



Banks USSD Code: A Future Development for Financial Inclusion in Nigeria

^{*1}Muhammad Ishaq Umar, ²Adamu Zubairu Zubairu, ³Maryam Yusuf Umar and ⁴Aisha Ibrahim Galadima

¹Department of Computer Science, Federal University of Lafia, Nasarawa State, Nigeria.

²Department of Computer Science, Isa Mustapha Agwai I Polytechnic Lafia, Nasarawa State, Nigeria.

³ICT Department, Isa Mustapha Agwai I Polytechnic Lafia, Nasarawa State, Nigeria.

⁴Department of Computer Science, Federal University of Lafia, Nasarawa State, Nigeria.

*Corresponding authors' email: muhammadishaqumar@gmail.com

ABSTRACT

The invention of Unstructured Supplementary Service Data (USSD) banking system of operations in Nigeria is so important due to its effective service delivery; this practice provides real-time services for bank customers to facilitate payments and transactions through this advanced system of banking. In about 20 years ago, the Nigeria government embraced e-system of banking, so interested, the unstructured Supplementary Service Data (USSD) was introduced, which aimed at easing ways of banking and appreciate the cashless policy deployed in Nigeria. Also, as the system evolves, financial institutions also introduce Point of Sales (POS) system of banking, this service improving economic activities in Nigeria. The introduction of USSD by financial institutions in Nigeria has made positive impact to rural dwellers in some part of Nigeria where GSM network is available, this advancement brought smiles in the faces of rural dwellers, because they use this system to effects transaction without reaching banks. The USSD enables customer's self-services such as account balances enquiry, funds transferring, bills payments, and buying airtime without going to a bank, customers hold USSD as the means of their transactions. Since USSD has come to ease banking services for rural dwellers in Nigeria, for which they can bank at their domain without reaching banks. According to the research, USSD code innovation brought significantly excellent to financial inclusion in Nigeria. But this research has discovered a gap, which this study attempts to address; the study examined some banks USSD codes services in Nigeria, and observed that, one of the important aspects of the goal of USSD code is missing (Complaint Option). This work seeks to address this gap by proposing to include the "Complaint Option" in the USSD service options, using PHP Framework, web server and MySQL database management system.

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INTRODUCTION

The invention of the Unstructured Supplementary Service Data (USSD) banking system in Nigeria is important for effective service delivery; it provides real-time services to bank customers, facilitating payments and transactions through this advanced banking system. About 20 years ago, the Nigerian government embraced an e-banking system, and, as an extension, the Unstructured Supplementary Service Data (USSD) was introduced to ease banking and support Nigeria's cashless policy. Also, as the system evolves, financial institutions have introduced the Point of Sale (POS) system of banking, which has improved economic activities and has also created financial problems for banking customers in Nigeria (Umar Muhammad I. et., al 2024). The introduction of USSD by financial institutions in Nigeria has made a positive impact on rural dwellers in some parts of Nigeria where GSM network is available; this advancement brought smiles on the faces of rural dwellers, because they use this system to effect transactions without reaching banks (Umar Muhammad I. et., al 2024). The USSD enables customer self-services such as account balance enquiry, funds transfer, bill payment, and buying airtime without going to a bank, and this made customers hold USSD as the means of their transactions (Oladipa O. et al, 2022). Since USSD has come to ease banking services for rural dwellers in Nigeria, for which they can bank in their domain without reaching banks, we discovered that there is no complaint login option

in the USSD service process, so there is a need for financial institutions to improve their system to meet customers' demands (Umar Muhammad I. et., al 2024). The practice of Unstructured Supplementary Service Data (USSD) by financial institutions in Nigeria has been a habit and a way of providing real-time services to bank customers, which involves bank account balance enquiry, funds transfer, bill payment, and buying airtime without visiting a bank (Oladipa O. et al, 2022). Mobile phones have become an indispensable tool for driving digital financial services as Bill Gates stated, "Banking is necessary, but banks are not" (Oladipa O. et al, 2022). According to Oladipa O. et al. (2022), reported that the mobile phones have allowed financial transactions based on mobile telephony, without the need for physical branches for banking. Thus, mobile-based financial service providers have adopted varying technologies for enabling digital financial services. Such technologies include Short Messaging Service (SMS), Unstructured Supplementary Service Data (USSD), Interactive Voice Response (IVR), Wireless Application Protocol (WAP), SIM Tool Kit (STK), mobile financial applications, Artificial Intelligence (AI), and Machine Learning (ML) models, among others. The USSD channel for payments allows making financial transactions using a basic feature mobile phone, without the need for internet connectivity. It is one of the most widely used means of offline payments, aiming at financial deepening and inclusion of the marginalized and under-banked population in normal

