Mount Kenya University

SCHOOL OF COMPUTING AND INFORMATICS

DEPARTMENT OF INFORMATION TECHNOLOGY/ ENTERPRISE COMPUTING

Title PesaBank Internet Banking System

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This project is submitted in a partial fulfillment of the Bachelor of Business Information Technology degree offered in the department of Information Technology of Mount Kenya University.

December, 2024

DECLARATION

I hereby declare that this project report is based on my original work except for citations and quotations which have been duly acknowledged. I also declare that it has not been previously and concurrently submitted for any other degree or award at Mount Kenya University.

Signature: _____

Name: _____

ID No: _____

Date: _____

SUPERVISOR

I the undersigned do hereby certify that this is a true report for the project undertaken by the above named student under my supervision and that it has been submitted to Mount Kenya University.

Signature: _____ **Date: _____**

ACKNOWLEDGEMENT.

I would like to thank everyone who had contributed to the successful completion of this project. I would like to express my gratitude to my research supervisor, Mr. Biko for his invaluable advice, guidance and his enormous patience throughout the development of the research.

In addition, I would also like to express my gratitude and loving parents and friends who had helped me and given me encouragement throughout my coursework.

Finally, lots of thanks to the University for giving me the ultimate opportunity to use their library, computer laboratories and resources as regular student as well as helping us to demonstrate our educational life. It is incredible that I am finally submitting this project. Above all my heartiest gratitude to Almighty God for giving me the passion, and my family to their continuous emotional support.

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ABSTRACT

The PesaBank Internet Banking System project represents a significant advancement in the banking industry, aiming to modernize traditional banking services by leveraging digital technologies. In today's fast-paced world, customers demand convenient and accessible banking solutions, and this project seeks to address these needs by providing a secure and user-friendly platform for conducting financial transactions online.

Through the PesaBank Internet Banking System, customers can access a wide range of banking services, including account management from the comfort of their own devices

By embracing innovation and technology, the PesaBank Internet Banking System project aims to enhance customer satisfaction, drive operational efficiency, and position the bank as a leader in the digital banking landscape.

CHAPTER ONE.

1.1 Introduction

The introduction of PesaBank Internet Banking System marked a significant shift in the way individuals and businesses conduct financial transactions, bringing banking services directly to customers' fingertips through the internet.

1. **Emergence of Online Banking:** In the early stages, PesaBank Internet Banking System primarily offered basic services such as checking account balances, viewing transaction history, and transferring funds between accounts. Banks created online platforms accessible via desktop computers, allowing customers to conduct routine banking tasks remotely without visiting a physical branch.
2. **Expansion of Services:** As PesaBank Internet Banking System gained popularity, banks expanded their online offerings to include a broader range of services. This included online bill payment, electronic statements, fund transfers to other accounts within the bank, and even some limited services like applying for loans or opening new accounts online.
3. **Advancements in Security:** With the growing popularity of PesaBank Internet Banking System came concerns about security and privacy. Banks implemented robust security measures such as encryption, firewalls, and authentication protocols to safeguard customer data and transactions from cyber threats.
4. **Mobile Banking Revolution**: The introduction of smartphones and mobile devices led to a significant evolution in PesaBank Internet Banking System with the emergence of mobile banking apps. These apps allowed customers to access banking services on-the-go, enabling features such as mobile check deposit, card less ATM withdrawals, and real-time transaction alerts.
5. **User Experience Improvements:** Banks focused on enhancing the user experience of PesaBank Internet Banking System platforms and mobile apps. This involved improving navigation, simplifying account management, and providing personalized features such as budgeting tools and financial insights.
6. **Integration of Advanced Technologies**: PesaBank Internet Banking System continued to evolve with the integration of advanced technologies such as artificial intelligence (AI), machine learning, and chat bots. These technologies enable personalized banking experiences, predictive analytics for financial planning, and automated customer support.

1.2 All operations of the organization

The organization of an PesaBank Internet Banking System encompasses various operations and functions that ensure the efficient delivery of banking services over the internet. Here's a comprehensive overview of the key operations:

1. IT Operations: This operation involves managing the hardware infrastructure, software systems, and network connectivity of the PesaBank Internet Banking System platform. IT operations ensure the continuous availability, reliability, and performance of the system. It includes tasks such as server maintenance, system monitoring, database management, and troubleshooting technical issues.

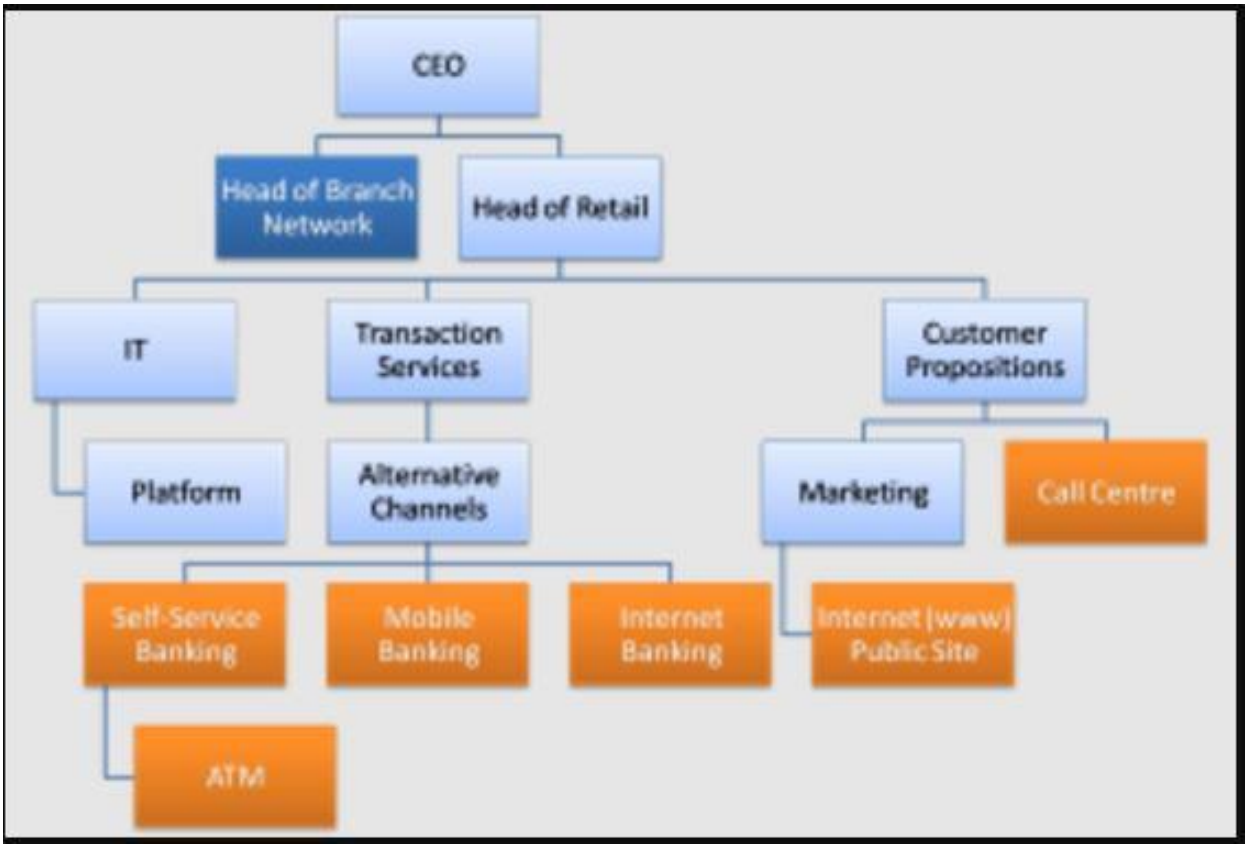
2. Software Development: The software development operation focuses on designing, developing, and maintaining the software applications that power the PesaBank Internet Banking System. This includes the core banking system, online banking platform, mobile banking apps, security software, and other specialized modules. Software developers work to enhance functionality, improve user experience, and implement new features based on customer feedback and industry trends.

