# Development of Smart Tax Payment and Monitoring System in Nigeria

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*Abstract:* **Tax and revenue generation are fundamental components of any government's ability to deliver public goods and services. In modern economies, taxes are the main revenue source for governments, however generating sufficient revenue by means of taxes depends on having a good tax administration system. In most developing countries, the tax system, especially in Nigeria has been characterized with fraud, tax evasion, inefficient collection processes, lack of transparency and maladministration. To overcome these challenges, the need for an efficient tax management and monitoring mechanism cannot be over emphasized. Hence, this work developed a Smart Tax Payment and Monitoring System (STPMS) model as an improvement over existing ones. To test the efficacy of the model, a system prototype was developed, employing traditional structured system analysis and design methodology (SSADM) built with hypertext markup language (HTML), and MYSQL database deployable on cloud. The system's performance was evaluated based on efficiency, reliability, security, user experience, and financial impact. The result showed a response time of 2seconds, 97% reliability, 95% fraud detection, at least 85% user satisfaction, and a 90% revenue collection efficiency rate. Tax evasion was reduced by 20%. This result suggests that the system performed well in both efficiency and fraud control. The model, if fully implemented, will improve how taxes are managed, increase public trust and conveniently handle the compounding issues and corrupt practices ravaging the entire tax system in Nigeria and other Sub-Saharan Africa.**

*Keywords:* **Tax Payment, Fraud Control, SSADM, Monitoring System, Government Revenue, Smart Tax.**

## I. INTRODUCTION

In modern economies, taxes have served as main source of governments' revenue to finance both her capital and recurrent expenditures (Enahoro & Jayeola, 2012). This includes public projects such as roads and schools, as well as services such as social security and healthcare (Gorton, 2023). According to Charles (2015), a tax is a mandatory financial charge imposed on an individual or legal entity by a governmental organization in order to collectively fund government spending and public expenditures. Every country has a tax system in place; most of these countries charge a tax on an individual's income as well as on corporate income. Taxes are not only to provide social amenities or to finance social projects, but it also contribute to the growth of Gross Domestic Product (GDP) of a country and economy stabilization which in turn has a ripple effect on the country's economy. The ratio of Tax-to-GDP is a useful tool for assessing the health of a country's tax system and potentials (NBS, 2022). However, in most developing economies, revenue from tax has been sparingly low, this is because the tax system in these countries are weak, as their system suffers from lack of modern facilities, inadequate and inexperienced personnel, mostly especially the system is characterized by fraud and other corrupt practices (Ogbonna & Appah, 2012; Bird, 2015).

According to Gupta & Agarwal, (2021), many tax systems still involve manual documentation and bureaucratic processes that result in inefficiencies, revenue loss, and fraud. However, advancement of digital technologies has opened up an opportunity to develop a smart tax system that integrates automation, transparency, and efficiency. In the recent, some governments around the world had embarked on tax reform administration in order to increase their tax generated revenue (Taliercio, 2004; Aminu & Eluwa, 2014). According to Owens (2006), tax administration reform has been described as a process by which government change the existing administration pattern, tax laws, and principles in order to enhance tax revenue collection. Strategies for proper management of taxation and effective administration include: simplification of tax structure reform and employment of appropriate model to achieve their set revenue goals and objectives (Abata, 2014), which is the main focus of this work.

## II. LITERATURE REVIEW

### 2.1 Overview of Tax and Revenue Generation

According to the World Bank (2023), collecting taxes and fees is a fundamental way for countries to generate public revenues that make it possible for her to finance her investments in human capital, infrastructure, and provision of services for citizens and businesses. During the 19th century the prevalent idea was that taxes should serve mainly to finance the government budgets and expenditures. But, today governments have been utilizing taxation for other than merely fiscal purposes including the way to regulate and reduce negative externalities (Charles, 2015). According to (Stiglitz & Rosengard, 2015), there are three main sources by which government raise revenue for the purposes of financing its expenditures. These sources include taxation, borrowing, grants and aids. The tax source includes non-tax, and capital receipts comprising of revenue received by the government from all available components of tax in a given country (Okafor, 2012). Non-tax revenue sources are aid from inter-governmental or another level of government. On the other hand, capital receipts include all revenue received by the government from investment made in other countries or investment within the country. Among these three sources, taxation is the most central because the level of government expenditure to a great extent is dependent on tax revenue which further relies on the ability and efficiency of tax administration to generate adequate revenue (Bird, 2005; Bird, 2007).

