



AN IMPROVED MOBILE AGENCY BANKING SYSTEM

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ABSTRACT

The introduction of agency banking system in Nigeria has created a new economy with the adoption and the use of POS terminals to enhance business transaction and the inclusivity with respect of the unbanked population in rural areas of the country. The widespread use of internet-based banking led to a significant increase in the use of electronic payment systems and POS terminals play a major role. As technology continues to advance, financial institutions have deployed agency banking system using POS terminals to create outlets that serve the public in terms of account creation, savings, transfer and withdrawal respectively. This approach have brought more customers into the banking net and reduced the level of the unbanked promoting financing inclusivity. Irrespective of the accruable benefits of agent banking there remains the challenge of failed, declined, uncommitted and wrongly debited transactions leading to loss of funds and valuable man-hour. This project therefore, proposed the development of an improved agency banking system to mitigate the aforementioned challenges using mobile application development framework to report POS the above cases to the NIBSS remotely without going to the baking hall. The system was developed using objected oriented analysis and design methodology (OOADM) which is a software development paradigm suitable for mobile application development and Java programming language in android studio integrated development environment (IDE). The system outperformed the existing system in terms of response time, flexibility, efficiency, data security and integrity.

Keywords: POS Agent, Agency Banking, POS Debit, Chargeback and Commercial Banks

INTRODUCTION

Nigeria began its journey in the early 2000s and embraced electronic banking, including mobile banking, also known as mobile financial services. Although Nigeria has experienced phenomenal growth in terms of financial inclusion, half of the population still lacks access to standard financial services. In an effort to include this sizable population in the formal financial system, Nigeria's central bank launched "Agent Banking" in late 2011. Through their agents, who will offer banking services to the public on behalf of a bank, and the closest bank branch providing the required logistical assistance, it can assist the formal banking sector in reaching out to the underprivileged members of society (Odi & Innocent, 2016).

An agency bank is a business organization that performs a variety of functions on behalf of another bank, so that the latter is unable to accept deposits or make loans in its own name. In other words, an agency bank is a retail location that a financial institution or mobile network operator engages to handle customer transactions and enable customers to make deposits, withdraw and transfer money, pay bills, check the balance of their accounts, receive government benefits, or receive direct deposits (Agu et al., 2016).

Odi and Innocent (2016) further opines that agent banking reduces operating and establishment costs for banks, provides cost-effective banking services, and fills the gap between them and the unbanked by making banking services available to rural residents.

Agency banking, though novel in its operations with respect to solving the problem of inclusion and bringing of the unbanked population into the banking net thereby bridging the gap in financial inclusion, there remains lots of challenges that this banking operation has posed on the banking public. There are issues of failed and uncommitted transactions are not reversed to the senders' bank account, but in most cases these transactions due to network failure or delay get committed and the customer debited without their knowledge since it was initially a failed or declined transaction.

The aim of this study is "An Improved Agent Banking System"

Outline below are the objectives of this study:

- i. Examines the concept of agency banking
- ii. Develop a mobile application to track and report failed and declined transactions,
- iii. Implement the new system using android studio IDE with Java and Kotlin,
- iv. Deploy, test and evaluate the system.

The study will be of great importance to both the POS operators and their customers who will use the system for prompt reporting of the cases of failed transaction to their banks and reduce

the issues of delay in reversal, bank visit to lodge complaints and possible physical altercation, misunderstandings, quarrels and mischief.

The scope of the study is the development of a mobile application for the reporting of failed and declined transactions from POS operators, to enable for easy and smooth reversal of the fund to the customers' account.

LITERATURE REVIEW

Theoretical Framework

The underpinning theory for this study is the innovation diffusion theory which strengthens the need for the adoption of the technology for the improvement and advancement of the banking services to the unbanked population of the society through the deployment of POS terminals and operations nationwide.

Innovation Diffusion Theory (IDT)

The Innovation Diffusion Theory derived from two key words or concepts namely, innovation and diffusion was propounded in 1993 by Everett M. Rogers. Innovation is defined as an idea, activity, or initiative that is viewed as novel for an individual to accept (Ekechukwu, 2016). Diffusion refers to the process by which invention spreads through channels over time among members in a social system. Communication, creativity, temporal channels, and the social system are the four primary factors that collaborate in the process of propagating new ideas (Oniore & Okoli, 2019). These key elements are transferred through five major steps which include;

- i. Knowledge,
- ii. Persuasion,
- iii. Decision,
- iv. Implementation and,
- v. Confirmation.

The essential premise of this idea is that innovation adoption is a process aimed at minimizing ambiguity regarding the most recent technology. Individuals seeking to accept new technology must gather and synthesizes knowledge about it. Thus, adopters of an innovation must first become aware of it, be persuaded to adopt it, make a decision to adopt or not, implement the decision, and confirm whether the decision to adopt the technology meets the criteria of compatibility, relative advantage, trial ability, complexity, and observability (Nworie & Okafor, 2023).