3. Cybersecurity: Cybersecurity is a critical operation that aims to protect sensitive customer data, financial transactions, and the integrity of the PesaBank Internet Banking System. This operation involves implementing robust security measures such as encryption, firewalls, intrusion detection/prevention systems, secure authentication methods, and regular security audits. Cybersecurity teams monitor for potential threats, respond to security incidents, and educate employees and customers about best security practices.

4. Risk Management: Risk management is responsible for identifying, assessing, and mitigating risks associated with the PesaBank Internet Banking System. This includes operational risks, cybersecurity risks, compliance risks, and strategic risks. Risk management teams develop risk assessment frameworks, establish risk mitigation strategies, and monitor key risk indicators to ensure the stability and resilience of the system.

5. Compliance: Compliance operations ensure that the PesaBank Internet Banking System complies with relevant laws, regulations, and industry standards governing the financial services sector. This includes data privacy regulations (e.g., GDPR), anti-money laundering (AML) laws, know your customer (KYC) requirements, consumer protection laws, and banking industry regulations. Compliance teams monitor regulatory developments, implement compliance controls, and conduct regular audits to ensure adherence to regulatory requirements.

1.3 Organization structure



1.4 Area and scope of the project

The scope of a project for an PesaBank Internet Banking System encompasses the entirety of activities, functionalities, and objectives involved in designing, developing, implementing, and maintaining the system. Here's an overview of the scope of such a project:

1. Functional Requirements: This includes defining the core functionalities of the PesaBank Internet Banking System, such as account management, fund transfers, bill payments, transaction history, balance inquiries, loan applications, and account statements. Additionally, features like account aggregation, budgeting tools, financial planning calculators, and alerts/notification systems may be considered.

2. Security and Compliance: Ensuring the security and compliance of the PesaBank Internet Banking System is paramount. This involves implementing measures such as data encryption, secure authentication mechanisms, firewalls, intrusion detection/prevention systems, and compliance with regulatory standards such as GDPR, AML, KYC, and PCI-DSS.

3. User Experience (UX) Design: The project scope includes designing a user-friendly interface for the PesaBank Internet Banking System to enhance the overall user experience. This involves creating intuitive navigation, clear layout, responsive design for various devices, accessibility features, and incorporating user feedback to improve usability.

4. Mobile Banking: Given the prevalence of smartphones, mobile banking is a crucial component of the project scope. This involves developing mobile banking apps for various platforms (iOS, Android) with similar functionalities to the web-based system, ensuring consistency in user experience across different channels.

5. Testing and Quality Assurance: Thorough testing and quality assurance are essential to ensure the reliability, security, and functionality of the PesaBank Internet Banking System. This includes unit testing, integration testing, regression testing, security testing, and user acceptance testing to identify and address any issues before deployment.

1.5 Current system

The current system of an PesaBank Internet Banking System is a sophisticated digital platform that enables customers to access and manage their bank accounts and financial transactions over the internet. It typically consists of a web-based portal and mobile banking applications that provide a range of functionalities. Customers can log in securely using their credentials to view account balances, transaction history, and statements.

Overall, the current system of an PesaBank Internet Banking System provides customers with convenient, secure, and accessible banking services anytime, anywhere, thereby transforming the traditional banking experience into a digital-first approach

1.6 Problems and shortcomings of the current system

While PesaBank Internet Banking System systems offer numerous benefits, they also face several challenges and problems that can impact user experience, security, and overall efficiency. Some common problems of the current system of PesaBank Internet Banking System include:

1. **Security Concerns:** One of the primary concerns with PesaBank Internet Banking System is security. Despite implementing robust security measures, such as encryption and multi-factor authentication, PesaBank Internet Banking System systems remain susceptible to cyber threats such as phishing attacks, malware, and hacking attempts. Breaches in security can lead to unauthorized access to sensitive customer information, identity theft, and financial fraud.

2. **Technical Issues:** Users may encounter technical glitches and system downtime when accessing PesaBank Internet Banking System services. Slow response times, system errors, and service interruptions can frustrate customers and disrupt their banking activities. Technical issues can arise due to system maintenance, software bugs, or hardware failures, impacting the reliability and availability of the PesaBank Internet Banking System.

3. **User Experience Challenges:** The user experience of PesaBank Internet Banking System systems may vary across different devices and platforms. Poorly designed user interfaces, complex navigation, and inconsistent functionality can make it difficult for users to perform banking tasks efficiently. Additionally, limited accessibility features may pose challenges for users with disabilities or older adults.

4. **Limited Functionality:** While PesaBank Internet Banking System systems offer a wide range of functionalities, they may lack certain features or integration with third-party services that customers demand. For example, support for international transactions, real-time payments, or advanced financial planning tools may be limited or unavailable, limiting the utility of the PesaBank Internet Banking System.

5. **Regulatory Compliance:** Compliance with regulatory requirements, such as data privacy laws, anti-money laundering regulations, and consumer protection statutes, poses a significant challenge for PesaBank Internet Banking System providers. Ensuring compliance with evolving regulatory standards can be complex and resource-intensive, requiring ongoing monitoring and updates to the PesaBank Internet Banking System.

1.7 Proposed solutions

Proposed solutions for addressing the challenges of the current PesaBank Internet Banking System aim to enhance security, improve user experience, expand functionality, ensure regulatory compliance, and provide better customer support. Here are some proposed solutions:

1. Enhanced Security Measures: Implementing advanced security measures such as biometric authentication, behavioral analytics, and real-time transaction monitoring can enhance the security of PesaBank Internet Banking System systems. Additionally, banks can invest in technologies like block chain for secure and tamper-proof transaction processing.

2. Improved User Experience: Enhancing the user interface design, streamlining navigation, and optimizing performance across devices can improve the overall user experience of PesaBank Internet Banking System systems. Providing personalized recommendations, contextual help, and interactive tutorials can guide users through complex banking tasks more effectively.

3. Expanded Functionality: Adding new features and integrating with third-party services can expand the functionality of PesaBank Internet Banking System systems. This includes support for real-time payments, international transactions, peer-to-peer transfers, investment management tools, and integration with financial management apps.

4. Regulatory Compliance Solutions: Implementing robust compliance management systems and regulatory reporting tools can help banks stay compliant with evolving regulatory requirements. Automated compliance checks, real-time monitoring of transactions, and regular audits can ensure adherence to data privacy laws, anti-money laundering regulations, and consumer protection statutes.

5. Advanced Fraud Detection and Prevention: Leveraging machine learning algorithms, artificial intelligence, and big data analytics can enhance fraud detection and prevention capabilities. Real-time monitoring of user behavior, transaction patterns, and account activity can identify suspicious activities and prevent fraudulent transactions.

CHAPTER 2: ANALYSIS

2.0 Fact-finding methods

Fact-finding methods for an PesaBank Internet Banking System involve various approaches to gather information, assess requirements, and understand the needs of stakeholders. Here are some common fact-finding methods used in the context of PesaBank Internet Banking System systems:

- **Interview**
- **Observation**
- **Questionnaire**

2.0.1 Interview

Conducting interviews is a fundamental fact-finding method to gather insights and requirements for an PesaBank Internet Banking System. Here's an example of how interviews could be used:

Interviewer: "Could you describe your experience using our current PesaBank Internet Banking System?"
Customer: "Sure. Overall, I find it quite convenient for basic tasks like checking my account balance and transferring funds between accounts. However, I've encountered some difficulties when trying to set up recurring bill payments. The process seems a bit cumbersome and confusing."