banking services. It is a protocol used by the Global System for Mobile Communication (GSM) network to communicate with payment service providers' platforms. USSD is a session based, real time messaging communication technology, which can be accessed through a string, starting normally with an asterisk (*) and ending with a hash (#), for instance *710#. USSD sessions are relatively shorter than SMS or IVR, and unlike SMS, it does not store any data on the mobile phone or in the application. Due to the short turnaround time and data privacy, USSD technology is considered a cost-effective, faster, and handset-agnostic mode of payments (Ebole, A. F et al., 2023). Most countries began with the USSD or STK channel for digital financial transactions, and as the internet and smartphones became accessible and affordable, new technologies like WAP, Application Programming Interface (API), and Graphic User Interface (GUI)-based mobile applications (apps) are evolving to offer faster, more convenient, and easier payment channels to customers. In Nigeria today, the USSD channel has been influential in driving financial inclusion for the underserved and the unbanked population. In another review, USSD-based payments rose by 50 per cent between 2020 and 2026, with an estimated 7.3 billion transactions; this is as a result of digital banking wallets (OPay, Palmpay, MoniePoint, Kuda, Etc.) we have in Nigeria (Ebole, A. F et al., 2023). Mobile network operators (MNOs) and payment service providers (PSPs), such as banks and financial institutions (BFIs) and non-bank financial institutions, are part of related markets in mobile communication and financial services. In many countries, MNOs have also entered the banking space as digital banks (Nepal Rastra Bank, 2024). The invention of USSD codes captured services that ease customers' ways of banking, but according to the review, the USSD session database does not include complaint login option. In view of this, this research proposed the addition of a USSD complaints Login option on the USSD services database. The work also examined Nigeria Banks USSD codes, challenges and prospects, and suggestions for future research.

Statement of Problems

Despite the innovation of USSD to financial inclusion, this work appraised few banks USSD codes and their functions. The codes appraised, have discovered similar USSD functions but some banks have more USSD services than another. The USSD codes examined by this research are: account balance enquiry, funds transfer, PIN-Change request option, Airtime purchase, Data subscription, Account blockage request option, Account Opening, Bills payment, BVN linkage, NIN linkage, loan request option, etc., but in the review, as appraised of bank USSD services, there is no Complaint Login Option. Customer's transactions faced a lot of challenges and loss of funds due to network failure during the session time transactions, and customers are not able to complaints to banks until they goes to bank, this is one of the key reason for the development and inventing USSD codes to embrace cashless policy in Nigeria. Looking into this problem, this research seeks to propose a session complaint login request option on USSD database for financial institutions in Nigeria.

Review of Related Works

This research reviewed some related work for the work, cited, established to drive ideas, facts, and direction for the work. In Sholanke, T. F (2026), emphasized the importance of extending financial services to underserved populations who have limited or no internet access. The study recommended leveraging USSD technology, as it functions without