The study is connected to the innovation diffusion theory (IDT) through the criteria of relative advantage and compatibility. Compatibility in this sense defines the amount to which an innovation is regarded to be consistent with current values, past experiences, and future demands of those adopting it (Ekechukwu, 2016). Relative advantage here refers to degree to which an innovation is regarded to be superior to previous idea or technology (Oniore & Okoli, 2019); the onus therefore lies on those adopting it weigh the costs and advantages of adopting a technological improvement, which can be stated monetarily or socially.

Conceptual Review

There are different concepts and reviews that reinforce the core component of this work which shall be reviewed in this section include some of the key reforms, transformations and evolutions in the banking sector which has directly impacted on the socioeconomic wellbeing of the average Nigerian and businesses in the country. Indeed, the adoption of the point of service (POS) terminals across the country has not only improved and enhance the service delivery of the banking sector but it has also created an new industry of operators spanning the length and breadth of the Nigerian state with high level of employment generation across gender and age divide.

Agency Banking

Agent banking is a viable strategy for supplying financial services in emerging economies. This technique is especially effective for helping the unbanked poor by lowering bank costs and locating low-paying specialists near their homes. Agency banking is branchless banking in which third parties conduct certain banking activities that would normally be performed by bank personnel in physical bank branches (Ndegwa, 2017; Ayadi et al., 2023). Agent banking is a recent banking invention in emerging economies like Nigeria. According to Mwende et al.(2015), agency banking is not a new concept and has been successfully implemented in Latin America and Asia. Few African countries have adopted agency banking. Agency banking is a crucial strategy for financial institutions to connect with their customers on a local level. Agency banking allows users to access financial products and services near them, reducing obstacles to financial inclusion like cost and accessibility.

Agent banking services are offered by authorized banking representatives. These agent locations are far smaller than bank branches and are outfitted with point-of-sale (POS) systems, mobile phones, barcode scanners, PCs, and biometric devices. By lowering the overhead necessary to open a bank branch and utilizing technology, agent banking enables financial institutions to contact unbanked and underrepresented populations population, particularly in rural and isolated

places, in a more cost-effective manner. One of the key offering of this system of banking is not only for increase the banking public and profit maximization by the commercial banks, it is also an avenue to promote financial inclusivity especially to rural communities. Many people have benefited from this system of financial inclusivity by having easier access to financial services, which has aided in the growth of both the nation and the world at large. According to Lotto (2019), agency banking made banking services easier to understand by shortening the distance between the customer and the service location.

According to Akiyode-Lawanson (2019) the Nigerian unbanked and underbanked population, which as of 2010 accounted for a staggering 39.2 million people and 46.3 percent of the country's adult population, has identified agent banking a system of providing banking services to customers through licensed agents outside the bank branch /as a major enabler of last mile access to formal financial services. These services include cash deposit and withdrawal, bill payments, funds transfers, and BVN enrolment.

The basic operational processes and procedures of the agent banking system include:

- i. Customer account creation,
- ii. Deposits,
- iii. Withdrawals,
- iv. Transfers,
- v. Point-of-Sales/ Point-of-Purchase
- vi. Utility bill payment

Figure A shows the basic operation procedures carried out by every agent banker with respect the demand and the service need of the clients or customers be it in a POS terminal or a retail complex where the system is deployed for the payment of goods and services only without have to get a cashback from the operator as the case may be.

AGENT BANKING



Figure A: Basic Operations of the Agent Banking (Source: Akiyode-Lawanson, 2019)

Challenges of POS in Agent Banking System

Agent banking like other channels of financial transaction has over time plagued with a plethora of challenges that hampers their operations and erodes customers and clients confidence in the process. One of such challenges include technological issues that most of the POS operators have to grapple with as in most cases the terminal they work with are not uniformly designed therefore the management and operation of these POS terminals are in themselves a big challenge. Unintentionally, network issues from transmitting or receiving institutions can taint transactions and occasionally lead to disputes or inconsistencies. People still contest decisions and actions made by agents and POS machines since their faith in their functionality is still developing, unlike in banks where the identical situation would occur(Odebola, 2022).

Despite the benefits that using POS technology brings to the Nigerian banking system, such as cost-effectiveness and convenience of processing, there are various barriers to its implementation. These constraints include insufficient infrastructure, low levels of internet access and financial literacy, high transaction costs, and security concerns (Nwakoby et al., 2020). Ekele and Ukpata (2020) reviewed the effects of e-banking on commercial bank performance in Nigeria and discovered that sensitive information protection, password insecurity, and network failure are among the primary challenges influencing the adoption of POS terminals. From the foregoing the following challenges and limitation have been identified as issues militating against the use of the POS system for the agent banking in Nigeria;

- i. Security concerns,
- ii. Insufficient infrastructures,

- iii. Low internet access and availability,
- iv. Financial literacy and high transaction cost.