Interviewer: "Thank you for sharing that. Are there any specific features or functionalities you would like to see improved or added to the PesaBank Internet Banking System?"
Customer: "Yes, I think it would be helpful to have better categorization of transactions to track my spending more effectively. Also, it would be great if we could receive real-time alerts for certain transactions, like large withdrawals or unusual activity."

Interviewer: "That's valuable feedback. In terms of security, do you feel confident in the measures in place to protect your personal and financial information?"
Customer: "Generally, yes. However, I would appreciate more transparency about the security features and how my data is being protected. It would also be reassuring to have

additional options for two-factor authentication."

Interviewer: "Understood. Finally, how do you typically prefer to access customer support if you encounter any issues or have questions about the PesaBank Internet Banking System? **Customer:** "I usually prefer to contact customer support via live chat or email, as it's more convenient for me than calling. It would be helpful if responses were prompt and knowledgeable."

2.0.2 Observation

Observation of users interacting with an PesaBank Internet Banking System can provide valuable insights into usability issues, user behavior, and areas for improvement. Here's an example of how fact findings could be conducted through observation:

An observer sits in a designated area of a bank branch where customers can access computers or kiosks to use the PesaBank Internet Banking System. They discreetly watch and take notes as customers navigate through various screens and perform different tasks within the system.

Observation Notes:

- Several customers appear to have difficulty locating the login button on the homepage of the PesaBank Internet Banking System.

- One customer hesitates before clicking on a link for bill payments, suggesting uncertainty about its functionality.

- A few customers make multiple attempts to enter their password, indicating potential issues with password entry or authentication.

- Several elderly customers seem to struggle with small font sizes and unclear navigation labels, leading to frustration and slower navigation.

- Some customer’s express concerns about the security of the system, particularly when prompted to enter sensitive information or complete financial transactions.

2.0.3 Questionnaire

Using a questionnaire is another effective way to gather fact-based insights and requirements for an PesaBank Internet Banking System. Below is an example questionnaire tailored for this purpose:

1. How often do you use our PesaBank Internet Banking System?

- Daily
- Several times a week
- Once a week
- Rarely

2. What are the main reasons for using our PesaBank Internet Banking System? (Select all that apply)

- Checking account balances
- Transferring funds between accounts
- Paying bills
- Applying for loans or credit cards
- Managing investments
- Other (please specify)

3. On a scale of 1 to 5, how would you rate the user-friendliness of our PesaBank Internet Banking System?

- 1 (Very difficult to use)
- 2
- 3 (Neutral)
- 4

- 5 (Very easy to use)

4. Have you encountered any difficulties or challenges when using our PesaBank Internet Banking System? If yes, please describe.

5. What additional features or functionalities would you like to see implemented in our PesaBank Internet Banking System?

6. How satisfied are you with the security measures in place to protect your personal and financial information?

- Very satisfied
- Satisfied
- Neutral
- Dissatisfied
- Very dissatisfied

7. How do you typically prefer to receive customer support for PesaBank Internet Banking System-related inquiries or issues?

- Phone support
- Email support
- Live chat support
- Self-service options (FAQs, knowledge base)
- Other (please specify)

8. On a scale of 1 to 5, how likely are you to recommend our PesaBank Internet Banking System to friends or family?

- 1 (Not likely at all)
- 2
- 3 (Neutral)
- 4
- 5 (Very likely)

9. Is there any other feedback or suggestions you would like to provide regarding our PesaBank Internet Banking System?

2.0.4 Report of findings

The report of findings for the PesaBank Internet Banking System presents a comprehensive analysis of user interactions, observations, and feedback gathered through various fact-finding methods. Through observation, interviews, and questionnaires, significant insights into the system's usability, security, and user experience have been obtained.

The analysis reveals several key findings, including usability challenges such as difficulties with navigation and unclear labeling, security concerns regarding authentication processes, and user preferences for enhanced features like real-time alerts and improved mobile banking functionality.

2.2 Feasibility study

A feasibility study for an PesaBank Internet Banking System evaluates the practicality and viability of implementing such a system within an organization. Here's a breakdown of the key components typically addressed in a feasibility study:

2.2.1 Technical Feasibility:

Technical feasibility evaluates whether an organization possesses the necessary technical capabilities, resources, and infrastructure to develop, deploy, and maintain an PesaBank Internet Banking System. In the context of PesaBank Internet Banking System, technical feasibility examines factors such as the availability of suitable hardware and software infrastructure to support the system's requirements. This includes assessing the organization's network infrastructure, server capacity, and database management systems to ensure they can handle the anticipated volume of transactions and user traffic.

Additionally, technical feasibility evaluates the organization's IT personnel's skills and expertise to design, develop, and maintain the PesaBank Internet Banking System. It considers whether the organization has access to specialized technical skills such as web development, database administration, cybersecurity, and system integration.

2.2.2 Economic Feasibility

Economic feasibility examines the financial implications of implementing an PesaBank Internet Banking System to determine whether the investment is justified and offers a favorable return on investment. In the case of an PesaBank Internet Banking System, economic feasibility evaluates the costs associated with developing, deploying, and maintaining the system against the potential

benefits and revenue streams it can generate. This analysis includes estimating both the initial investment required for system development, infrastructure setup, software licensing, and personnel training, as well as the ongoing operational costs such as maintenance, security, and customer support.

Additionally, economic feasibility considers the potential revenue streams from PesaBank Internet Banking System services, such as fees for transactions, account maintenance, and new customer acquisition.

2.2.3 Operational Feasibility

Operational feasibility assesses the readiness of an organization to adopt and operate an PesaBank Internet Banking System effectively. It encompasses various aspects of the organization's operational capabilities, processes, and resources. In the context of an PesaBank Internet Banking System, operational feasibility evaluates whether the organization's existing infrastructure, personnel, and workflows can support the implementation and ongoing operation of the system.

This includes assessing factors such as the availability of skilled IT personnel to manage system development and maintenance, the adequacy of hardware and software infrastructure to support the system's requirements, and the organization's ability to adapt to changes in business processes and customer interactions.

2.3 Detailed description of the proposed system

The proposed system for an PesaBank Internet Banking System platform aims to provide customers with a secure, user-friendly, and feature-rich digital banking experience. Here's a detailed description of the proposed system:

1. User Interface: The PesaBank Internet Banking System will feature an intuitive and responsive user interface accessible via web browsers and mobile applications. The interface will offer streamlined navigation, clear layout, and visually appealing design to enhance usability and user experience across different devices and screen sizes.

2. Account Management: Customers will have access to a range of account management functionalities, including viewing account balances, transaction history, and statements

3. Fund Transfers: The system will facilitate secure and convenient fund transfers between accounts within the same bank.

4. Profile Update: Clients, Staff and the Admin have access to update their profile, which includes adding profile picture to their accounts, updating their names and date of birth.