requiring an internet connection or a smartphone resources that may be inaccessible to individuals in these communities. Temitope Folasade Sholanke (2026), reported that, the rise of mobile wallets, facilitated by increased smartphone adoption and internet connectivity, has the potential to advance cashless transactions and promote financial inclusion. However, a significant portion of Nigeria's population, particularly in rural areas, remains financially excluded, with approximately 40.1 million individuals lacking access to basic financial services (Enhancing Financial Innovation & Access, 2023). This exclusion is lessened by limited internet access, low digital literacy, and the necessity of pre-existing bank accounts for many electronic wallet services (Adewusi et al., 2025). The majority of these financially excluded populations are rural dwellers. As such, financial inclusion has been seen as key to reducing poverty: bank accounts have an important role to play in establishing and expanding businesses while making transactions more efficient, secure, and transparent and managing savings (Mwale, M, 2025). In a research by Adeyinka Adedoyin et al., (2022) titled "Design and Simulation of Unstructured Supplementary Service Data (USSD) to Fund Bank Accounts using Mobile Recharge Credit Vouchers" proposed a USSD system based, to fund bank account from SIM card airtime, the work proposed a session login for conversion of loaded airtime to fund banks accounts and recommended that if MNP will implements it, it will be of an advantage for financial inclusion in Nigeria. Also, in Aamo et al. (2017) designed and developed a web-based app and USSD system platform that converts airtime credit to an equivalent amount in the airtime credit holder's bank account. The system was built using PHP and Apache Server technology. The work demonstrated the conversion of airtime vouchers into cash by using the pin number of purchased airtime that has not been loaded on a mobile number. Their system accommodated any airtime from the available services provider. Temitope Folasade Sholanke (2026), wrote on "Development of a USSD-based Electronic Wallet System" the study underscores the potential of USSD technology to support underserved populations, advancing financial inclusion for individuals who may lack access to smartphones or stable internet connectivity. The implementation of such a system represents a crucial step towards achieving seamless, secure financial transactions in Nigeria. The work of Haoyang et al. (2022), developed a blockchain-based digital wallet application using the HoneyBadger-BFT consensus algorithm, demonstrating innovative approaches to enhancing security and reliability in digital wallet systems. The application was developed using Python and Google Remote Procedure Call (gRPC). The result indicated that the application did not scale well with an increase in transactions and batch sizes, with batch sizes of 40, 60, 80, 100, 300, 500, 700 used and 4 nodes. The result also showed that as the batch size remained constant and the node count increased, the time it took to run a transaction decreased. The limitation of this work was how unconventional and complex it was to use an electronic wallet to bridge the financial inclusion gap. The work of Tamitope et al. (2024) addressed the limitation of the work by Bongani & Venkata by developing a USSD-based service-oriented wallet application aimed at helping rural dwellers in Congo to receive money more easily (Bongani, C., 2023 & Patrick, M. 2023). This work aimed at providing simple and cost-effective means of facilitating money transfers to and from rural areas in Congo without the need for an internet connection. The application was built using HTML, JavaScript, and PHP, it allowed users to access its features by dialing a USSD code, enabling them to send and receive

money without internet access. The findings showed that the application helped users save up to 10% on transaction costs compared to other traditional methods of sending money. However, the system had notable limitations. First, users were unable to send money to customers of commercial banks in Congo, restricting its overall functionality. Additionally, the lack of multiple language support was a significant drawback, particularly given the application's rural target audience, where linguistic diversity is common. Samera Ugo Otor (2020) wrote a paper titled 'An Improved Security Model for Nigerian Unstructured Supplementary Services Data Mobile Banking Platform' stated; USSD is a menu driven, real time communication technology used for value added services, banks adopts USSD for financial transactions due to its ease of operation. However existing USSD are used by fraudster to commit identity theft through Subscriber Identification Module (SIM) swap, phone theft and kidnap, in other to access funds in the bank. One of the reasons this is made possible is because existing USSD platforms use Automated Teller Machine (ATM) Personal Identification Number (PIN) as second level authenticator and this compromises the ATM channel and violets one of the stated guidelines for USSD operation in Nigeria. More so, the PIN is entered bare on the platform and so can easily be stolen by shoulder surfing. They developed and simulated an improved USSD security model for banking operations in Nigeria. The security of existing USSD platform was enhanced using answer to a secret question as another level of authentication. This was with the view to minimize identity theft. This secret question is registered in the bank during account opening for new customers while existing customers will have to update their details in the banks data base before registering for USSD services. This is done the same way customers verify their ATM PIN in the bank. Hence the answer is known by the customer alone. The model was implemented using php on XAMPP platform and simulated using hubtel USSD mocker. Results showed that security of the proposed system was enhanced through another level of authentication provided by the answer to the security question. Chete F.O (2020), Wrote a Paper titled "Towards Minimizing Physical Presence In The Banking Halls During Funds Deposit Using Unstructured Supplementary Service Data" This research looks into the Unstructured Supplementary Service Data (USSD) technology, and proposes a proof-of-concept solution for bank cash deposits which could save time and resources on the part of the customer and the bank. To achieve this, an information system is developed, which will operate a Voucher Card technology (like our network recharge card system) and help reduce waiting and service times. Also, the USSD communication will be simulated using wireless connection between two computers acting as user's mobile