Aside from the basic challenges here enumerated, there are other critical challenges that the agent banker and POS operator faces on daily basis as they interface with their clients and customers. These challenges adversely impacts on the customer and the operator and in most cases has resulted to issue quarrels and physical assaults. However, the major operating problems identified include;

- i. Transaction Failures,
- ii. Delayed Reversal,
- iii. Network Failures and Fraud.

From the foregoing therefore, it has always been speculated and recommended that to improve operational efficiency of the agent banker and POS operator, there is the need for network facility upgrade and agent training as this will go a long way to improve the system and evoke the confidence of the clients and customers of agency banking in Nigeria(Ayadi et al., 2023).

Application of Technology for Agent Banking

Information technology advancements have an impact on daily living, especially the banking industry, which in turn affects how individuals obtain banking services. Branchless banking services are currently being developed. Over the past ten years, branchless banking innovation has been centered across Africa and other developing economies globally such as Kenya and Nigeria drawing attention from researchers worldwide (Chipeta & Muthinja, 2018).Time and location are fundamental aspects of human life that are altered by the technology revolution, particularly when it comes to computer programmes and telecoms like online banking. One of the branchless banking services is e-banking. With the help of E-banking services, which include internet, phone, and SMS banking, customers could conduct transactions more conveniently without having to relocate(Rachmawati et al., 2020).

RESEARCH METHODOLOGY AND SYSTEMS DESIGN

Methodology

In software program development, there are standard methodologies that could be adopted depending on the nature and intended functionality of the proposed system development. Some of the key underpinning factors that determine the type software development methodology to be deployed include the problem to be solved, the data type, development tool required and other requirement specification. From the array of software development techniques available, the most suitable for the design and implementation of agent system is the object-oriented analysis

and design methodology (OOADM). This software development methodology applies object orientation for the analysis and design of a software project deploying techniques that models a system as a group of interacting objects which makes it more ideal for the development of mobile application software irrespective of the domain.

Object Oriented Analysis and Design Methodology (OOADM)

Object oriented analysis and design methodology is the principal industry proven software development that involves three distinct component such as object-oriented analysis (OOA), object-oriented design (OOD) and object-oriented programming (OOP) respectively. Object oriented analysis takes care of the design requirement and overall architecture of the system being developed with detailed description of the what the system is aimed to achieve with clear definition of major or key objects within the problem domain, while the object oriented design translates this architecture in to vivid programming constructs which include the interfaces, classes, method and others while the actual program is then implemented by the object oriented programming constructs.

Analysis of the Existing System

The Present method of Chargeback claim by Agents or Bank customers takes minimum of 7 to 14 working days, Most customers are not patient enough or have the time/chance to even visit the bank branch to make complains or stay on queue. Sometimes customers received their fund back to their account after 3months while some funds are not refunded thereby causing dissatisfaction between Agents and customers. Since debit on Point of Sales machine is caused by network or technical issue or upgrade or fraud, Customers and Agents will always have Chargeback claim issues.