2.4 Required system DFD

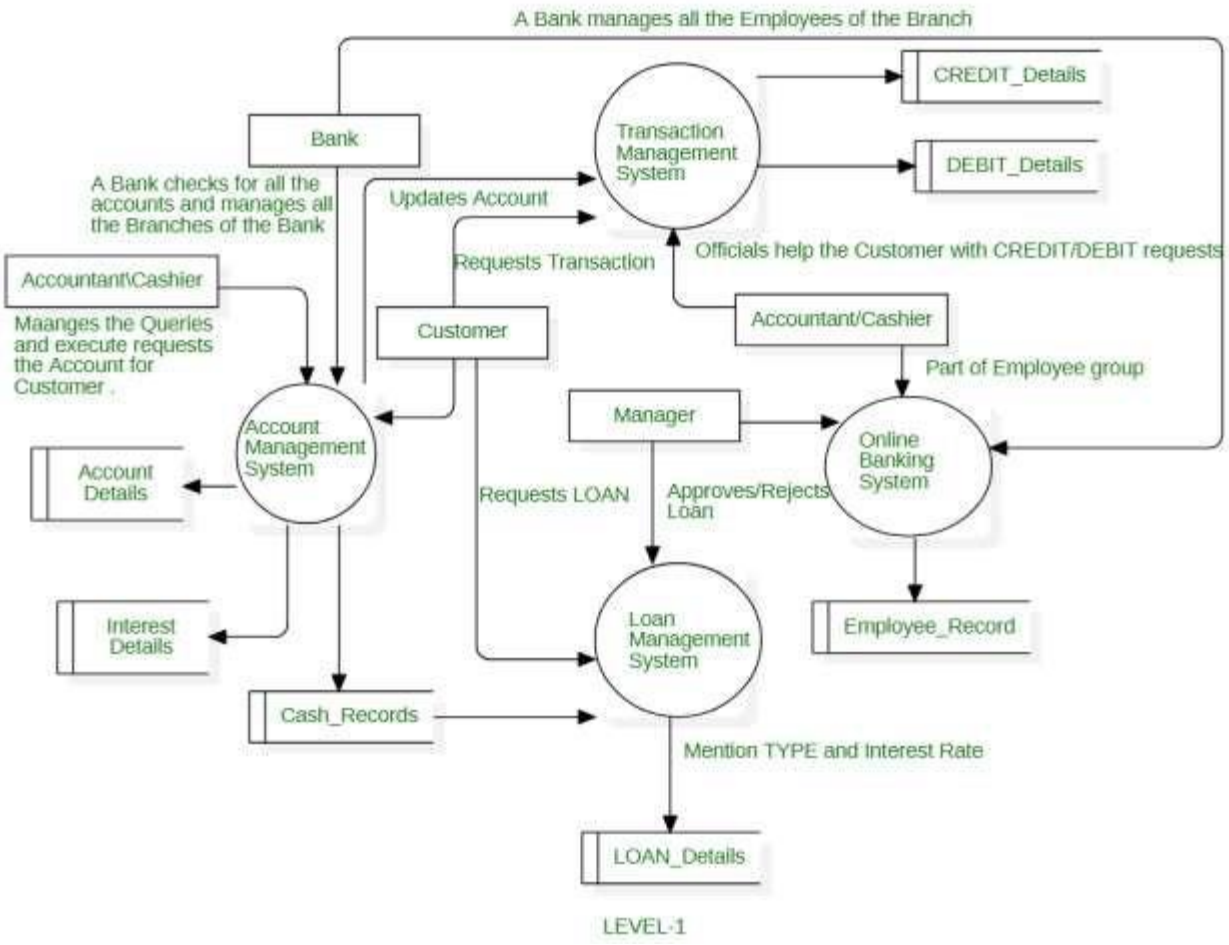


Figure 1 Required system data flow diagram.

CHAPTER 3: SYSTEM DESIGN

3.0 Objectives of the design.

The objectives of system design for an PesaBank Internet Banking System encompass a range of goals aimed at creating a robust, secure, and user-friendly platform. Here are some key objectives:

1. **Functionality:** The system design aims to ensure that the PesaBank Internet Banking System platform offers a comprehensive set of functionalities to meet the diverse needs of customers. This includes features such as account management, fund transfers, bill payments, loan applications, transaction history, and account alerts.

2. **Usability:** An important objective is to design the system with a user-friendly interface that enhances usability and accessibility for customers. This involves creating intuitive navigation, clear layout, and simple workflows to facilitate easy interaction with the platform across different devices and screen sizes.

3. **Security:** Security is a critical objective of system design to protect customer data and transactions from unauthorized access, fraud, and cyber threats. The design should incorporate robust security measures such as encryption, multi-factor authentication, secure session management, and real-time fraud detection to safeguard sensitive information and maintain customer trust.

4. **Reliability:** Ensuring the reliability of the PesaBank Internet Banking System is another key objective. The design should minimize downtime, errors, and system failures to provide uninterrupted service to customers. This includes implementing redundancy, failover mechanisms, and proactive monitoring to detect and address issues promptly.

5. **Integration**: The system design aims to facilitate seamless integration with other banking systems, third-party services, and external APIs to enhance functionality and interoperability. This involves designing open and flexible architectures that support integration with core banking systems, payment gateways, credit scoring services, and financial management tools.

3.1 Nature of the new system

The nature of the new system of an PesaBank Internet Banking System is characterized by its digital-first approach, offering customers enhanced convenience, accessibility, and flexibility in managing their finances. Here are some key aspects of the nature of the new system:

1. Digital Transformation: The new system represents a shift towards digital transformation within the banking industry, leveraging technology to modernize traditional banking services and processes. It embraces digital channels such as web portals, mobile applications, and online platforms to deliver banking services to customers anytime, anywhere, and on any device.

2. 24/7 Accessibility: Unlike traditional brick-and-mortar branches with limited operating hours, the new PesaBank Internet Banking System provides customers with round-the-clock access to banking services. Customers can perform various transactions, check account balances, and manage their finances at their convenience, without being constrained by time or location.

3. Multi-channel Experience: The new system offers a multi-channel banking experience, allowing customers to interact with the bank through a variety of touchpoints, including web browsers, mobile apps, and self-service kiosks. This Omni-channel approach ensures consistency and continuity across different channels, enabling seamless transitions between online and offline banking interactions.

4. Personalization: The new system emphasizes personalization and tailored experiences for customers, leveraging data analytics and customer insights to deliver targeted recommendations, customized offers, and personalized financial advice. By understanding customer preferences and behaviors, the system can anticipate needs and provide relevant solutions to enhance customer satisfaction and loyalty.

5. Enhanced Security: Security is a paramount concern in the new PesaBank Internet Banking System, which employs advanced security measures such as encryption, multi-factor authentication, biometric authentication, and real-time fraud detection to protect customer data and transactions. The system prioritizes security to instill confidence and trust among customers in conducting financial transactions online.