In Nigeria, the system of taxation recognizes three levels of authorities as set up by the law, that is: The Federal government (Federal Inland Revenue Service) - FIRS; State government (State Inland Revenue Service) - SIRS; and the Local government Revenue Committee who are in charge of tax collection in their respective domain. According to CBN (2022), Nigeria's revenue is largely derived from two sources: Oil and non oil revenue. Oil revenue refers to income derived from crude oil production, exportation, and related activities. Nigeria, as a major oil-producing nation, relies heavily on this source for its fiscal operations. Oil revenue contribution to Nigeria economy accounts for approximately 60-70% of total government revenue and over 80% of export earnings that makes up a significant share of the foreign reserves and federal budget funding (CBN, 2022; NBS, 2022). Non-oil revenue comprises all income earned by the government from sectors other than oil. This includes taxes, customs duties, and revenues from government-owned enterprises. Major Sources include: Taxes (Company Income Tax (CIT), Value Added Tax (VAT), Personal Income Tax (PIT), Capital Gains Tax (CGT), and Stamp Duties). Others include: Customs and Excise Duties, Fees and Licenses, Fines, Levies, and Interest Income, Dividends from State-Owned Enterprises. This provides stable and sustainable income not tied to commodity price fluctuations, but supports economic diversification and encourages development of other sectors like agriculture, manufacturing, ICT, and services.

### 2.2 Tax Administration and Tax Laws in Nigeria

Tax administration refers to the processes and institutions responsible for tax collection, enforcement, and compliance. In Nigeria, tax administration is overseen by multiple agencies, primarily the Federal Inland Revenue Service (FIRS) and State Boards of Internal Revenue (SBIRs) (Adebisi & Gbegi, 2013). The Federal Inland Revenue Service (FIRS) was established by the Federal Inland Revenue (Establishment) Act, 2017. It is established to administer the various Federal taxes as recognized by the relevant laws. This power includes power to assess, collect and account for revenues accruing to the Government of the Federation. According to Olusola (2020), in Nigeria, tax administration is carried out by the three tiers of government through the machineries set up by the respective government. The FIRS is the body statutorily empowered to administer and enforce the various tax laws in Nigeria at the Federal level. The States' Governments administer tax through the various State Boards of Internal Revenue, while the Local Government Revenue Committee of each State administers taxes at the local government areas.

Over the years, various tax laws in Nigeria have made provision for different taxes (Ola, 2001; FIRS, 2021). A review of the various tax laws presents an insight into the different taxes in Nigeria; for instance:

**1.   Companies Income Tax** (CIT): This is a tax imposed on profit of a company from all sources. It is one of the main taxes administered and collected by the Federal Inland Revenue Service (FIRS). Company's income taxes are regulated by the Companies Income Tax Act (CITA), Cap. C21, LFN 2004 (as amended). The rate on this tax is 30% of a company of total profit less all expenses for the period which a company reasonably incurred in generating the taxable profit.

**2.   Personal Income Tax** (PIT): This tax is imposed on income of individuals (employees), corporate sole or body of individuals, communities, families or trustees or executors of any settlement as the case may be. It also covers taxation of sole traders, partnership assessment, and taxation of estates. PIT is regulated by the Personal Income Tax Act Cap P8 LFN 2004 (as amended). The relevant tax authority responsible under the law to administer this type of tax may vary from the FIRS to the various State Boards of Internal Revenue.

**3.   Value Added Tax** (VAT): This is a tax charged on the sale of specified goods and services at the rate of 5%. It is also referred to as a consumption tax and it is mostly borne by the final consumer. The FIRS is vested with the power of administration and management of VAT in Nigeria. It is regulated by the VAT Act and the VAT (Amended) Act 2007. The Federal Government of Nigeria has approved a 50% increase in VAT for supply of goods and services, that is from 5% to 7.5%. The new rate took effect since 2020.

**4.   Capital Gains Tax** (CGT): This is a tax charged where there is a disposal of assets. Where any capital sum is derived from a sale, lease, transfer, assignment, compulsory acquisition or any disposition of properties classified as chargeable assets. It is regulated by the Capital Gains Tax Act, Laws of the Federation CAP C1 LFN, 2004 (as amended). CGT is usually charged at a flat rate of 10% on chargeable assets. CGT may not be charged from assets which are not in connection with any trade carried on by the organization. CGT is also not be applicable to charitable or educational institution of public character.