Architecture of the Existing System

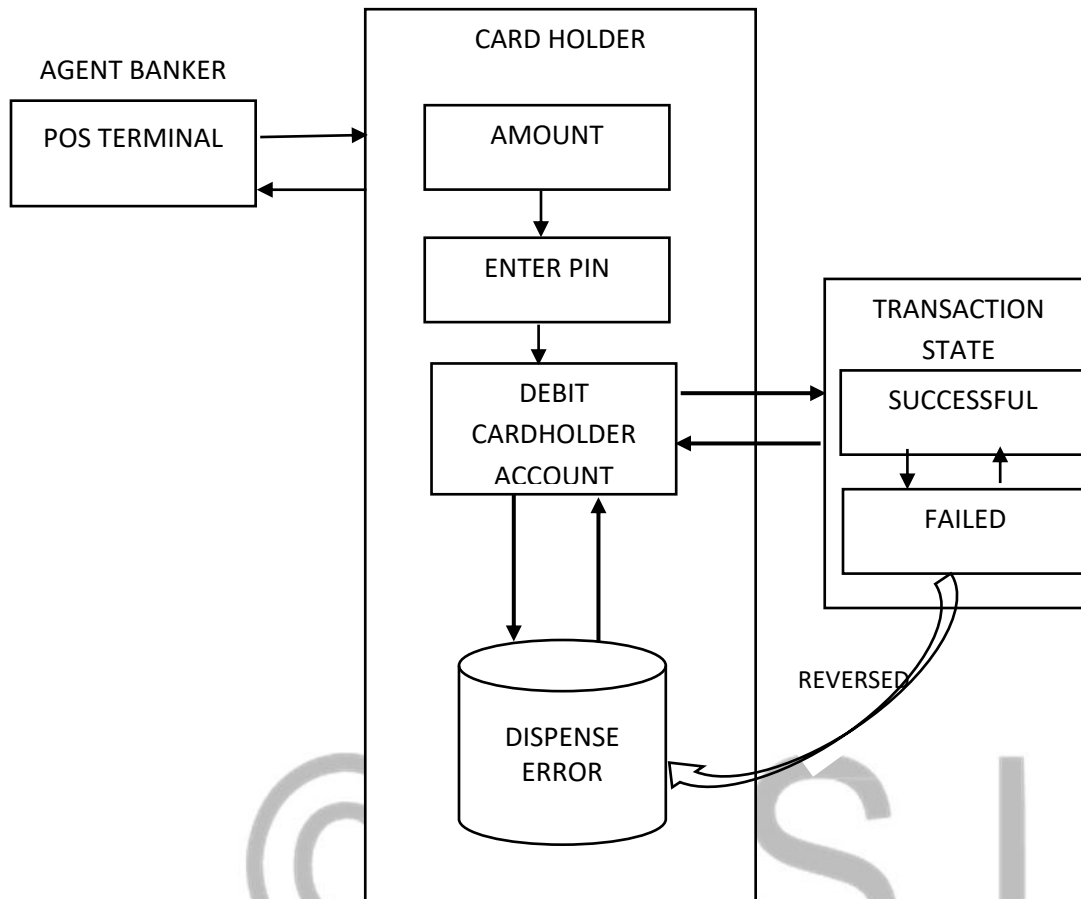


Figure B: Architecture of the Existing System (Source: Lestaringati, 2018)

The existing system comprises of the agent banker's POS terminal and the activity/ interaction with the cardholder. Here the card holder hands the card to the POS operator/ agent banker who enters the amount requested by the cardholder and the requisite commission for the transaction. If the transaction is committed/successful the operator gives the cardholder the cash, receipt and the card, but if the transaction fails or is aborted, the POS operator hands the card holder the card and the declined/ failed transaction receipt which the card holder is expected to take to their bank if the fund is not refunded to the cardholder's account. In most cases if the cardholder carried out transaction in a place where he does not reside and the transaction finally gets committed due to network delay or glitch, the cardholder may not have his/ her fund reversed since the transaction has been committed. This is one of the greatest limitation and challenge of the agent banking system.

Analysis of the Proposed System

The proposed system is the mobile application that enables the user to report an instant complaint in the event of a Dispense error transaction that did not commit via a dedicated email

to the Nigeria Interbank Settlement System (NIBSS). In the proposed system once there appears to be a debit transaction, after the declined or failed receipt has been generated by the POS machine the cardholder can use their mobile device to send an instant complain directly to NIBSS indicating the POS terminal ID, amount, transaction date, and the terminal issuer without the Agent customer visiting any bank branch. It will also reduce the stress involved if the card user has to carryout that transaction outside of their station or residence. The proposed system incorporates a complaint module to the existing architecture to enable seamless communication with respect to Dispense error transaction.