phone and the banks deposit voucher system respectively. It is expected that the effectiveness of this solution will spur a prototype implementation that could be employed for use regularly, and consequently, help Nigerians develop a proper and more efficient saving culture for sustainable economic development. Nova, N. A. et al. (2023), reported on the implementation of a financial inclusion app for farmers in rural Colombia. Stemming from the triple helix initiative, the work aimed at make public financing instruments more readily available to farmers. Through a design science research approach, the app was collaboratively conceived, designed, implemented, and evaluated. It provided this reflective design as a case study of how a combination of triple helix collaboration, design science, and agile software development contributes toward the creation of context-oriented artifacts'. The app could potentially benefit rural farmers to obtain information regarding the credit access, which is traditionally delivered in face-to-face meetings with bank staff. The findings provided evidence of the benefits and ease of use of the app, including certain affordances and constraints that are perceived by farmers. Moreover, factors such as technology literacy, experience using information and communication technologies (ICT), trust in technology, age of farmers, and mediation suggest that the researcher should consider both material features of technology and social determinants for adoption in case of designing ICTs for rural communities.

Summary of Related Work Reviewed

The innovation driving financial inclusion in digital world today is evolving; many researchers have tried to addressing challenges in digital marketing and of banking sectors today. The invention of USSD codes is significantly driven e-system, e-money and easing ways of banking especially for people living in rural communities. Many challenges are encountering by the subscribers of this technology and some of these challenges are network issues, session time drop-out, among others. Researchers have work on these challenges, but still gap. In a research by Nwakoby, I. P. (2026) topic "Challenges and Prospects of Measuring Digital Transactions in Nigeria" outlines some challenges and other related issues connected to USSD and digital banking services in Nigeria. Hence, this work proposed a USSD codes session-based system (Addition) to enable users login complain for any error transaction that occurred, the work appraised USSD codes across Nigeria Bank as shown in section V.

Review of Nigeria Banks USSD Codes

This section presents different USSD service codes for few banks and their functions in Nigeria;

Table 1: Some of Nigeria Banks USSD Codes

Bank	Code
Access Bank	*901#
ALAT Bank	*945#
Ecobank	*326#
FCMB	*329#
Fidelity Bank	*770#
First Bank	*894#
GTBank	*737#
Heritage Bank	*745#
Keystone Bank	*7111#
Polaris Bank	*833#
Stanbic IBTC Bank	*909#

Bank	Code
Sterling Bank	*822#
UBA	*919#
Union Bank	*826#
Unity Bank	*7799#
Wema Bank	*945#
Zenith Bank	*966#

In the table above, each bank has distinct USSD codes for its services, but many have similar functions in their modules of process and service execution, below are some of their functions.

Table 2: Access Bank USSD Codes (*901#)

Transaction Type	USSD Code
Airtime Top-Up for Self	*901*Amount#
Airtime Top-Up for Others	*901*Amount*Phone Number#
Deactivate Account	*901*911#
Pay bills	*901*3#
Transfer to Other banks	*901*2*amount*Account Number#
Transfer to Access Account	*901*1*amount*account Number#
Check Balance	*901*00#

Table 3: Alat Bank USSD Codes (*945#)

Transaction Type	USSD Code
Airtime Top-Up for Others	*945*phone Number*Amount#
Airtime Top-Up for Self	*945*Amount#
Check balance	*945*0#
Transfer to ALAT Account	*945*Account Number*Amount#
Transfer to Other banks	*945*Account Number*Amount#

Table 4: Ecobank USSD Codes (*326#)

Transaction Type	USSD Code
Airtime Top-Up for Others	*326*Amount*PhoneNumber#
Airtime Top-Up for Self	*326*Amount#Check
Balance	*326*0#
Pay bills	*326# and follow the options
Transfer to Ecobank Account	*326# and follow the options
Transfer to Other bank.	*326# and follow the options

Table 5: First Bank USSD Codes

Option	Code
Start	*894#
Transfer to other banks	*894*Amount*Account Number#
Airtime self	*894*Amount#
Airtime others	*894*Amount*Phone Number#
Balance	*894*00#
BVN	*565*0#
Deactivate Your Mobile Number	*894*911#
Get Mini Account Statement	*894*Account Number#
Activate code	*894*0#

Table 6: Fidelity Bank USSD Codes

Service	USSD Code
Fidelity Bank Main Menu	*770#
Check Account Balance	7700#
Transfer Money	*770# → Transfers
Buy Airtime for Self	*770*Amount#
Buy Airtime for Others	*770*Amount*PhoneNumber#
Pay Bills	*770# → Open Account
Block Account	*770# → Security Options

