

SeVPesa

Technical proposal by Tech-board Company Limited

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# INTRODUCTION

Tech-board company limited, as within this document referred as Tech-board, is a research, design and innovation company registered under the Tanzanian companies act of 2002. The company’s scope of works ranges from designing FIN-TECH solutions for banks and microfinance industries to interactive case management and reporting solutions to both public and private agencies. We are also involved in the design, development and maintenance of Intelligent transportation systems (ITS). Our focus is leveraging technology for the betterment of the local community.

As is our name, pronounced “Tech Dash Board”, Tech-board is defined by its attention to writing software platforms that are centralized, user friendly, secure and most importantly, custom made for our clients and partners. In laymen terms, all our platforms are tailored to serve specific needs and solve specific problems. We employ the latest technology in software design, deployment and operations to ensure that our platforms are safe and secure. Tech-board is also an official technical partner with the Tanzanian National Internet Data Center, a government agency committed to software innovation, internet safety and security. This proposal is focused on introducing our latest product on the FIN-TECH division, code named SevPesa.

SevPesa is fin-tech solution custom made for the Tanzanian banking institution. The platform focuses on one key goal that is to increase and boost the level of financial inclusion in the local Tanzanian society. The platform also has a subsidiary goal which is to use technology to empower and connect the local community. The tools and features coded in our program are aimed specifically in enhancing and providing banking access to people of all kinds within our local community. A domestic worker at home to a ‘boda-boda’ driver on the streets, a farmer in the remote unreached parts of the country to the small business owner in town. These tools are meant to provide banking convenience, reach and security for the economic growth of local businesses and personal welfares.

Tech-board has partnered with the National Internet Data Center and is, through this proposal, requesting partnership with the Tanzania Investment Bank to deliver a service that is, by no doubt, the most consequential at our time. This technical proposal outlines the Software model by which SevPesa stand on. It also outlines the digital KYC compliance measures built within the platform as required by the Bank of Tanzania.

# SEVPESA BRIEF

The platform, code named SevPesa, is a technical solution designed to cater to the banking needs of a specific kind of customer to whom using a bank was inconvenient, out of reach and insecure. SevPesa is also built to enhance financial discipline and inclusion among its users. Tech-board engineers have leveraged the latest technology to create a bridge between the banks and the customer as explained visually by fig 1.0 below.

SEVPESA

* Financial discipline
* Financial inclusion
* Convenience
* Accessibility
* Security

CUSTOMER

BANKS

Figure Image to show SevPesa methodology

The platform consists of four Interfaces.

1. USSD Code application (Sim banking)
2. Mobile Application (Sim banking)
3. Web application (Online banking)
4. Dashboard administrative panel (Admin online interface)

As described by fig 1.0, Tech-board has built a software platform that will enable users to have access to banking institutions without ever having to visit a banking location. Everything is designed to work from the comfort of one’s mobile device. SevPesa is also designed to be KYC compliant.

### How it works

SevPesa is run by an algorithm we call the fetcher. Instead of having the user get all their personal information to the bank to open an account hence fulfilling the banks KYC requirements, the fetcher interfaces with multiple national databases to create a user profile that automatically gets submitted to the bank for approval. The fetcher uses data from multiple national verified databases to implement and establish KYC compliance between the bank and the user. This means, the user will only have to provide one unique id about themselves and leave the rest to the fetcher. Our software, backed by the NIDC is safe, secure and efficient meaning that a SevPesa user can open and access a bank account in minutes.

The user will also have 24/7 access to their account via an online banking platform or a ussd coded application rendered through their MNO provider. Since SevPesa is completely paperless and mobile, users will be able to perform all banking transactions and have access to all banking services in the tips of their fingers. This will increase and safeguard the safety of all our customers. Figures 2 and 3 below show a small glimpse of the USSD code application and the APP respectively.