Architecture of the Proposed System

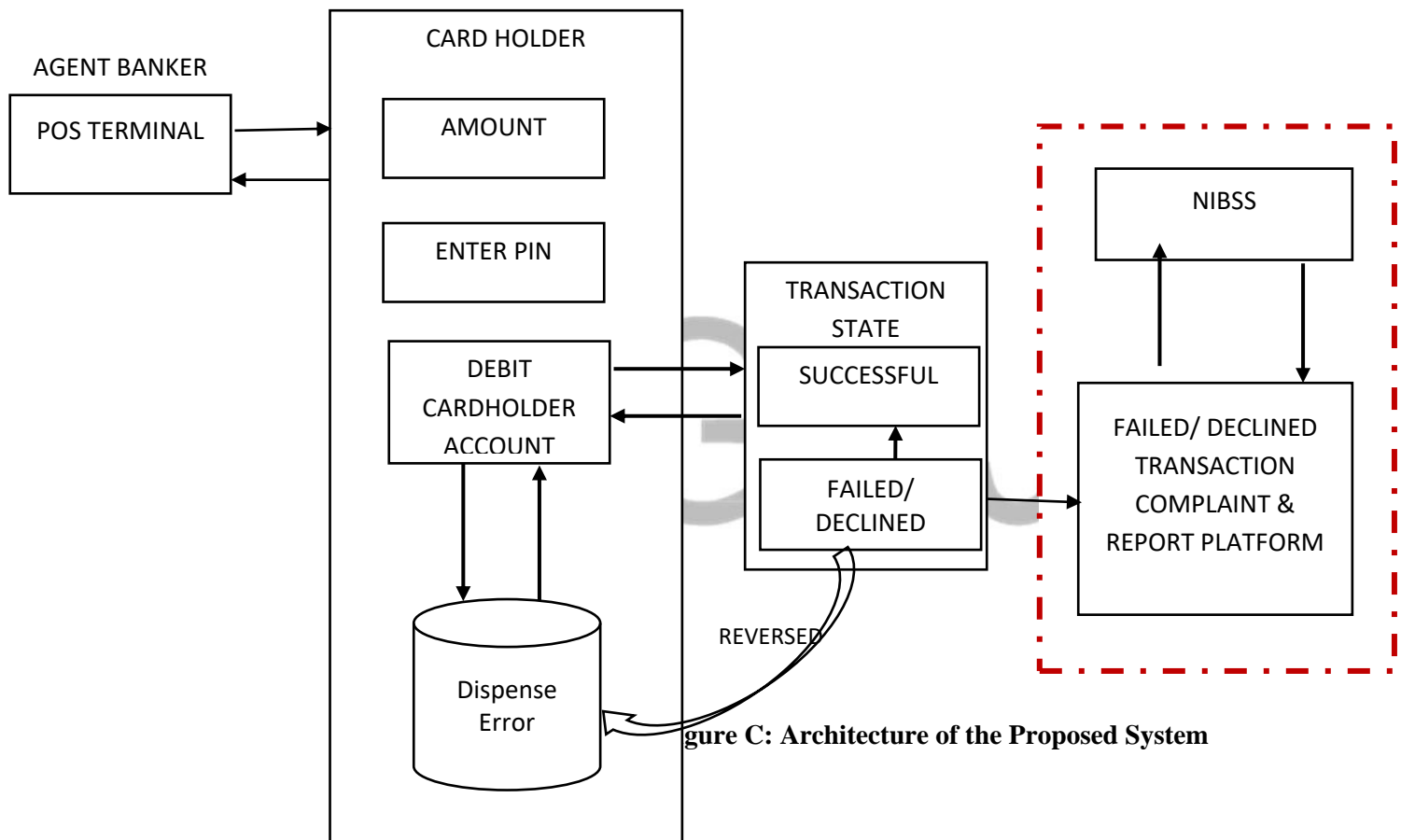


Figure C: Architecture of the Proposed System

RESULTS AND DISCUSSION

The emergence of agent banking system in Nigeria brought a lot of benefits not just to the financial service sector but also the banking public as it opened up the opportunity for the unbanked population to be reached with financial services and products promoting inclusivity in the sector. The entry of Fintech companies also enhanced this socioeconomic enhancement activities as people in remote communities can now access banking services with the use of their mobile phones and devices making it easy for them to receive and send money to and from people across the country and the world. The proliferation of agent banking terminals (POS)

across the country which served as a key driver of the cashless policy and financial inclusion agenda of the government came with is many challenges of failed, declined and fraudulent transaction making the unsuspecting members of the banking public to loss funds through these activities.

The most popular of these challenges being failed, declined and pending transactions takes between 24 hours or more to be resolved by the banking institution debited as in most cases the monies have moved to the target account and committed in the receiving financial institutions' database. Most customers have lost of funds through this process as they are asked to go to their banks and most time the banks user will be required to fill forms and other cumbersome processes but the monies will still not be recovered. And with the increase in criminal activities of "one-chance taxis", the assailants now go about with POS terminal which they use to defraud their victims all these can be resolved using the new system.

Results

The results for the new mobile banking system are described in the various user interface (UI) that are used to interact with the system and their efficiency and response level with respect to reporting of the cases of failed, pending and reversals transactions respectively. The new system is as earlier stated is a mobile application used for the reporting of failed transactions from agency banking terminals also known as POS operators. The major challenge as revealed from studies and primary data remains that most time there are network challenges the tendency for failed and declined transactions are on the rise and it takes approximately 24 hours or more for a reversal to be effected from the bank and most time these reversals are never done leading to loss of funds by the customers who patronized the POS operators. This system enables a user who has experienced a failed or declined transaction to immediately file a report to the Nigeria Inter-Bank Settlement agency using the mobile application on their mobile devices.

The mobile application (App) consists of the following modules;

- i. Registration Module
 - ii. Login Module
 - iii. Dashboard
 - iv. Profile
 - v. Complaint
 - vi. View Complaint/ Report Module etc.
- i. Registration Module:** The registration module is the part of the system that requires the user to officially register their details and the information to enable them create an

account to use the system. This module serves as a point to initialize the program use by the user as they would be required to create an account by registering before they would be able to login. This module is a precursor to the Login module that serves a security check and authentication process for the system as indicated in Figure D