**5.   Withholding Tax** (WHT):

This is an advance tax payment deduction made on any income or disbursement due to a taxable person or a taxable corporation, for onward remittance to the relevant government authority. This tax when deducted from source is subsequently remitted to the relevant tax authorities. WHT in Nigeria varies and ranges from 2.5 to 10% for companies and 5 to 10% for individuals depending on the nature of the transaction. Section 78 of the Companies' Income Tax Act (as amended) provides that where a company makes a payment to another company or to another individual, either as interest (with interbank deposit and royalty included), rent, dividend, etc. such a company shall at the time of making the payment deduct an advance tax of 10% of the gross amount that is paid and remit such deducted and withheld tax to the FIRS forthwith.

**6.   Stamp Duties**: The Stamp Duties Act, CAP S8 LFN 2004 (as amended) regulates stamp duties in Nigeria. Stamp duties due from individuals are paid to the respective State Government, while corporate bodies pay theirs to the Federal Government. The stamp duties rates applied by FIRS are in two forms, namely; flat rate charges and add valorem charges. In line with the Federal Inland Revenue Service (Establishment) Act, FIRS is empowered to administer taxes for stamp duties listed in the first schedule to the Act. It is also administered by the respective States Internal Revenue Services (IRS).

**7.   Custom and Excise Duties**:

These are taxes charged at the Nigeria's Port of Entry on certain imported goods. It is usually administered and collected by the Nigerian Customs Service by virtue of the Customs and Excise Management Act. There are two types of taxes charged at the Nigeria Port of Entry; one is in certain imported goods and the other is on some exported good. Thus, custom and excise taxes are imposed on goods either for revenue purposes or to discourage consumption of such products. This is why it is a times referred to as consumption tax.

**8.   Education Tax** (EDT):

This tax is regulated by the Education Tax Act, CAP E4, Laws of the Federation of Nigeria, 2004 and administered by the FIRS. It is also governed by Tertiary Education Trust Fund (Establishment, Etc.) Act 2011. EDT is imposed on all companies registered in Nigeria. The rate of the tax is 2% of assessable profit. The amount in the Fund is distributed between Universities, Polytechnics and Colleges of Education in the ratio 2:1:1 respectively.

**9. Petroleum Profit Tax** (PPT):

This tax is imposed on income of companies in petroleum operations (Upstream). The tax is governed by the Petroleum Profits Tax Act, Cap P13 LFN 2004 (as amended). Companies liable to PPT are not liable to Companies Income Tax (CIT) on the same income. The administration of these laws involves assessment, collection and accounting for revenues accruing to the Government of the Federation.

Several models of tax administration to maximize tax revenue have been examined in the literature. Pantamee et al (2016), reported system-based and congruence model for tax revenue maximization. Other related studies of this nature are (Seera, 2005; Owens, 2006; Mansor, 2010; Abiola, 2012; Mansor, 2012; Sanni, 2019). Many of these papers explored how corruption within tax agencies affects tax compliance and revenue generation in Nigeria. They submitted that weak governance and bribery discourage taxpayers from fulfilling their tax obligations. However, in this paper, our work is focused on Smart Tax Payment and Monitoring System for an efficient tax management, fraud control and monitoring mechanism.

## III. METHODOLOGY

To achieve the objectives of this study, this section provides the research design, procedures, and techniques adopted. It outlines the systematic approach employed in the architectural design, data collection and development of the smart tax payment monitoring system.

### 3.1 Data Collection

The study uses a mixed-method, multi-stakeholder approach combining quantitative surveys, qualitative interviews focused on selected groups. Engaged direct process observation, document review, and pilot system telemetry collection. The goal is to gather comprehensive insights into taxpayer behaviour, administrative processes, and technical requirements for the development of a Smart Tax Payment and Monitoring System in Nigeria.