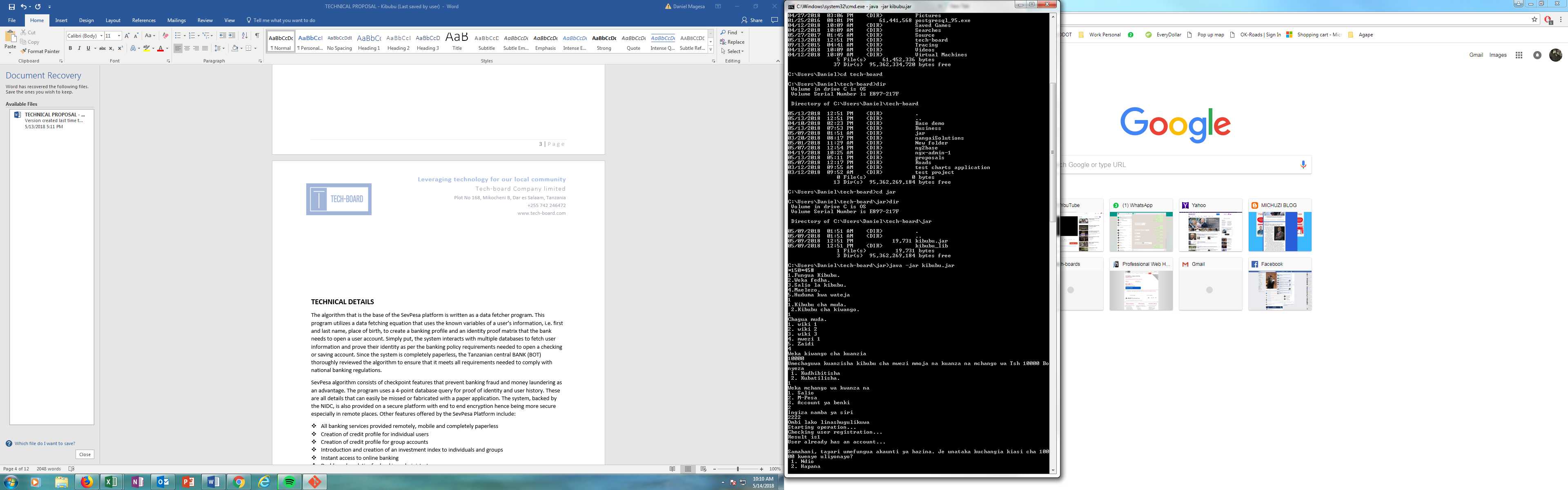


Figure To show USSD code program for the SevPesa platform

As seen in figure 2.0 above, the user will first be connected to SevPesa Menu via a specified ussd code. This will provide access to a menu that will lead them to creating an account. The menu also consists of options to deposit money into the account, check the account balance, information and an automated customer service request. All of this is built to increase safety, convenience and efficiency of the platform. The platform can also be accessed via a mobile application interface as shown is figure 3 below. The mobile application, just like the USSD enables the user to remotely open and manage a savings account from one’s finger tips in 4 easy steps. No paper work is required!

A screenshot of a cell phone

Description generated with very high confidence

Figure To show the mobile application demo for the SevPesa Project

For further details regarding the system model, please see figure 4 below.

# SOFTWARE MODEL

### Introduction

The proposed software shall be a SIM (MOBILE) and Online banking platform custom written as a solution for the TIBCBL users and administrators. The system, designed from scratch, will include and integrate:

* All present features offered by the current TIB banking software solution
* The fully automated account opening and saving platform (SEVPESA)
* A mobile banking module comprising of android and iOS platform applications
* A highly amped USSD code application for automated SIM banking with increased KYC architecture
* A mobile and online payment API

This banking system shall focus on three major themes which would be to **centralize**, **modernize** and **secure** the TIB banking software platform for the purposes of providing better customer banking experience, generating quality data for enhanced banking administrative needs (investing, marketing, sales) and to enhance the overall quality of the user banking experience and banking management of user accounts.

The solution shall be written using the latest coding standards. Its designed to follow the MVC architectural pattern using Angular on the client side and PHP and MYSQL on the server and database respectively. These specific languages were selected due to their immense performance and stability in the current market but also because of the ease they shall create in the operations and maintenance of the platform. The solution shall rest on a farm of Centos 6.9 servers which will utilize a load balancer for maximum uptime and efficiency. The system shall also utilize minimal dependencies on the client side to perfectly accommodate the network capacity challenges faced in the clear majority parts of our country. This simply means that the system shall be built to be secure yet light weight on the client for maximum operability even in low bandwidth areas.