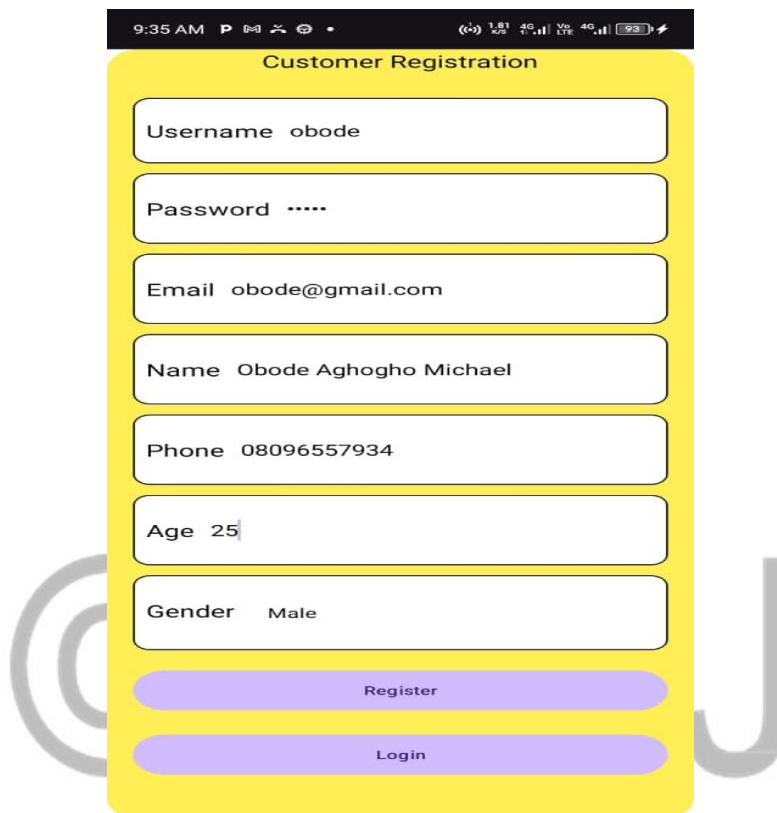


Figure D Registration/ Signup

- ii. **Login:** The access control component of the system which is the login Interface, verifies that only users who have registered and created accounts are authorized and given access to the system. This is achieved by entering their username and password, which are created at the time of registration when they input their essential information to enable the system to function. The user whose authentication criteria matches what is on the database is given access to the system to carry out its many built-in features. In essence, there are features on the login form that call for user authentication. Because it has several security safeguards to prevent unauthorized access to the system, it enables users to access their accounts created during the registration process by entering their username and password. See Figure E



Figure E: Login Form

- iii. **Dashboard:** The dashboard serves as a central point after the login process from where the user can navigate to other functional parts of the application to make complaints, view and logout from the system. It is the home page of the new system and the base from which other activities are conducted as they provide users with critical, at-a-glance information and access points and buttons that are relevant to the operations of the application. Figure F: shows the image of the dashboard indicating the aforementioned functions.

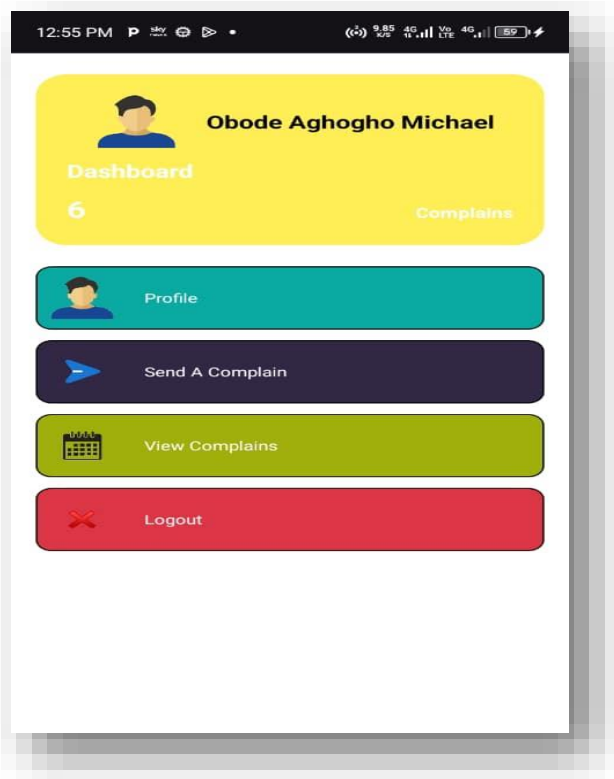


Figure F: Dashboard of the New System

- iv. **User Profile Module:** The User Profile module in Figure 4.4 enables the user to make corrections and updates on their personal information on the system. It here the user can easily edit their information such as their gender, address, age, phone number, email and contact address respectively. This component of the new system serves as the user information repository of the system and it can be accessed from the dashboard be a click on the profile button.



Figure G: User Profile

- v. **Complaint Module:** The issue of complains relating to failed and declined transaction in agency banking processes has remained the major setback of the system as it takes between 24 – 48 hours to effect a refund or reversal of debited funds to the customers’ account. The complaint module or page of the new system enables the user to make a direct complaint to the Nigeria Inter-Bank Settlement System (NIBSS) for every failed transaction from any POS terminal nationwide. With the current registration of POS operators and terminals, it becomes much easier to track funds and the exact location and address of the terminal, the owner and the registered account to number and holder or agent banker (POS) terminal. Once a complaint is placed on the App an automatic mail is sent to the dedicated complaint mail of the NIBSS and the fund can be tract immediately and response delivered to the sender. The complaint form indicated in Figure 4.5 and 4.6 shows the various input fields required for the complaint to be sent they include the bank/ account details, POS terminal ID, complaints, amount debited, time and the date of the transaction respectively.

