshops

All relevant staff will attend hands on training sessions including interpreting AI scores, recommendation and explanations, Navigating the software via test scenarios in a sandbox, handling overrides and explaining decisions to members and basic AI literacy on accuracy and how it is trained. The training will be delivered in small groups for personalization supported by user manuals and quick reference guides for continued use.

### 14.3. Continuous feedback and Peer Support

A feedback loop will be introduced through weekly meetings or digital platforms like zoom or teams where staff can report unusual AI outputs or ask questions.

This creates a culture of inclusive improvement. The AI Stereo will host town halls post launch to address emerging concerns and ensure transparency.

### 14.4. AI Champions and Peer Mentorship

Select enthusiastic staff especially from the pilot team to become AI champions. These individuals will mentor others answer questions and encourage the adoption through peer influence. Their success stories and support will reinforce trust in the system.

### 14.5. Performance Incentives and Reassurance

Staff KPIs may be adjusted to align with AI enhanced workflows like faster processing or improved loan quality. The system will be shown to support their performance goals and do not threaten their jobs. Roles will evolve not to be replaced but rather shift towards more strategic responsibilities like relationships management and quality oversight.

### 14.6. Technical Training for IT staff

The IT team will receive in depth operational training from the development team covering model deployment and updates, system monitoring and error handling, Python or platform specific skills as needed. A system manual book and formal handover will ensure the SACCOs internal team can fully manage the AI system post deployment

---

## 15. Member Communication and Cultural Considerations

### 15.1. Member outreach and Messaging

To build trust SACCOs will clearly communicate to members that the new AI system is designed to make loan processing faster fairer and more inclusive. This can be done through member meetings circulars or public messages that highlight tangible benefits of the system like quicker approvals and recognition of good financial behavior. Recognizing the AI system as a tool to help identify and reward responsible members to encourage acceptance.

### 15.2. Addressing Fears and Promoting Transparency

Considering that some members may fear impersonal or robotic decisions, the SACCO will emphasize that the loan officers remain involved and the AI system is a smart assistant not a replacement. Clear relatable explanations like Your loan officers now have an expert helper will be shared to humanize technology. Transparency around data usage and

privacy is critical where members will be asked for consent when alternative data is used and reassured that their data is securely handled and never shared improperly.

#### *15.2.1. Managing Procedural and cultural change*

Any changes in the loan approval process will be reflected in all updated internal policies and terms of reference with proper communication to members and committees. Given the SACCOs cooperative and relationship-based culture, the AI system will be positioned as enhancing and not replacing community-based decision making.

#### *15.2.2. Building Confidence through success stories*

Early success stories like previously excluded members gaining access to loans will be shared publicly to demonstrate the value of the system. These stories will build confidence and show that the AI can extend financial inclusion in meaningful ways.

#### *15.2.3. Role Evaluation and Transition support*

As the AI model takes over analytical tasks loan officers can focus more on member engagement financial literacy and exception handling. The credit committee role may evolve towards policy and oversight not routine approvals. These changes will be discussed openly to ensure staff feel valued and involved. Running a dual system temporarily both AI and traditional process during the initial months will help ease the transition and allow staff and members to build trust in the new system.

---

## **16. Success Metrics**

### **16.1. Portfolio Quality and Lending Growth**

The primary metric will be loan default rate with a target of reducing it from a baseline e.g. 5% to below 3% within a year indicating smarter lending. Simultaneously SACCO aim to increase responsible loan approvals especially to underserved groups like the youth, women, and first-time borrowers. This includes tracking

- Loan approval rate and disbursement
- Inclusion metrics like a percentage of loans to first time borrower's target.

### **16.2. Efficiency and member experience**

To improve member experience, loan decision turnaround time is a key metric aiming to cut the average from 72 hours to under 24 hours especially for small low risk loans. Member satisfaction will be measured through surveys, feedback channels and monitoring of complains or appeals. A success indicator will be a higher satisfaction rating compared to the previous year and an increase in new membership or share contribution.

### **16.3. Technical Performance and Trust**

The AI models prediction accuracy calibration and override rate will be monitored.

Trust in AI will also be measured via staff surveys, targeting >90% confidence in using the tool within six months. A low override rate with good outcomes will signal model maturity and user alignment.

### **16.4. Operational efficiency and compliance**

Operational metrics like cost per loan processed, loans handled per officer and error reduction in underwriting will help quantify the systems efficiency gains. On the compliance side SACCOs will aim at zero data breaches or regulatory violations and monitor fairness.

### **16.5. Monitoring, Adaption and scaling**

A dedicated dashboard and monthly reports will track key performance indicators. The AI Stereo will review performance regularly making decisions on model retraining, threshold tuning or process adjustments. Feedback from staff and members will be integrated into system enhancement. A post implementation review report after 12 months will assess overall impact and inform future scaling or reinforcement

## 17. Conclusion

This paper presents a reconceptualized approach to credit scoring and loan underwriting for Ugandan SACCOs that is centred on artificial intelligence and alternative data integration. The motivation for this proposal stems from the pressing need to reduce the high default rates and broaden credit access among SACCOs that traditional methods have struggled to resolve. By thoroughly examining the proposed systems architecture and components, I demonstrated how machine learning models informed by diverse data sources like mobile money and utility payments can enhance the accuracy and inclusiveness of credit assessments. The system promises tangible benefits like a more objective and faster loan decisions, extension of credit to previously excluded members thereby advancing Uganda's financial inclusion goals and strengthening risk management capabilities for SACCOs.