Table 7: Guaranty Trust Bank USSD Codes

Option	USSD Code
Start	*737#
Transfer to same bank	*737*1*Amount*Account Number#
Transfer to other banks	*737*2*Amount*Account Number#
Airtime self	*737*Amount#
Airtime others	*737*Amount*Phone Number#
Balance	*737*6*1#
BVN	*565*0# or *737*6*1#
Account Opening	*737*0#
Cardless Withdrawal	*737*3*Amount#
Fast Track Deposit	*737*48*Amount*Account Number#
Data Purchase	*737*4#
Loan Balance	*737*6*2#
Card Status	*737*6*3#
Cheque Book Status	*737*6*4#
Generate OTP	*737*7#
Airtime Advance	*737*8*1
Give	*737*32*Amount*Church Code#
School Fees	*737*31*Amount*Schoo Code#
Pay Merchant (Checkout)	*737*35*Amount*Merchant Code#
Total Cashout	*737*50*Amount*50#
StarTimes Subscription	*737*37*Amount*SmartcardNo#
Swift Network Subscription	*737*50*Amount*4#
Salary Advance	*737*8*2#

Table 8: Heritage Bank USSD Codes

Option	USSD Code
Start	*745#
Transfer to same bank	*745*1*amount*account_number#
Transfer to other banks	*745*2*amount*account_number#
Airtime self	*745*amount#
Airtime others	*745*2*amount*phone_number#
Balance	*745*0#
BVN	*745*7#
Update BVN details	*745*7*1#
Stop debit transactions	*745*911#
Activate code	*745*00#

Table 9: Polaris Bank USSD Codes

Transaction	Polaris USSD Code
Main Menu	*833#
Buy airtime for yourself	*833*Amount#
Buy airtime for others	*833*Amount*PhoneNumber#
Transfer to Polaris Bank	*833*Amount*AccountNumber#
Transfer to Other Banks	*833*Amount*AccountNumber#
Check Account Balance	*833*6#
Pay Bills	*833*2#
Open New Account	*833*1#
Retrieve BVN	*565*0# (charges apply)
Block Account	*833*13#
Polaris Loan Services	*833*12#

Table 10: UBA Bank USSD Codes

Option	USSD Code
Start	*919#
Transfer to same bank	*919*3*account number*amount#
Transfer to other banks	*919*4*account number*amount#
Airtime self	*919*amount#
Airtime others	*919*Phone Number*Amount#
Balance	*919*00#
BVN	*565*0#
Pay your flight	*919*12#
Transfer to microfinance banks and mobile wallets.	*919*6#

Option	USSD Code
Transfer to your prepaid card	*919*32#
Account Opening	*919#

Table 11: Union Bank USSD Codes

Option	USSD Code
Start	*826#
Transfer to same bank	*901*amount*10 digit account number#
Transfer to other banks	*901*amount*10 digit account number#
Airtime self	*901*Amount#
Airtime others	*901*Amount*Phone Number#
Balance	*901*00#
BVN	*565*0#
Request for a loan	*826*41#
Purchase data	*826*9#
Request for ATM card	*826*21#
Cardless withdrawal	*826*7*amount#
To block an account on your phone number	*826*6#
To block accounts on other person's phone line	*826*6*mobile number#
Pay merchant(mCash)	*826*22*merchantcode*amount#
Block or Unblock ATM Card	*826*21#
Account Limit increase	*826*8#
Data capture after enrollment	*826*3*account number#

Table 12: Unity Bank USSD Codes

Option	USSD Code
Start	*7799#
Transfer to same bank	*7799*1*amount*account_number#
Transfer to other banks	*7799*2*amount*account_number#
Airtime self	*7799*amount#
Airtime others	*7799*2*amount*phone_number#
Balance	*7799*0#
BVN	*7799*8#
Update BVN details	*7799*8*1#
Stop debit transactions	*7799*911#
Activate code	*7799*00#

Table 13: Keystone Bank USSD Codes

Option	USSD Code
Start	*7111#
Transfer to same bank	*7111*Amount*Account Number#
Transfer to other banks	*7111*Amount*Account Number#
Airtime self	*7111*Amount#
Airtime others	*7111*Amount*Phone Number#
Balance	*7111*00#
BVN	*565*0# or *7111*6#
Activate USSD Banking	*7111*0#
Purchase Data	*7111*5#
Activate ATM Card	*7111*9*123#
Restrict Account	*7111*911# or *7111*911#