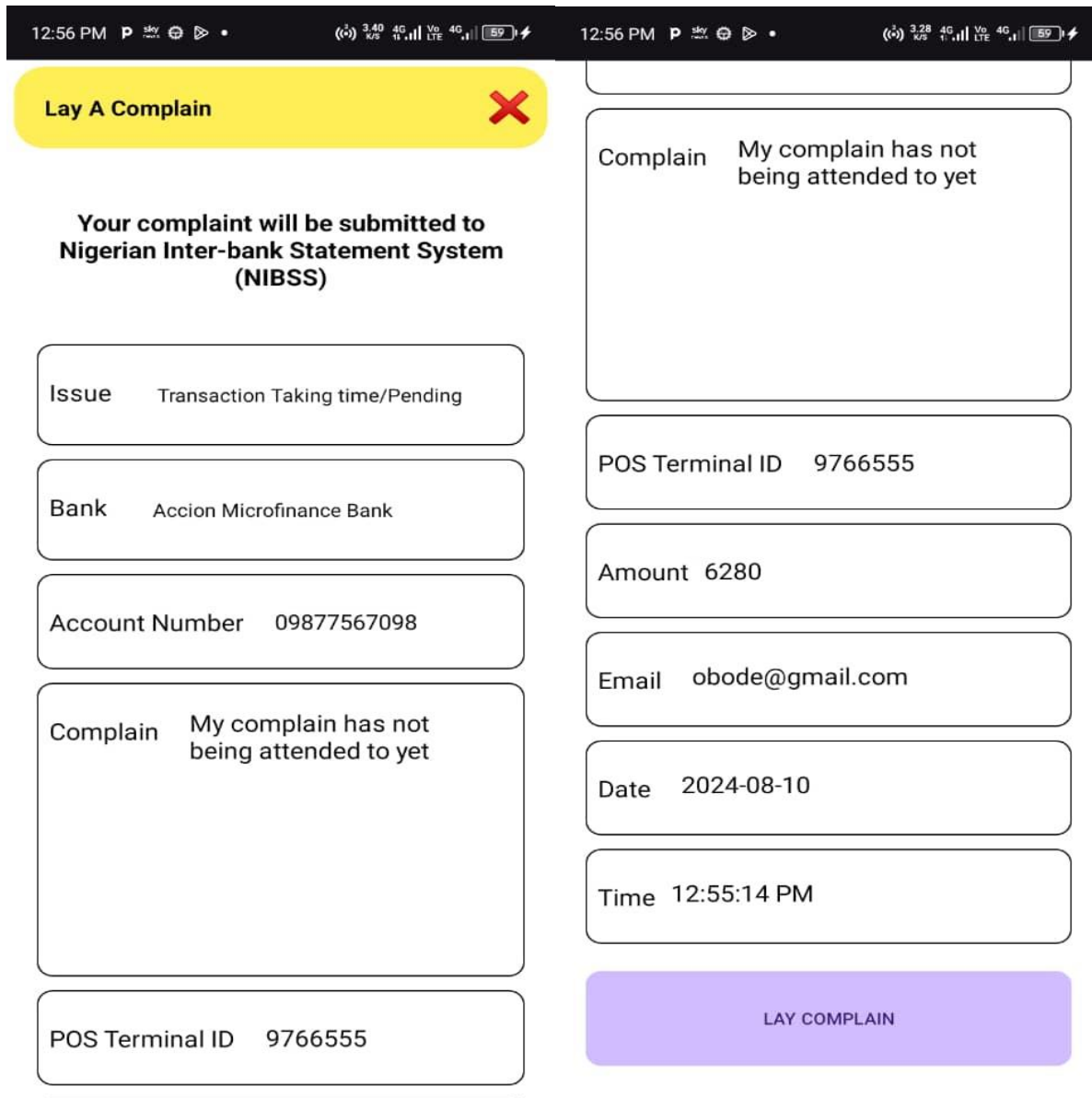


Figure H: Complaint Module (a)

Figure I: Complaint Module (b)

View Complaints/ Report Module: The report module shows the complaints that have been sent to the NIBSS with regards to failed, declined or incomplete transactions that was debited the customer/ user. Once the user sends a complaint an automatic responds is received notifying the sender that their complaints have been successfully lodged and will be attended to. Figure H, shows the list of failed transactions reported or complained for the day while Figure I, Shows a detailed view of a single complaint made. To view and see the details of a given complain, the user will have to tap on or select any complaint of their as indicated in Figure H, and it will automatically open up in details as shown in Figure I. The detailed complain shows the details of the account and financial institution debited, It also shows the time and date of transaction/ booking, the amount debited and the email address of the sender of the complaint.