### 3.2 Architectural model of the Smart Tax Payment Monitoring System (STPMS)

Figure 1 and 2 depict the architectural model of the tax payment monitoring system and the systematic flow diagram of the system respectively. The Smart Tax Payment Monitoring System (STPMS) model was developed with six distinct and integrated modules known as: Registration/ Capture Module, Client Assessment/ Billing Module, Central Database and Checker Module, Integrated Payment Module, Certification and Report Module.
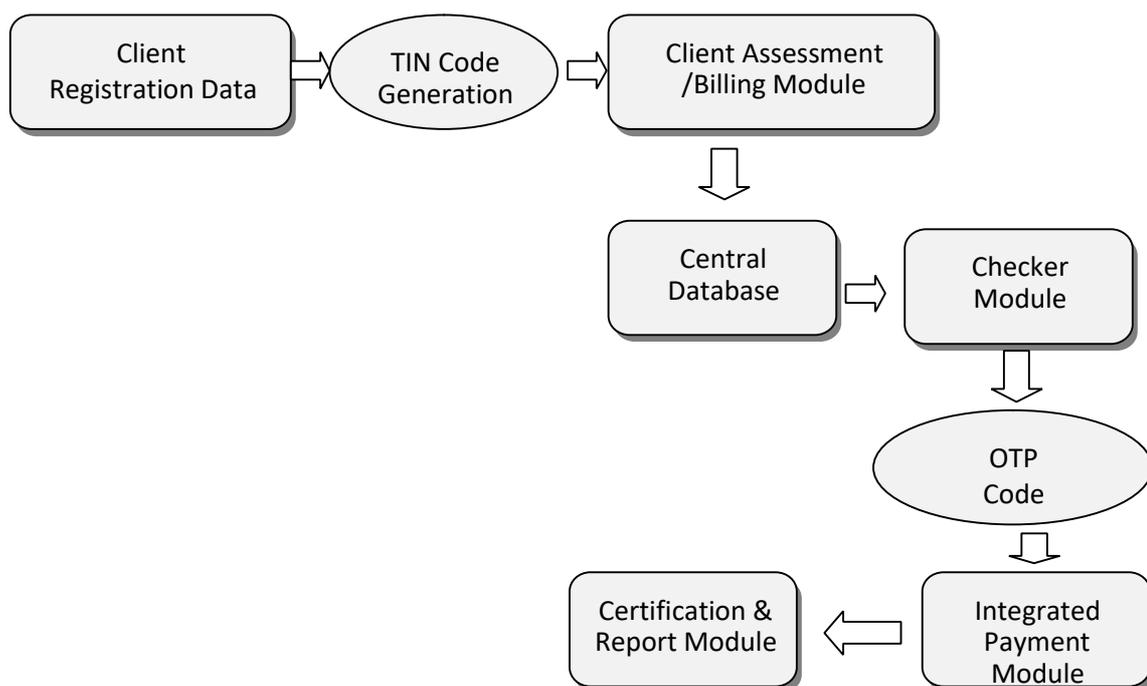


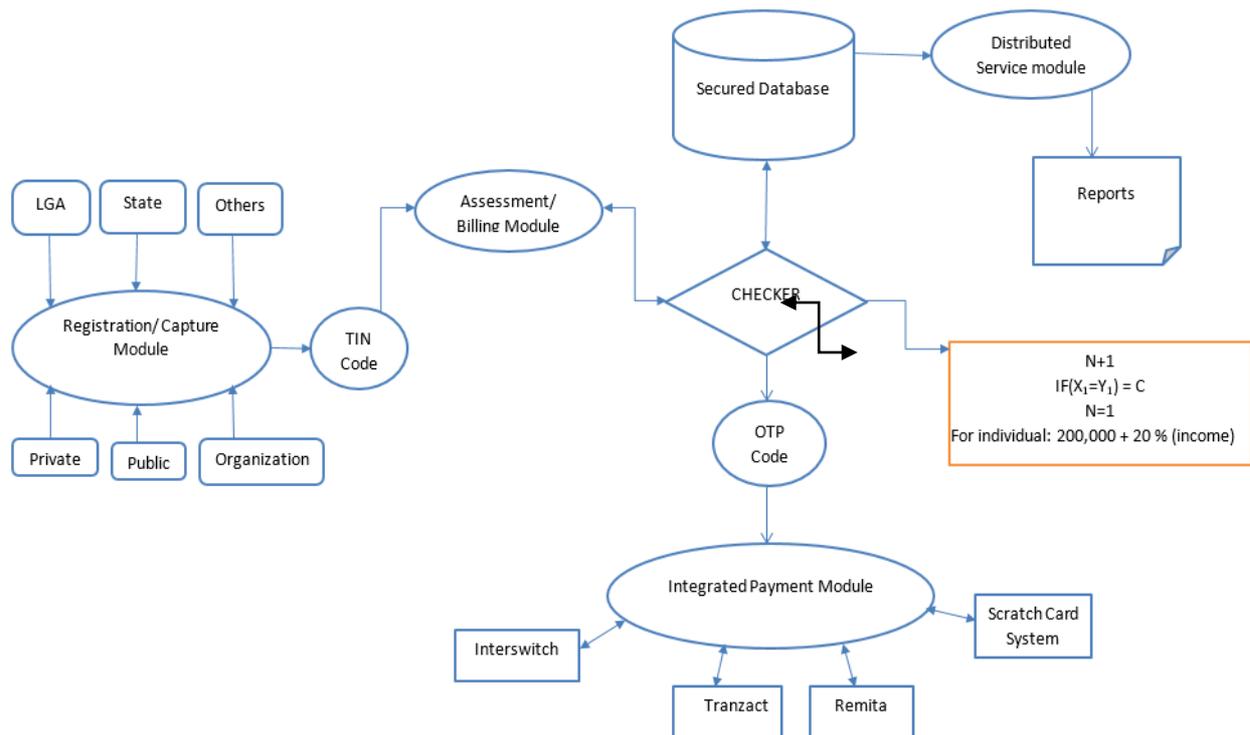**Figure 1: Architectural Model for the Tax Payment and Monitoring System**