The proposed work methodology shall comprise of solution deliverables divided into five parts. These are as outlined below:

1. Delivering the online banking module
2. Delivering the USSD coded application coupled with the SEVPESA platform
3. Delivering the Administrator and Dashboard panel
4. Delivering the SIM banking platform comprising of Android and iOS applications
5. Delivering the TIB payment API

This proposal shall present the Model View Controller architecture and other solution components as outlined below.

### SOFTWARE ARCHITECTURE – VIEW

#### Online banking

TIB online banking will be designed to enable TIB customers to access their bank accounts and services through a secure online platform. This will be available online through any browser on devices such as the desktop, laptop, tablets and mobile phones. The banking features for this online platform shall include

1. Automated enrollment
2. Secure authentication
3. Banking and account information
4. Account balance check
5. Paperless statements
6. Account alerts
7. Access to loan applications, document uploading and decision notice
8. Secure messages
9. Customized account offers
10. Pay and money transfers
11. Profile and settings
12. ATM and branch information
13. Feedback
14. Investments options
15. Help and support
16. Access to SEVPESA account

### Mobile banking (Android and iOS)

The TIB mobile banking platform shall be designed to enable TIB customers to access their TIB bank accounts and other connected TIB services through a mobile app written for both the Android and the iOS platforms. These apps shall be rendered through the play store for android and the apple store for iOS. The banking features for this mobile platform shall include

1. Automated enrollment
2. Secure authentication
3. Banking and account information
4. Account balance check
5. Mobile check deposits
6. Paperless statements
7. Account alerts
8. Access to loan applications, document uploading and decision notice
9. Secure messages
10. Customized account offers
11. Pay and money transfers
12. Profile and settings
13. ATM and branch information
14. Feedback
15. Investments options
16. Help and support
17. Access to SEVPESA account

#### Sim banking (USSD application)

The TIB SIM banking running on a USSD code platform shall be built to enable banking access to the customer who does not have access to both online and mobile app. Though the services will be limited, the user will be able to access basic banking features from any registered mobile phone with USSD code capability. The features included in this application will include:

1. Automated enrollment and automated account opening
2. Secure authentication
3. Banking and account information
4. Limited text statements
5. Account alerts
6. Text banking
7. Limited loan applications
8. Customized account offers
9. Pay and money transfers
10. Feedback
11. Investments options
12. Help and support
13. Access to SEVPESA account
14. Enhanced KYC backed by NIDA and TCRA integration

#### Administration platform (Web Application)

The TIB admin platform shall be designed to allow a control GUI for the TIB admin to seamlessly monitor and control the TIB banking mainframe. This platform shall consist of admin features that will allow admin to fully control and automated the mainframe with a custom-made GUI hence reduce the technical requirements needed for system management. It really is built to make sure that anyone with the correct clearance will be able to administer the mainframe. The features included in this platform will include

1. Automated enrollment with approval required
2. Secure authentication
3. Admin privilege cluster views
4. User account management
5. Report generation and automation
6. System feature overrides and suspension
7. Mass messaging and push features
8. Chat
9. Profile and settings
10. System back up scheduler
11. Help and support

#### Dashboard application for data presentation and analysis (Web application)

TIB Dashboard application will be an internal dashboard design to solely present and show case system data for marketing and performance evaluation purposes. The data will include comparisons between set milestones and what has been achieved and consumer data that can be applied for management purposes. The dashboard shall consist of the following features.

1. Automated enrollment
2. Secure authentication
3. Chart and graph analytic tools
4. System statistics
5. Data query
6. Reports

TIB payment API and smart POS

* + 1. Introduction
    2. Features
  1. Interface architecture and technology
  2. Interface security
     1. Authentication
        1. User registration
        2. Login
        3. Password recovery
        4. OTP for authentication
     2. Device and location recognition and tracking
     3. Data encryption
     4. Automated logout
     5. Password expiration
     6. Password strength
     7. BOT restrains
     8. Authentication logs

1. Model
   1. Database architecture
      1. Introduction
      2. Database structure
   2. Database features
      1. Security
      2. Operability
      3. Capacity
      4. Hardware and technology
      5. Scalability
   3. Data transfer protocols and encryption
   4. Database redundancy and management strategy
      1. Hot backup
      2. Cold backup
2. Controller
   1. Error caption and handling
   2. View-Controller communication protocols
   3. System installation, upgrading and updating strategies
   4. Redundancy and software backup strategies
   5. Hardware and technology
   6. System monitoring and even logging
   7. Design documentation and system manual
3. Hardware and software dependencies
4. Network dependencies
5. Documentation and training