Table 14: Stanbic IBTC Bank USSD Codes

Service	USSD Code
Access Main Menu	*909#
Check Account Balance	9090#
Transfer to Stanbic IBTC Bank	909Amount*AccountNumber#
Transfer to Other Banks	909Amount*AccountNumber#
Buy Airtime for Self	909Amount#
Buy Airtime for Others	909Amount*PhoneNumber#
Pay Bills	*909# → Pay Bills
Open Stanbic IBTC Account	*909# → Open Account
Block Account / Card	*909# → Security Options

Table 15: Sterling Bank USSD Codes

Option	USSD Code
Start	*822#
Transfer to same bank	*822*Amount*Account Number#
Transfer to other banks	*822*Amount*Account Number#
Airtime self	*822*AMOUNT#
Airtime others	*822*AMOUNT*Phone Number#
Balance	*822*6#
BNV	*565*0#
Pay Bills	*822*BillerCode*UniqueCode*Amount#
Block & Manage Card	*822*19#
Cardless Withdrawal	*822*42#
Reset PIN	*822#, select Pin Reset
Check your account number	*822*8#
Account Opening	*822*7#
Pay Merchant	*822*28*AMOUNT*MERCHANTCODE#
Coral Pay Merchant	*822*000*RefNo#
MCash Merchants	*822*22*Sellercode*Amount#
LCC Toll Payments	*822*15#

Table 16: Zenith Bank USSD Codes

Option	USSD Code
Start	*737#
Transfer to same bank	*737*1*Amount*Account Number#
Transfer to other banks	*737*2*Amount*Account Number#
Airtime self	*737*Amount#
Airtime others	*737*Amount*Phone Number#
Balance	*737*6*1#
BNV	*565*0# or *737*6*1#
Account Opening	*737*0#
Cardless Withdrawal	*737*3*Amount#
Fast Track Deposit	*737*48*Amount*Account Number#
Data Purchase	*737*4#
Loan Balance	*737*6*2#
Card Status	*737*6*3#
Cheque Book Status	*737*6*4#
Generate OTP	*737*7#
Airtime Advance	*737*8*1#
Give	*737*32*Amount*Church Code#
School Fees	*737*31*Amount*School Code#
Pay Merchant (Checkout)	*737*35*Amount*Merchant Code#
Total Cashout	*737*50*Amount*50#
StarTimes Subscription	*737*37*Amount*SmartcardNo#
Swift Network Subscription	*737*50*Amount*4#
Salary Advance	*737*8*2#

Table 17: Wema Bank USSD Codes

Option	USSD Code
Start	*945#
Transfer to same bank	*945*Account Number*Amount#
Transfer to other banks	*945*Account Number*Amount#
Airtime self	*945*Amount#
Airtime others	*945*Phone Number*Amount#
Balance	*945*0#
BNV	*565*0# or *945*4#
Activate USSD code	*945*5#
Change PIN	*945*00#
Get your account number	*945*000#
Change Account Number	*945*2*Old Account Number*New Account Number#
Account Reactivation	*945*5#
Send money to phone	*945*6*amount#
Quick loan	*945*65#
Data Purchase	*945*9#
Account restriction	*945*911#
Manage your BVN	*945*4#
Cable TV menu	*945*10#
DSTV	*945*11# and *945*11*smartcardNO#

Option	USSD Code
GOTV	*945*12# and *945*12*smartcardNO#
Electricity bill	*945*24#
Internet service menu	*945*15#
WAEC (result checking)	*945*70#
JAMB (result checking)S	*945*71#
Mcash	*945*57# and *945*57*merchantcode*amount#
Coralpay	*945*58# and *945*000*REFno#
Account Opening	*945*1#

Summary of Banks USSD Code and Limitation

According to the research, USSD code innovation brought significantly excellent to financial inclusion in Nigeria. But, has discovered a gap, which this study attempts to address; the study examined some banks USSD code services in Nigeria, and observed that, one of the important aspect of the USSD code invention is missing (Complaint Option). This work seeks to address this gap by proposing to include the "Complaint Option" in the USSD service options. The methodology deployed is discussed in section VII.

MATERIALS AND METHODS

This research embraced a qualitative research method, because we actually want to know how quality is this USSD innovation as well as the limitations, the research examined various banks USSD code and their functions, also, we used JavaScript and PHP for the development, evaluation and implementation of the proposed system.

USSD Architecture

This section presents the USSD architectural process channel execution; this architecture is divided into three major functional layers: Telecommunication Layer, Service Orchestration Layers and Financial Statement Layer as discussed below (See Figure 1).