3.2 File design (ERD)

The file design of PesaBank Internet Banking System refers to the organization and structure of digital files that store various data related to banking transactions, customer information, security protocols, and system configurations within an PesaBank Internet Banking System. Here's a breakdown of the typical components and file structures involved:

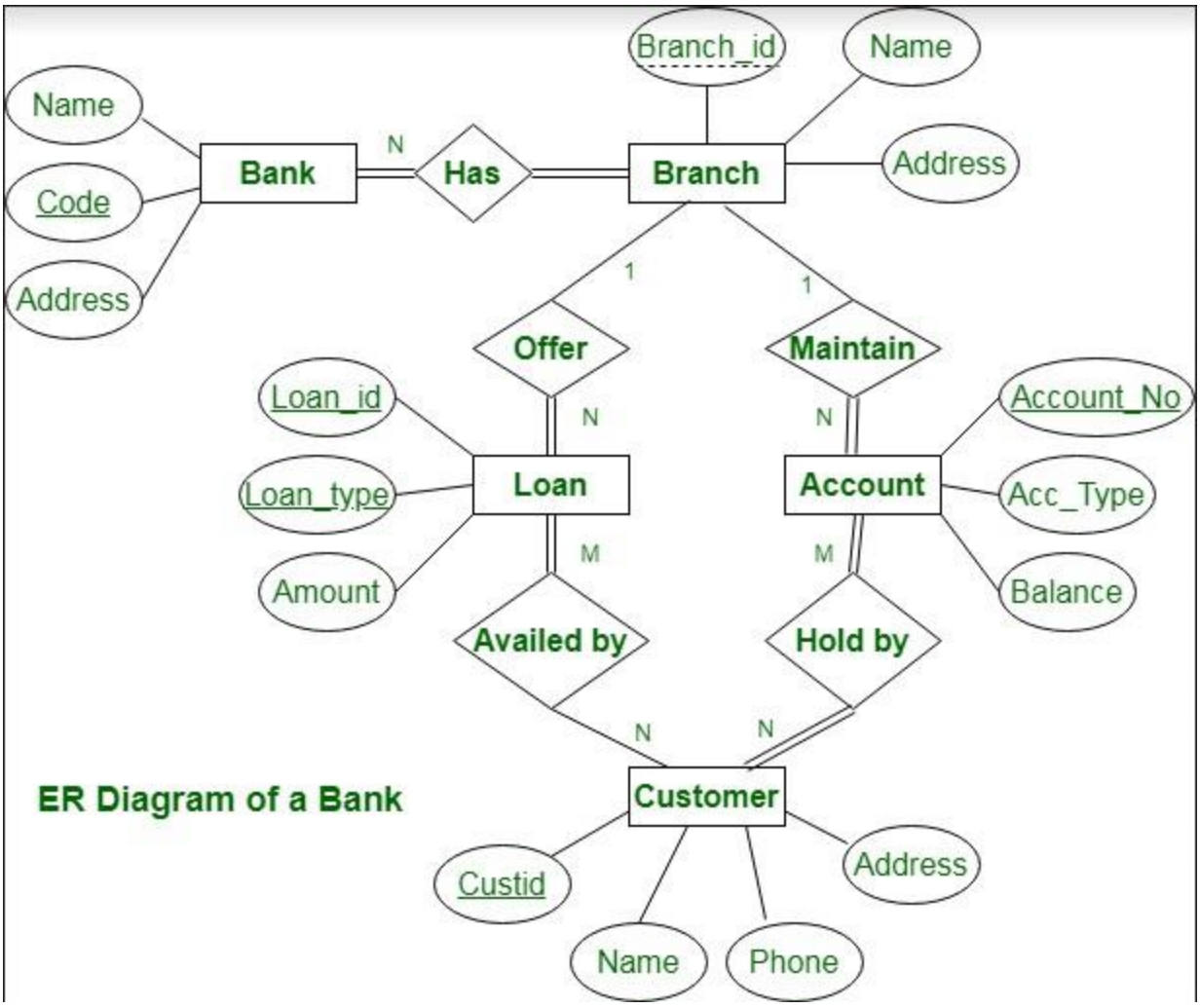


Figure 2 Entity Relationship Diagram

Login table

S.NO.	Field name	Data type	Description

Client record table

Sr.no.	Field name	Data type
1	Class	Text
2	Name	Text
3	Age	Number
4	Gender	Text
5	Date	Number

Staff record table

Sr.no.	Field name	Data type
1	Class	Text
2	Name	Text
3	Age	Number
4	Gender	Text
5	Date	Number

3.3 INPUT DESIGN.

The input design of PesaBank Internet Banking System involves a series of forms and fields that users must complete in order to be registered as a member. The design aims to make the process as simple and intuitive as possible for users, while also ensuring that all necessary information is collected accurately. It has the following:

Login Page.

Figure 3 Login display

Member entry form Page

Figure 4 Member entry form

Client details Page

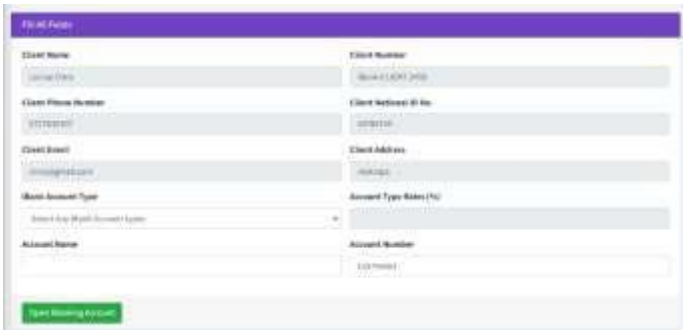


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Figure 5 clients entry details form

Deposit form Page.

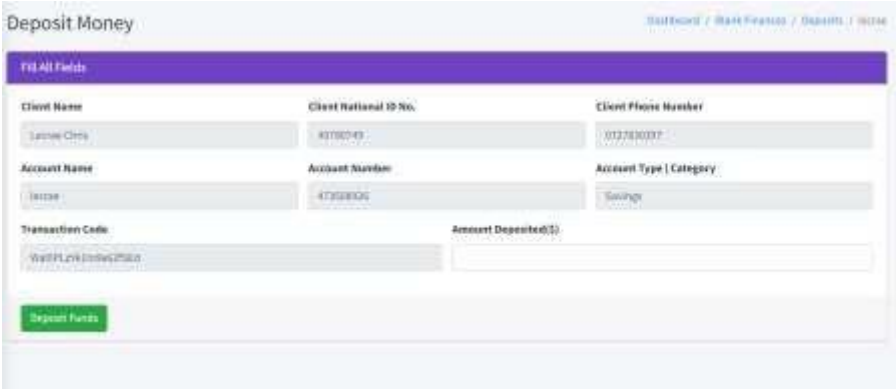


Figure 6 Money deposit form

Open account form Page.

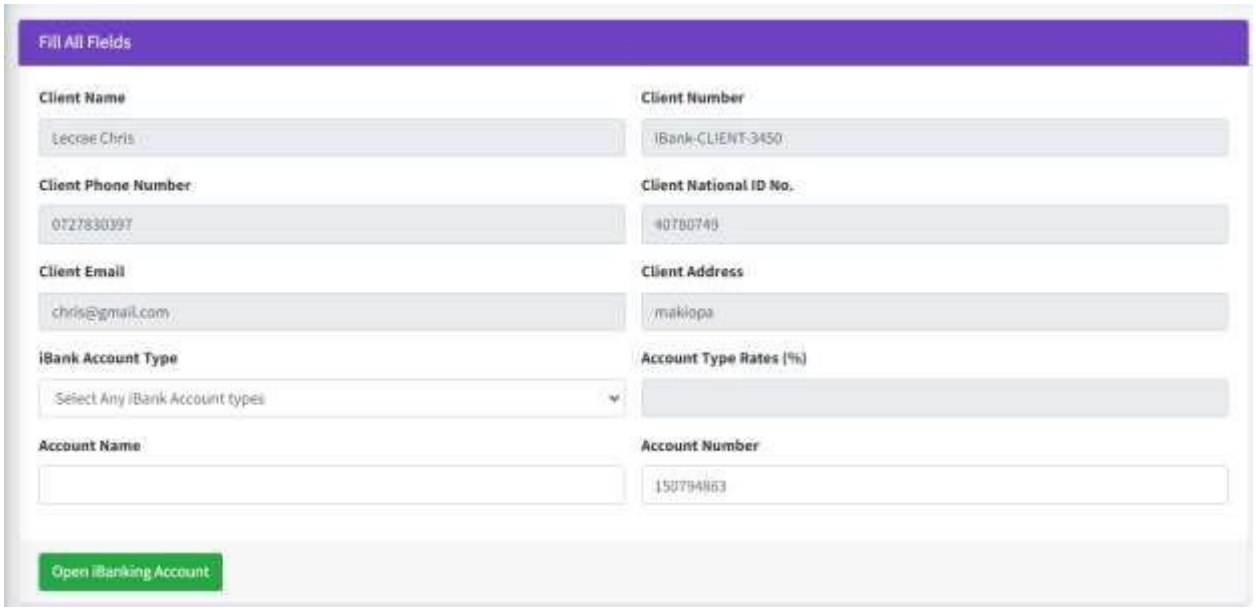


Figure 7 Open account form

Announcement check-form Page.