1. Proposed system support strategy
   1. System and banking support for users
      1. Chat
      2. Hotlines
      3. Online support
      4. FAQ blog
   2. System support for TIB
      1. Online support
      2. Hotline
      3. FAQ blog
2. Solution design plan and methodology
   1. Cost structure
      1. Development
      2. Deployment
      3. Maintenance
   2. Design timeline
   3. Deployment phases plan
3. Proposed integration and design of IVR customer service and Self-Service ATM banking
4. Solution extras
   1. TIB Social platform
   2. TIB marketing assistant
   3. TIB customer investment index initialization
   4. TIB customer credit index initialization

The proposed system will contain five major UI components that will interact with a processing unit to deliver quality banking experience for both the modern and the unreached, financial excluded customer. The focus of the platform, as stated, is to increase and enhance financial inclusion within the local Tanzanian community therefore our system will be built to tailor a user experience catering to achieving said focus. On the outline, the system will provide a platform for the following types of banking:

1. Online banking
   1. Web application accessed through a browser
2. Mobile banking
   1. Mobile app (Android and iOS)
   2. USSD application (Built to integrate into the already existing TIBCBL Sim banking)
3. Administrator Dashboard based application
   1. Web application access through a browser

All UI components will be fitted with the automated account opening feature as initially proposed through the SevPesa component of the system. This means that all UI components users will be able to access all banking features through mobile as presented earlier. That said, next follows the technical details about the proposed system.

### Technical details

1. Hardware and Network

The system will be built on a Linux server running Centos 6.9 64Bit. There will be several static and dedicated IP’s configured as access points to the machine with a guaranteed uptime of 99.9%. We shall achieve this by utilizing our partnership with the National Internet Data Center where the system will be hosted. We will work closely with our partners to ensure system upkeep and uptime is maintained. Other server details include:

* 4 cores, 8 threads Intel Xeon Processor
* 8 MB Cache
* 1000 GB (RAID 1)
* 15 TB/Month
* Initially configured with 5 dedicated static IP’s

The network infrastructure will also consist of a Cisco RV220W firewall with following standards for added internet security

* IEEE 802.11n, 802.11g, 802.11b,
* 802.3, 802.3u
* 802.1X (security authentication)
* 802.1Q (VLAN)
* 802.11i (Wi-Fi Protected Access [WPA2] security)
* 802.11e (wireless quality of service [QoS])
* IPv4 (RFC 791), IPv6 (RFC 2460)
* Routing Information Protocol (RIP) v1 (RFC 1058), RIP v2 (RFC 1723)

The system will also implement the open source ModSecurity web applications firewall for its web component and other server-client communications. The projected capacity of the above-mentioned hardware and network abilities will be to serve over 100,000 hits per hour with easy size allowances as traffic increases.

1. Platform and Database requirements

The platform will run an Apache/2.4.33 server (server-side) and a 5.6.39 MySQL Community server (GPL) on the database. These are proven system guaranteed to deliver quality server-side processing. Our back-end will be written and run on PHP 5.6 language while the front-end client-side web will be written in Angular 5 following the MVC framework.

Client-side mobile banking will be written in java and front-end XML for android while Objective-C shall be used to write the native iOS applications.

The programming mechanism shall follow the Model View Component (MVC) framework as well as the Object-Oriented Programming methodology. The class systems shall provide for a modularized system architecture with multiple threading hence enhances the user experience for multiple clients and business lines.

The system shall implement a blowfish encryption algorithm for data transfers. All web client-server communications shall be under the https protocol utilizing a SSL certificate for extra security. Data shall be compartmentalized into smaller packers hence reducing the need for compression. Using the angular technology will ensure no page refreshes and reloads are needed for full functionality.

1. Operational software requirements

As states in the hardware and network capabilities, the system shall have enough storage and will be built to scale without downtime. The system shall be custom made and tailored to the specific requirements as stated by TIBCBL.

The system shall also include an automated reporting module that will run a reporting script over on crontab as shall be requirement by system administrator. The system shall consist of GUI that will be used for easy report configuration and can produce both CSV and pdf reports on request and automatically.

1. Redundancy requirements

Load balancer

Have two servers that technical act as one.