Telecommunication Access Layer

- Mobile User: Initiates a request by dialing a specific shortcode (e.g., *777#).
- GSM Network: Routes the wireless signal from the handset to the core network components.
- Core Network: (MSC, HLR, AuC)

- MSC (Mobile Switching Center): Manages call/session routing.
- HLR (Home Location Register): Validates user subscription details and profile data.
- AuC (Authentication Center): Verifies the security credentials of the SIM card.

Service Orchestration Layer

- USSD Gateway: The vital bridge converting telecom protocols into standard internet protocols (like XML over TCP/IP).
- USSD Application Server: Hosts the interactive logic, generating menus and parsing user keystrokes.
- WEB Browser: Provides an administrative portal for operations, configuration, and routine system maintenance.

Financial Settlement Layer

- Transaction Server: Receives processed input from the USSD server to manage the specific financial session.
- Payment Server: Coordinates funds transfers securely between banking systems.
- Payer & Payee Banks: The source account (debited) and destination account (credited) for the transaction.
- Clearing and Settlement: Performs end-of-day reconciliation and final ledger matching between financial entities.
- Content Provider: Third-party services integrated via TCP/IP to fulfill purchases (e.g., utility token delivery or airtime top-ups).

Figure 1 below shows the USSD channel architecture.

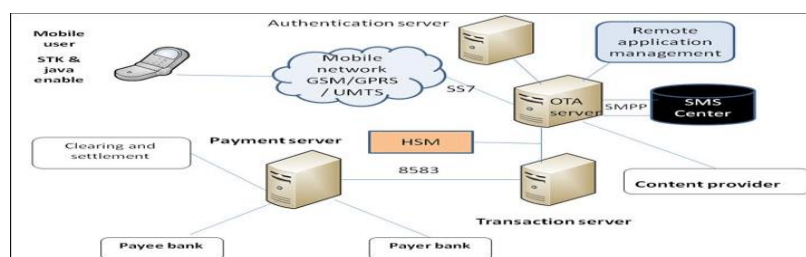


Figure 1: USSD Channel Architecture

USSD Gate Way

Unstructured Supplementary Service Data (USSD), at times referred to as "Quick Codes" or "Feature codes", it is a communications protocol used by Global System for Mobile Communication (GSM) cellular phones to communicate with the mobile network operator. USSD can be used for Airless Application Protocol (WAP) browser, prepaid callback service, mobile-money services, location-based content services, menu-based information services

Despite the advent of SMS messages, USSD messages create a real-time connection during a USSD session. The connection remains open, allowing a two-way exchange of a

sequence of data. This makes USSD more responsive than services that use SMS. Basically, there are 2 types of sessions;

- First is the one-time session that you input a code; the carrier replies a result and then session closed automatically.
- Second is standby session that you input a code, the carrier replies a menu and you could input an option. If you don't input, the session would keep alive until timeout. Or you could manually exit the standby session to perform other USSD session.

See the Figure 2 below.

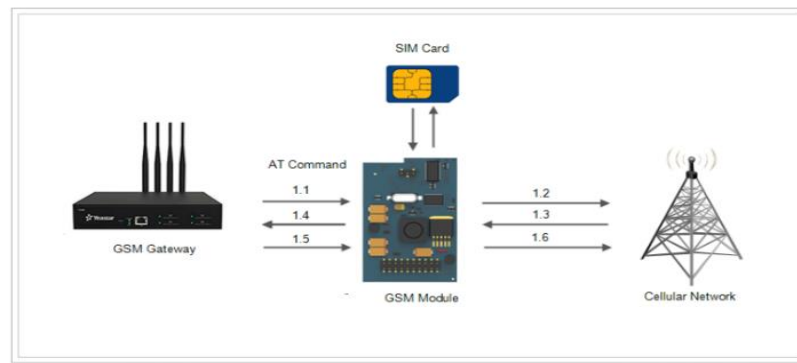


Figure 2: USSD Gateway

Proposed System Activity Flow Diagram

The Activity Diagram gives the Scenario of processes that is

happening in the backend during synchronization, see figure 3 below.