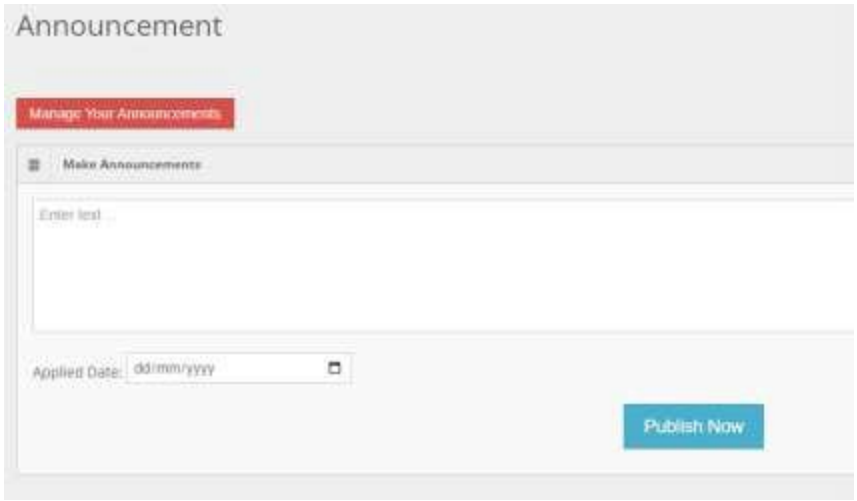


Figure 8 Announcement check form

3.4 OUTPUT DESIGN

Designing the output of an PesaBank Internet Banking System involves organizing and presenting information in a structured and user-friendly manner. To achieve this, we can use tables to display relevant data in a tabular format. Below is an example of how the output design of an PesaBank Internet Banking System could be represented using tables:

Login table

S.NO.	Field name	Data type	Description
1	User Name	Text	Store user name for checking correct Username
2	Password	Text/Number	Store password corresponding to user name

Clients record table

Sr.no.	Field name	Data type
1	Class	Text
2	Name	Text
3	Age	Number
4	Gender	Text
5	Date	Number

Cancellation table.

Sr.No.	Field name	Data type
1	P.N.R. Number	Number

3.5 CONTROL DESIGN.

The control design of a PesaBank Internet Banking System refers to the mechanisms and processes put in place to ensure the system operates effectively, efficiently, and securely. It involves implementing controls to monitor and regulate system access, data integrity, transaction processing, and overall system performance.

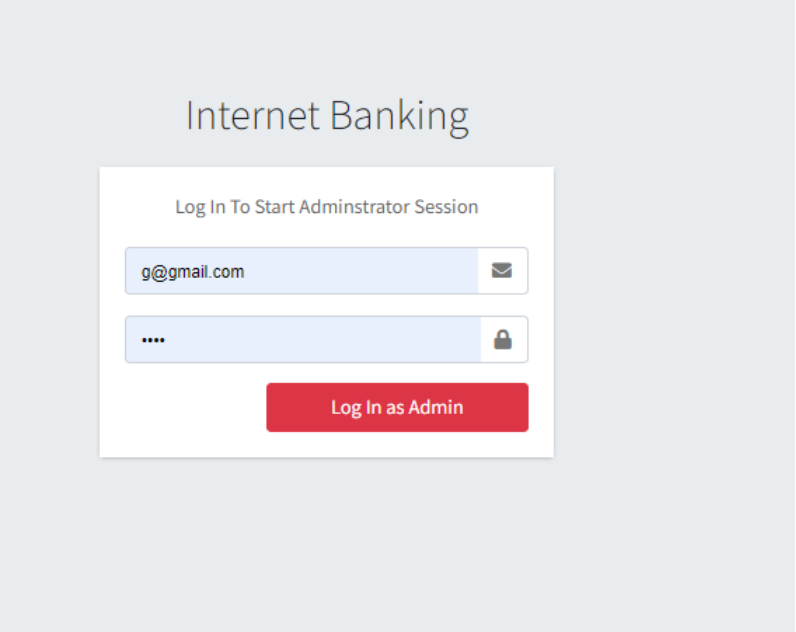


Figure 9 Control design

3.6 TEST DESIGN.

The test design of PesaBank Internet Banking System involves analyzing the requirements planning the testing efforts, designing test case, executing the tests, reporting the results and closing out the testing effort.

Test Reports and Debugging:

The testing team prepares all the defects are reported in the organization's standard defect tracking system. The defects found are categorized, prioritized and reported as Testing Guidelines. Development team also uses the defect tracking system to report the status of defects. Testing team before closure validates the defects eliminated by development team.

Error Message and Validations:

The goals of verification and validation activities are to access and improve the quality of work products generated during development and modification of software. There are two types of verification –

- Life cycle verification
- Formal verification

Life cycle verification is the process of determining the degree to which the work products of a given phase of the development cycle fulfill the specification established during prior phases.

Formal verification is a rigorous mathematical demonstration that source code confirms to its specification.

Validation is the process of evaluating software at the end of software Development process to determine compliance with requirements.

High quality can't be achieved through testing of source code alone. Although a program should be totally free of errors, this is seldom the case for large software products.

The best way to minimize errors is to detect and remove errors during analysis and design, so that few errors are introduced into the source code.

3.7 Program Design.

The system is designed with several interaction cues on each web page that makes up the web application (PesaBank Internet Banking System). These cues are well-defined such as to make several functionalities that the application exposes to collect, process and output data.

Access to these functionalities is made possible by the well-designed user interface which embodies several technologies to process data. The application is built in a modular form where these functionalities are built into modules.

CHAPTER FOUR
SYSTEM IMPLEMENTATION: HARDWARE AND SOFTWARE SPECIFICATION.

Hardware

1. Processor: AMD Phenom (™) II X4 925 Processor 2.81 Ghz

AMD Processor provide better processing capabilities and better cooling technology to our CPU. With an AMD processor, we can run our pc for long time without need to switch off. Besides that, AMD processor can help us to boost up the CPU processing power. By using this, we can keep developing the Library Management System without need to worry that the pc cannot support.

2. Ram: 4 Gb

In order to support Visual Studio and SQL Server 2020 we use 4Gb Ram to avoid any problem occurred during development phase. Besides that, SQL Server can process faster when running SQL statement with 4Gb ram. It can save a lot of time if total up the process time.

Software

1. Operating system: Windows 10 pro

Window 10 pro is selected as my developing operating system because it is more stable than any other windows. The advantage of Window 10 pro is able to run a lot of applications and hardware. We choose Window 10 pro to avoid this kind compatibility problem.

2. Database: Microsoft SQL Server 2020

Microsoft SQL Server 2020 is the latest version of SQL Server. Although there is one SQL Server 2008 V2 on the market, but I found it was under Beta after survey on it. So, I decide to use Microsoft SQL Server 2020 as the database software for my system. In addition, SQL Server 2020 enables us to copy or move the database to another computer easily. This is very useful when we developing the Library Management System.