If there is a failure in one, the other automatically takes over

1. Interface requirements

This software model follows the standard procedures of the model view controller framework. The model also adopts a Object-Oriented programming method where all system functions are divided into classes and methods. The system also shall be designed to contain API end points that can be used to both interact internally between its classes and UI components or externally between the system and other platforms.

1. System features

The system server is local hence runs on all local location settings including time and date. System can also be configured to fit the business calendar as instructed by the bank. This will be an admin feature installed with the design. The system offers many features on the client side as listed below but on important one does include the utilization of Angular’s powerful forms module which consists of automated data validation. Furthermore, the https protocol built alongside form validation does allow the system not only to validate data based on the client-side input but also with any checks that will be prescribed on the server side.

Other system features include:

1. System security features

This system, being a banking transactional system is loaded with several security features in addition to the firewall and mod security web firewall installed. These are outlined as follows.

* 1. Authentication
     1. Online banking Client registration shall require an email confirmation or one-time phone code confirmation. The code shall be sent to the phone number in file.
     2. Online banking client login shall consist of device recognition where by a user will have to confirm a device by a special code. Users will also be notified if their account has been logged in a different device and be prompted to report immediately if that was not them.
     3. Online banking client password retrieval shall be provided by a confirmation link sent to the user registered email or registered phone number. The user shall be notified of the action.
     4. The user will also be required to set and answer security questions for password retrieval.
     5. Mobile banking authentication for both android and iOS will follow the same procedures as outlined above for the web client
     6. Mobile apps will also restrict screen shooting
     7. Users will be required to update or confirm their identity every 6 months in both web and mobile.
     8. USSD applications will also consists of security questions that will be used as means of identifications. These will utilize the sms methodology where a user will reply with the security questions answer to a specific number.
     9. USSD will use PIN that shall be linked to the user’s mobile money account.
     10. Transactions shall be monitored and any irregular activity shall require user confirmation via a call from the customer care center.
     11. System shall implement an automatic log out after 5 minutes of user inactivity.
     12. Password complexity shall be enforced.
     13. All user activity logs shall be recorded and archived for reference and other security measures.
     14. Random generated questions are going to be implement whenever necessary

* 1. Users will be asked to change their password/pin every 6 months
  2. System log active and will be used.
     1. Logins and locations
     2. All activity archived
  3. Does require passwords to fulfill a criteria (cannot be username, email, first name, last name and must contain certain characters) Blowfish encryption uses.
  4. Automatic logout after x minutes in place
  5. User account activation and deactivation in place.
  6. Does support password recovery
  7. Other additional security features

1. Initial support, documentation and training

The system shall be well documented on the development and user end. With the deployment, there shall be a user and training manual that shall be written. These will allow not only our staff but also the bank’s HR training division to have plenty of material for training.

An online FAQ and chat help shall also be available for any issues regarding the usability of the system. This shall be updated and handled dynamically.

1. Quality attributes
2. For mobile app – there will be quick transactions that will be permitted with a code without logging in.
3. Admin will also have a select list of hotlist actions that they can configure to run quickly.
4. The error handling and reporting module in place will catch all the errors and provide for appropriate user readable error messages.
5. Business Continuity support

Hot back up – Using a load balancer

Under cold/warm back up the log will be stored.

1. Work plan and methodology

State the work plan here

1. Firm’s response to support services

The firm shall employ a 24-hour customer support system for the system. This shall also be available online via chat and/or email.

1. IVR/Self-Service

Future integration will be made possible.

1. Platform Vendor independence

The platform shall be available in English but a limited Swahili option shall be provided.

1. Management & Administration

The algorithm that is the base of the SevPesa platform is written as a data fetcher program. This program utilizes a data fetching equation that uses the known variables of a user’s information, i.e. first and last name, place of birth, to create a banking profile and an identity proof matrix that the bank needs to open a user account. Simply put, the system interacts with multiple databases to fetch user information and prove their identity as per the banking policy requirements (KYC) needed to open a checking or saving account.