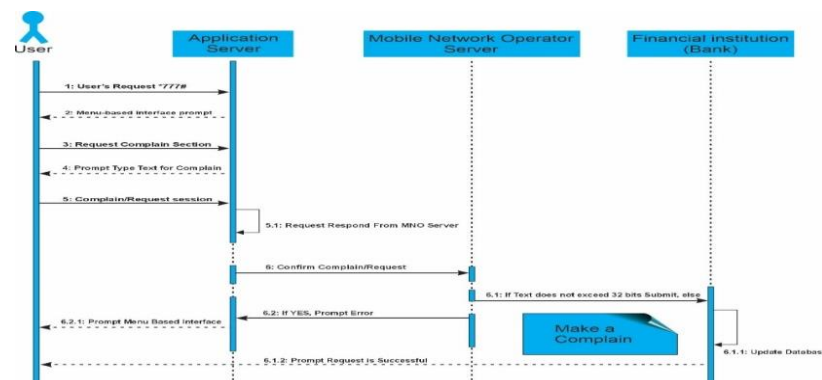


Figure 3: Proposed Activity flow Diagram

Proposed System Sequence Diagram

This section presents the proposed system sequence diagram

(Sequence Diagram is the systematic detail interaction of the system and its contents or components. See Figure 4 below.

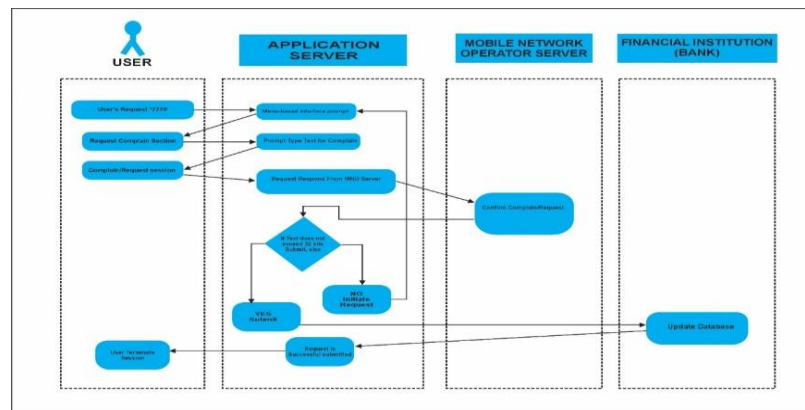


Figure 4: Proposed System Sequence Diagram

Proposed System

This section discussed the proposed system. Many banks have developed service Apps, which facilitates lots of services for customer's satisfaction; these banks have also introduced USSD to ease banking services for rural settlers. Here, we explained how the proposed system works; first, the system is aimed at adding complaint section in USSD systems, when the user dial the USSD *777#, the options promptly display, secondly, the user can select the option needed from the options displayed e.g. Complain, the system will guide the user to type the complaint in not more than 32bits, then the user will select submit and wait for the respond from the

application server as shown in Figure 4 above. See also section IX

RESULTS AND DISCUSSION

Implementation

Here, we present the proposed system and how its USSD modules function. The development of this system involves using PHP Framework and then hosting it on a web server. In order to create the database for our proposed system, MySQL database management system was adopted. See figure 5 below.



Figure 5: USSD Login and complain Request Menu

The figure 5 above, show how user attempt to login a complain, in this phase, the user is required to be carefully watching the menus' option so that he/she cannot submit

wrong option, when the user select option '5' and choose ok, the system will promptly take him/her to a page where he can select the service, he/she want, as shown in figure 6 below.



Figure 6: Menus for selection and complaint-typing

In this figure 6 above, after user select 'type complain' and allow to type his/her complain, the user will click submit to submit the complaint to the Bank database. Immediately if the

request is submitted successfully, the system will display the acknowledgement as shown in figure 7.



Figure 7: Acknowledgement for Successful complaint submission

CONCLUSION

USSD codes are a one-time session that improves financial inclusion in Nigeria, it is one of the fastest means of transaction today, this technology brought significantly excellent which driven financial inclusion and enhance global system of e-services. This system is aimed at adding a module-service that can give a customer an avenue to submit complaint in real-time without going to bank, the work observed the reason for the innovation of USSD codes of e-transaction to rural dwellers, since its allows them to bank and transacts, they should also have the means to complain and to feel party for financial inclusion in Nigeria. In order to create the database for our proposed system, MySQL database management system was adopted and we hope, Central Bank of Nigeria should implement this for Nigeria banks.

Recommendation for further research

We recommend that Central Bank of Nigeria should implement this for Nigeria banks, and financial institute should also embrace the system to ease their customer's stress to improve their banking services.

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