Development tools and programming language: Microsoft Visual Studio 2020 and VB.NET

We would like to use Microsoft Visual Studio 2020 as our developing software.

4.3 User Guide

1. Client login Page

Purpose: To provide authentication and authorization for user. Clients: All clients

Figure 10 Client login page

2. User information form.

This is the form a user registers and enter his or her details and will be captured by the system

Figure 11 User information form

3. Admin change login window.

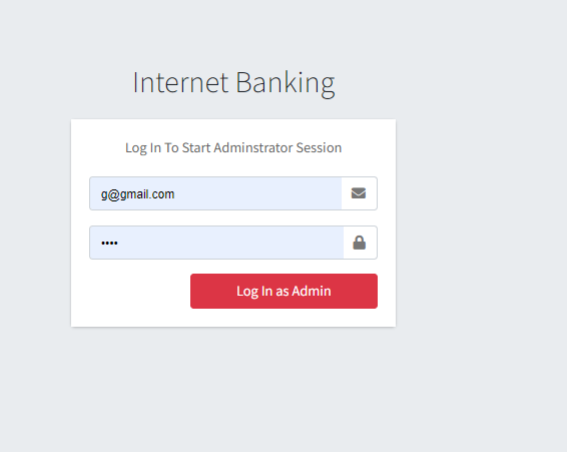


Figure 12 Admin change login window

4. Opening account details form

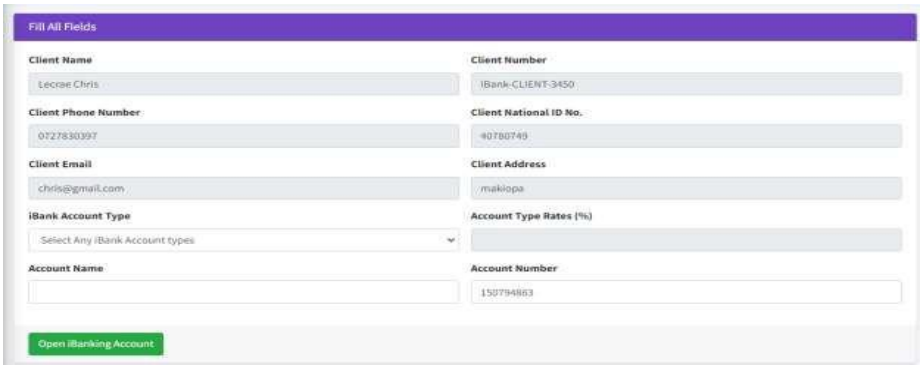


Figure 13 Open account details form

5. Deposit account details

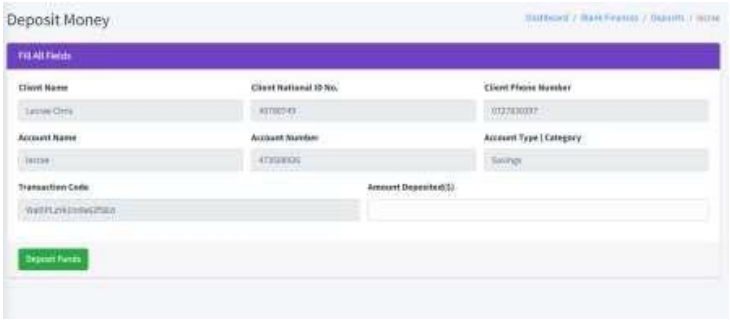


Figure 14 Deposit account details form

6. Transfer money account

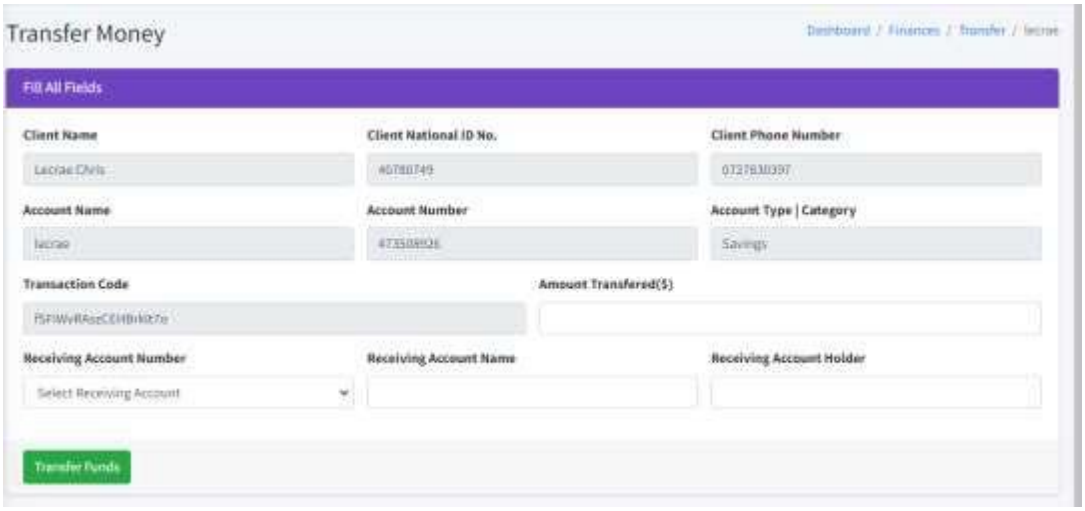
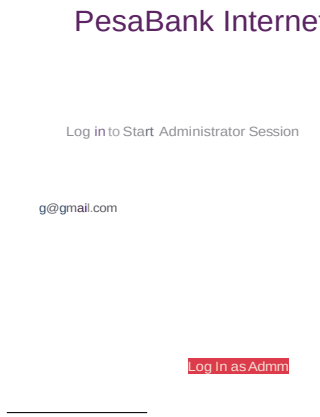


Figure 15 Transfer Money account details form

4.4 System Security.

These are controls and safeguards taken in this management system to ensure both backend and front-end information is safeguard from third party or intruders.

Password and login requirement is main method used where only allowed are able to access their accounts.



CHAPTER 5

5.1 Overall conclusions

In conclusion, the PesaBank Internet Banking System represents a significant advancement in the banking industry, revolutionizing the way customers manage their finances and interact with financial institutions. Throughout this analysis, it has become evident that PesaBank Internet Banking System offers numerous benefits, including convenience, accessibility, and efficiency.

Customers can now perform various banking transactions anytime, anywhere, using digital channels such as web portals and mobile apps.

However, while the PesaBank Internet Banking System presents opportunities for enhanced customer engagement and operational efficiency, it also poses challenges related to security, compliance, and technological complexity. Therefore, it is essential for banks to prioritize security measures, regulatory compliance, and ongoing innovation to ensure the success and sustainability of their PesaBank Internet Banking System initiatives

5.2 Achievement

The achievements of the PesaBank Internet Banking System are multifaceted and have significantly transformed the banking industry. Here are some key achievements:

1. Enhanced Convenience: PesaBank Internet Banking System has revolutionized the way customers access and manage their finances by offering 24/7 access to banking services from anywhere with an internet connection. Customers can perform various transactions, such as checking balances, transferring funds, paying bills, and applying for loans, at their convenience, without the need to visit physical bank branches.

2. Expanded Access: PesaBank Internet Banking System has expanded access to banking services, especially for individuals in remote or underserved areas. Customers no longer need to rely solely on brick- and-mortar branches to conduct banking transactions, as they can now access a wide range of services through online platforms and mobile apps.