SevPesa algorithm consists of checkpoint features that prevent banking fraud and money laundering as an advantage. The program uses a 4-point database query for proof of identity and user history. These are all details that can easily be missed or fabricated with a paper application. The system, backed by the NIDC, is also provided on a secure platform with end to end encryption hence being more secure especially in remote places. Other features offered by the SevPesa Platform include:

* All banking services provided remotely, mobile and completely paperless
* Creation of credit profile for individual users
* Creation of credit profile for group accounts
* Introduction and creation of an investment index to individuals and groups
* Instant access to online banking
* Dashboard analytics for banking administrators
* Dashboard analytics for group accounts
* Automated customer service
* Access to stock market and investment accounts
* Crowd funding platform linked with the account
* Contributions through any MNO account registered in Tanzania
* Contributions and transfers from other banks[[1]](#footnote-1)

SYSTEM MODEL

# TIB ADMIN - OneNote

Figure 4 System model SevPesa Platform

### SYSTEM MODEL EXPLAINED

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **No:** | **System Model** | **Feature Sets** | **Steps/Scenario** | **Impact to TIBCBL** |
| 1 | Sim banking App model | * Automated paperless account opening * Balance inquiry * Balance alert (SMS) * Bill payments * Bilingual * Account alerts and notifications * Loan application and access * Funds transfer (Inter and Intra bank) * SevPesa account access * Automated customer service * Live customer service (Chat) | 1. User downloads App from Store. 2. User registers account with National ID/ phone number. 3. User provides answers to randomized security questions. 4. User waits for approval. 5. If approved, user gains access to Sim banking platform features offered by TIB. 6. If not approved, necessary communication protocols proceed. | TIB Sim banking APP to provide TIB banking services anywhere 24/7  Centralized  Access to full TIB services on mobile  Bilingual  Custom made  Affordable  Light-weight data option |
| 2 | Online banking | * Automated paperless account opening * Online investment portfolio access (real time) * Bill payments * Loan applications * Bilingual * Fund transfer (Inter and Intra bank) * Balance inquiry * Balance alerts * SevPesa account access * Automated customer service * Live customer service (chat) | 1. User requests web application via browser. 2. User registers account with National ID / phone number. 3. User provides answers to randomized security questions. 4. User waits for approval. 5. If approved, user gains access to Online banking platform features offered by TIB. 6. If not approved, necessary communication protocols proceed. | TIB Online banking to provide TIB banking services anywhere 24/7  Centralized,  Custom made,  Bilingual  Affordable  Light weight data option |
| 3 | TIB Admin dashboard | * System dashboard * Group account analytics * Individual account analytics * System stats as per required * Super user account access * Automated account opening approval * Investment index analysis * Custom system security alerts * Anti-money laundering alert/ automated account behavior analysis * SevPesa account analytics | 1. Admin user requests web application via browser. 2. Admin user registers with TIB email and password 3. Admin user given approval based on admin tier privileges 4. Admin user has access to TIB dashboard | Centralized account mainframe,  Analytic tools,  Statistical analysis,  Customer profiling, |
| **No:** | **System Model (Business Case)** | **Feature Sets** | **Steps/Scenario** | **Impact to TIBCBL** |
| 4 | Sim banking USSD – model | * Automated paperless account opening * Balance inquiry * Balance alert(SMS) * Bilingual * Account alerts and notifications (SMS) * Bill payments * Loan application * Fund transfer (Intra Bank and MNO accounts) * SevPesa account access * Limited access to online investment portfolio via SMS | 1. User requests site via USSD code 2. User registers via phone number/national ID 3. User provides answers to randomized security questions. 4. User waits for approval 5. User gets access to limited services offered via TIB sim banking | First USSD app with fully automated Account opening,  BOT KYC compliant,  Spread TIB banking services to the nontraditional banking client,  Take TIB banking services to areas with no banking branch access, |
| 5 | System Security model | * Randomized security questions for KYC compliance * End to end encryption (Client – Server) * Multiple layer firewall * Data backed by NIDC * Secure registration and login * JWT security tokens implementation for session activation * Client(browser) change verification and alert * Two factor authentications * Session monitoring * Anti-identity theft implementation | Security features implemented by TIB and Tech-board |  |

# Conclusion

At Tech-board we dream big. It is that simple. We believe to have created a platform that will boost financial inclusion in the local Tanzanian community. Our goal is to get 90 percent of the population access to formal banking services. Not only have we employed the latest technology in achieving this goal, we have a dedicated team of individuals who are committed to this goal. Our developers, who come from different social economic backgrounds, have the passion and experience to pull such a task off.

1. Banks affiliated with the SevPesa Platform [↑](#footnote-ref-1)