Table A: Comparison of Existing and Proposed System

S/No	Functions	Existing System	Proposed/ New System
1	Responds time to reports	>24hrs	<24hrs
2	Quick recovery/ reversal of debited funds	>5 or more working days	>5 or more working days
3	Money Back	Not Guarantee	Guarantee
4	User friendliness	Stressful	Stress free
5	Accessibility	Complex	Simple

Conclusion

The importance of prompt reporting and accessibility provided by the new system brings a new lease of life to the agent banking public who can leverage on the advantages of the new system to transact their various transactions using the POS terminal without fear of the loss of funds inherent in the existing system due to network failure or glitch and possible human error which could lead to these loses. The new system when evaluated as against the existing system outperformed the existing system in terms of accessibility, response time to lay a complaint/ report incidence of failed/ declined transaction, identification of the POS terminal using the terminal ID, quick recovery of funds and user friendliness. The key takeaway here is that the new system is portable and flexible as the system can be downloaded and installed to any mobile device and deployed on the go.

Contribution to Knowledge

This work has contributed to the body of available knowledge in the development of an improved agency banking system that enhances the reporting of failed, declined and pending transaction to enhance customer satisfaction and confidence in the system. Furthermore, this study can evoke more research in the development of advanced agency banking application using more enhanced technologies to deploy the system to improve customer satisfaction as the agency banking system has come to stay as a key economic indicator to assess the level of

inclusion of the financial service sector to the under-banked and unbanked members of the public to promote the cashless policy framework of the central bank of Nigeria.

REFERENCES

- Agu, B.O., Anidiobu, G.A & Ezinwa, C.E. (2016). Challenges of Sustainability of Agency Banking in Nigeria: A Study of Selected Commercial Banks. *NG-Journal of Social Development*, 5(3), 106-120.
- Agu, B.O., Simon, N.P.N & Onwuka, I. O. (2016). Mobile banking-adoption and challenges in Nigeria. *International Journal of Innovative Social Sciences & Humanities Research*, 4(1), 17-27.
- Akiyode-Lawanson, J. (2019). *The drive for agent banking to significantly deepen financial inclusion*. Retrieved from Business Day: <https://businessday.ng/technology/article/the-drive-for-agent-banking-to-significantly-deepen-financial-inclusion/>
- Ayadi, O. F., Oke, B., Oladimeji, A & Aladejebi, O. (2023). Agency Banking In Nigeria: Impact and Impediments. *SEDME (Small Enterprises Development, Management & Extension Journal)*, 50(3), 227-247.
- Chipeta, C & Muthinja, M.M. (2018). Financial innovations and bank performance in kenya: Evidence from branchless banking models. *South African Journal of Economic and Management Sciences*, 21(1), 1-11.
- Ekechukwu, C. (2016). Investigating the effect of e-banking on the economic growth of Nigeria. *Asia Pacific Journal of Research in Business Management*, 7(10), 50-69.
- Ekele, J.S & Ukpata, I. S. (2020). Implications of Electronic Banking on Commercial Banks' Performance in Nigeria (2000-2017). *International Journal of Modern Management Sciences*, 8(1), 42-60.
- Lestaringati, S. (2018). Mobile point of sale design and implementation. *Materials Science and Engineering*, 407(1), 1-4.
- Mwende, M.J., Bichanga, J & Mosoti, J. (2015). Investigation on Importance of Agency Banking in Provision of Banking Services in Kenya:A Case of Equity Bank in Kitui Central District, Kitui County, Kenya. *International Journal of Scientific and Research Publications*, 5(10), 1-13.
- Ndegwa, P. (2017). An Analysis of the Effectiveness of Agency Banking As A Financial Inclusion Strategy in Commercial Banks (A Survey Of Selected Commercial Banks In Kiambu Town). *International Journal of Business and Management Invention*, 6(8), 67-75.
- Nwakoby, C., Chukwu, K. O., & Oghenetega, E. O. (2020). Effect of Cashless Policy on Deposit Money Banks Profitability in Nigeria. *Asian Journal of Economics, Business and Accounting*, 19(4), 48-63.
- Nworie, G.O & Okafor, T.G. (2023). A Literature Review on the Challenges of the Use of Point ofSale (POS) Terminals in the Nigerian Banking System. *International Journal of Academic Information Systems Research (IJAISR)*, 7(2), 1-14.
- Odebola, T. (2022). The Syzygy of the Operations and Drawbacks of POS (Point of Sale) in Nigeria as a Financial Inclusion Product. *International Research Journal of Economics and Management Studies*, 1(2), 39-44.
- Odi, N & Innocent, I.O. (2016). Effect of Agency Banking on the Performance of Deposit Money Banks in Nigeria. *FUNAI Journal of Humanities and Social Sciences*, 3(1), 62-69.

- Oniore, J. O. & Okoli, U. V. (2019). Impact of Electronic Banking on the Performance of Money Deposit Banks in Nigeria. *Noble International Journal of Economics and Financial Research*, 4(9), 83-90.
- Rachmawati, R., Farda, N.M & Setiyono, B. (2020). Model of Agents-Based Branchless Banking Services Development in Urban and Rural Area. *Indonesian Journal of Geography*, 52(1), 69-79.

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