3. Cost Savings: For banks, PesaBank Internet Banking System has led to significant cost savings by reducing the need for physical infrastructure and personnel. With fewer branch visits and manual transactions, banks can streamline operations, optimize resources, and lower overhead costs, resulting in improved operational efficiency and profitability.

4. Innovation and Technological Advancements: PesaBank Internet Banking System has spurred innovation and technological advancements within the banking industry, driving the development of new products, services, and delivery channels. Banks are continuously investing in emerging technologies such as artificial intelligence, machine learning, block chain, and biometrics to stay competitive in the digital era.

5.3 Limitations

While PesaBank Internet Banking System offers numerous benefits, it also has several limitations and challenges that need to be addressed. Here are some common limitations of PesaBank Internet Banking System systems:

1. Security Concerns: One of the primary concerns with PesaBank Internet Banking System is security. Despite advancements in security measures, such as encryption and authentication protocols, PesaBank Internet Banking System systems remain vulnerable to cyber threats, including phishing attacks, malware, and hacking attempts. Customers may also be at risk of identity theft or fraud if their login credentials are compromised.

2. Reliance on Technology: PesaBank Internet Banking System is heavily reliant on technology, and disruptions or outages in the internet or banking systems can affect service availability. Customers may experience difficulties accessing their accounts, making transactions, or contacting customer support during system downtimes or technical glitches, leading to frustration and inconvenience.

3. Limited Accessibility: While PesaBank Internet Banking System provides convenient access to banking services for many customers, it may not be accessible to everyone. Individuals in rural or underdeveloped areas with limited internet connectivity or technological literacy may face challenges in using PesaBank Internet Banking System services. Moreover, elderly or disabled individuals may find it difficult to navigate online platforms or mobile apps, limiting their access to banking services.

4. Complexity and Learning Curve: PesaBank Internet Banking System platforms can be complex, especially for users who are unfamiliar with online banking or technology. New users may find it challenging to navigate the interface, understand the functionalities, or perform transactions without

assistance. The learning curve associated with PesaBank Internet Banking System may deter some customers from adopting digital banking services.

5. Privacy Concerns: Customers may have concerns about their privacy when using PesaBank Internet Banking System services, particularly regarding the collection, storage, and use of their personal and financial information by banks and third-party service providers. Banks must maintain strict confidentiality and adhere to data protection laws and regulations to address these privacy concerns effectively.

5.4 Future improvements

The future improvements of PesaBank Internet Banking System systems are centered around enhancing security, expanding functionality, improving user experience, and embracing emerging technologies. Here are some potential areas for improvement:

1. Enhanced Security Measures: Future PesaBank Internet Banking System systems will continue to focus on strengthening security measures to combat evolving cyber threats. This may include the adoption of advanced authentication methods, such as biometric authentication (e.g., fingerprint or facial recognition) and behavioral analytics, to enhance user verification and prevent unauthorized access to accounts. Additionally, banks may leverage block chain technology to improve data integrity, transparency, and fraud detection in PesaBank Internet Banking System transactions.

2. AI-Powered Personalization: Artificial intelligence (AI) and machine learning (ML) technologies will enable banks to deliver more personalized and proactive banking experiences. AI-powered chatbots and virtual assistants can assist customers in real-time, provide personalized recommendations, and anticipate customer needs based on transaction history and behavior patterns. Moreover, AI algorithms can analyze customer data to offer tailored financial advice, product recommendations, and targeted marketing offers, enhancing customer engagement and satisfaction.

3. Seamless Omni channel Experience: The future of PesaBank Internet Banking System will involve providing customers with a seamless Omni channel experience, allowing them to switch between different channels (e.g., web, mobile (MPESA), branches) without losing context or continuity. Banks will invest in integrating various channels and touchpoints to deliver consistent branding, messaging, and service experiences across all customer interactions, ensuring a cohesive and frictionless banking journey.

4. Mobile-First Approach: With the increasing adoption of smartphones and mobile devices, banks will prioritize a mobile-first approach solution. Future PesaBank Internet Banking System systems will offer intuitive, user-friendly mobile applications such as MPESA with rich features, seamless navigation, and responsive design to provide customers with a superior mobile banking experience. This includes support for mobile payments, digital wallets, and biometric authentication for secure and convenient transactions on the go.

CHAPTER 6
APPENDICES.

6.1 Program Listing.

```
<? php session start ();
 include('dbcon.php') ;>
<! DOCTYPE html>

<html lang="en">

   <! -- Visit codeastro.com for more projects -->

<head>

      <title>Gym System Admin</title><meta charset="UTF-8" />

      <meta name="viewport" content="width=device-width, initial-scale=1.0" />

                        <link rel="stylesheet" href="css/bootstrap.min.css" />

                        <link rel="stylesheet" href="css/bootstrap-responsive.min.css" />

      <link rel="stylesheet" href="css/matrix-style.css" />

      <link rel="stylesheet" href="css/matrix-login.css" />

      <link href="font-awesome/css/fontawesome.css" rel="stylesheet" />

      <link href="font-awesome/css/all.css" rel="stylesheet" />

<link href='http://fonts.googleapis.com/css?family=Open+Sans:400,700,800'          rel='stylesheet'
type='text/css'>
   </head>
   <body>
      <div id="loginbox">

         <form id="loginform" method="POST" class="form-vertical" action="#">

         <div class="control-group normal_text"> <h3><img src="img/icontest3.png" alt="Logo"
/></h3></div>

            <div class="control-group">

               <div class="controls">
```

```
                <div class="main_input_box">
                    <span class="add-on bg_lg"><i class="fas fa-user-circle"></i></span><input type="text" name="user" placeholder="Username" required/>
                </div>
            </div>
            <div class="control-group">
                <div class="controls">
                    <div class="main_input_box">
                        <span class="add-on bg_ly"><i class="fas fa-lock"></i></span><input type="password" name="pass" placeholder="Password" required />
                    </div>
                </div>
            </div>
            <div class="form-actions center">
                <!-- <span class="pull-right"><a type="submit" href="index.html" class="btn-success" /> Login</a></span> -->
                <!-- <input type="submit" class="button" title="Log In" name="login" value="Admin Login"></input> -->
                <button type="submit" class="btn btn-block btn-large btn-info" title="Log In" name="login" value="Admin Login">Admin Login</button>
            </div>
        </form>
        <?php
            if (isset($_POST['login']))
            {
```

```
$username = mysqli_real_escape_string($con, $_POST['user']);

$password = mysqli_real_escape_string($con, $_POST['pass']);

$password = md5($password);



$query = mysqli_query($con, "SELECT * FROM admin WHERE password='$password' and username='$username'");

$row = mysqli_fetch_array($query);

$num_row = mysqli_num_rows($query);

if ($num_row > 0)

{

$_SESSION['user_id']=$row['user_id'];

header('location:admin/index.php');



}

else

{

}

?>

echo "<div class='alert alert-danger alert-dismissible' role='alert'>

Invalid Username and Password

<button type='button' class='close' data-dismiss='alert' aria-label='Close'>

<span aria-hidden='true'>&times;</span>

</button>

</div>";

<div class="pull-left">

<a href="customer/index.php"><h6>Customer Login</h6></a>

</div>
```

```
            <div class="pull-right">
            <a href="staff/index.php"><h6>Staff Login</h6></a>
            </div>
        </div>
        <script src="js/jquery.min.js"></script>
        <script src="js/matrix.login.js"></script>
        <script src="js/bootstrap.min.js"></script>
<script src="js/matrix.js"></script>
    </body>
<!-- Visit codeastro.com for more projects -->
</html>
```

6.2 Index.