Most importantly the proposed system is grounded in responsible AI principles including measures for data privacy in compliance with Uganda's Data Protection and Privacy Act 2019, fairness to prevent bias against any group, explainability to maintain transparency in decisions and human agency in keeping SACCO loan officers in control of the final decision. These safeguards ensure that the adoption of AI adhere to both local regulatory frameworks and international best practices for ethical AI deployment. By doing so, the systems not only innovate technologically but also upholds the trust and values core to cooperative finance. As noted by global financial authorities integrating such precautions is key to avoiding unintended harms and ensuring that AI tools augment rather than undermine fair lending 6.

The successful implementation of this AI powered credit scoring system will depend on collaborative efforts. SACCOs must invest in capacity building for their staff, regulators should continue to provide an enabling, yet vigilant oversight environment and technologies need to remain engaged in refining the model for local realities. The establishment of an industry level AI Steering Committee is recommended to oversee these aspects and foster continuous learning. With the right governance, the SACCO sector in Uganda can become a pioneer in deploying AI for community-based finance setting an example that other countries and financial cooperatives can study and emulate.

All in all, an AI- powered credit scoring and loan underwriting system offers a promising avenue to boost the performance and outreach of Uganda's SACCOs. It leverages cutting edge technology to solve persistent problems in credit risk assessment while keeping member interests and rights at the forefront. Future works work should focus on scaling up across the country's SACCO network could profoundly transform access to credit for the underserved, fuelling entrepreneurship and development at the grassroots. By merging innovation with inclusion and ethics, Ugandan SACCOs can truly revolution Alize their lending paradigm thereby achieving stronger portfolios and more empowered communities.

## References

- [1] Businge J. Innovations poised to reduce high default rates among SACCOs.. <https://www.independent.co.ug/innovations-poised-to-reduce-high-default-rates-among-saccos/>. May 30, 2024.
- [2] Gaichuru EM. Financial Innovations on Financial Performance of Savings and Credit Cooperative Societies in Meru County, Kenya (Doctoral dissertation, Meru University of Science and Technology).
- [3] The World Bank Group. The Use of Alternative Data in Credit Risk Assessment: The Opportunities, Risks, and Challenges. 2024
- [4] Azaroual F. Artificial Intelligence in Africa: Challenges and Opportunities. Policy Brief. PB. 2024 May:23-4.
- [5] Raji AA, Alabdoon AH, Almagtome A. AI in credit scoring and risk assessment: Enhancing lending practices and financial inclusion. In2024 International Conference on Knowledge Engineering and Communication Systems (ICKECS) 2024 Apr 18 (Vol. 1, pp. 1-7). IEEE.
- [6] Alliance for Financial Inclusion (AFI). Alternative Data for credit scorirng. AFI Guidelines Note. Kuala Lumpur. AFI; 2025
- [7] Faheem MA. AI-driven risk assessment models: Revolutionizing credit scoring and default prediction. Iconic Research And Engineering Journals. 2021 Sep 30;5(3):177-86.
- [8] Nemko Digital. Uganda AI Regulation: Digital policy and legal framework analysis. <https://digital.nemko.com/regulations/uganda-ai-regulation> . 2023

- [9] Pooja V, Preeti S Desai. The Role of AI and ML in Alternative Credit Scoring in Fintech Lending. DOI: <https://doi.org/10.52783/jisem.v10i31s.4956>. 2025
- [10] Fintechnews Africa. Sub-Saharan Africa and Asia Specific fuel the growth of the global mobile money sector. Uganda launches first mobile credit scoring system. <https://fintechnews.africa/45192/fintechafrica/sub-saharan-africa-and-asia-pacific-fuel-the-growth-of-the-global-mobile-money-sector/> . April 28, 2025
- [11] Atsiaya SA, Bwire FJ. Information Technology Shared Services Adoption and Performance of Savings and Credit Cooperative Societies (SACCOS) in Kenya.
- [12] OpenAI. GPT-4 technical report. 2023. <https://cdn.openai.com/papers/gpt-4.pdf>
- [13] African Law and Business. Protecting Uganda's data – Uganda Data Protection and Privacy Act enters into force. <https://www.africanlawbusiness.com/expert-views/9498-protecting-uganda-s-data/> . Oct 2019
- [14] Umeaduma CM, Adedapo IA. AI-powered credit scoring models: ethical considerations, bias reduction, and financial inclusion strategies. *Int J Res Publ Rev*. 2025 Mar;6(3):6647-61.
- [15] Nakayenga HN, Akashaba B, Twineamatsiko E, Zimbe I, Ssetimba ID, Bagonza JK, Pinyi EO. Leveraging AI for real time crime prediction, disaster response optimization and threat detection to improve public safety and emergency management in the US. *World journal of advanced research and reviews*. 2024;23(3).