**Figure 2:  The Systematic Flow Diagram of the System**

In the registration module, three categories of registration (individual, private and public organization) are being carried out in the system. Asset such as land, building, business, vehicle etc. can be captured with picture and biometric for individual. The taxpayer identifier number (TIN) is generated for registered individual and company. TIN is a unique ID preferably tied to biometrics useful for enumerating and organizing the taxable population. The registration Data Management Module is made up of relational database in which all the reference tables are defined and managed individually through the Create, Read, Update and Delete (CRUD) operations. Module two is the Assessment/Billing Module**:** The assessments are carried out based on the following revenue streams: Asset Types, Agencies and Agency Types. The third and fourth module is the Database and checker modules. These modules serve as the repository to all transactions and ensure that all transactions and payments are tracked. The tax checker module integrated is responsible for ensuring that the tax payers are well assessed and pay the required amount of tax billed. The checker operation is mathematically presented in equation 1.

$$N+1$$
$$IF(X1=Y1) = C$$
$$N=1$$
$$\text{For individual: } 200,000 + 20\% \text{ (income)}$$

……………………..equation 1

Tax payers that fail to pay the required amount of money will not be issued a receipt and once an assessment item is due or without payment, a notification note is sent to the taxpayer and the exception module is notified for the necessary action. Actions include generating demand notices and sending notification to the enforcement unit. When a tax payer initiate a payment, an OTP is generated, and when payment is successful,  issuance of receipts or certificate is triggered electronically by the distributed service module linked with the database with OTP generation. Module five is the Integrated Payment Module:  This module provides aggregation service for payment systems, and payment channels include: Remit, E- tranzact, Interswitch Webpay, Interswitch PayDirect, Interswitch QuickTeller, NIBBS e-bills, etc. seamlessly providing a payment platform that is flexible to meet the users need. Module six is the Certification and Report Module responsible for the issuance of receipts and certificates to the appropriate clients. The module also generates report for management consideration and decisions.

## IV. SYSTEM DESIGN AND IMPLEMENTATION

In order to test the efficiency of the model, a system prototype was developed, employing traditional structured system analysis and design methodology (SSADM) built with hypertext markup language (HTML), and MYSQL database. The coding was written using web and PHP storms. A web application performance tool (WAPT) and image editor was used to compliment this. (HTML 5) and Cascading Style Sheet (CSS) were used to design the front end, and a Hypertext Preprocessor (PHP), Structural Query Language (SQL) and MYSQL for the implementation of the back ends of the design. The model evaluation and system testing were conducted using functional test data and engagement of system specialists respectively to ascertain the quality, functionalities and reliability of the system model.

### 4.1 System Interfaces.

### 4.1.1 Login/ Home Page

Figure 3 depicts the Log in page. The login page gives a user privilege to access the home page and sign up by simply clicking onto the site www.ibkproject.tk/ by prospective client.
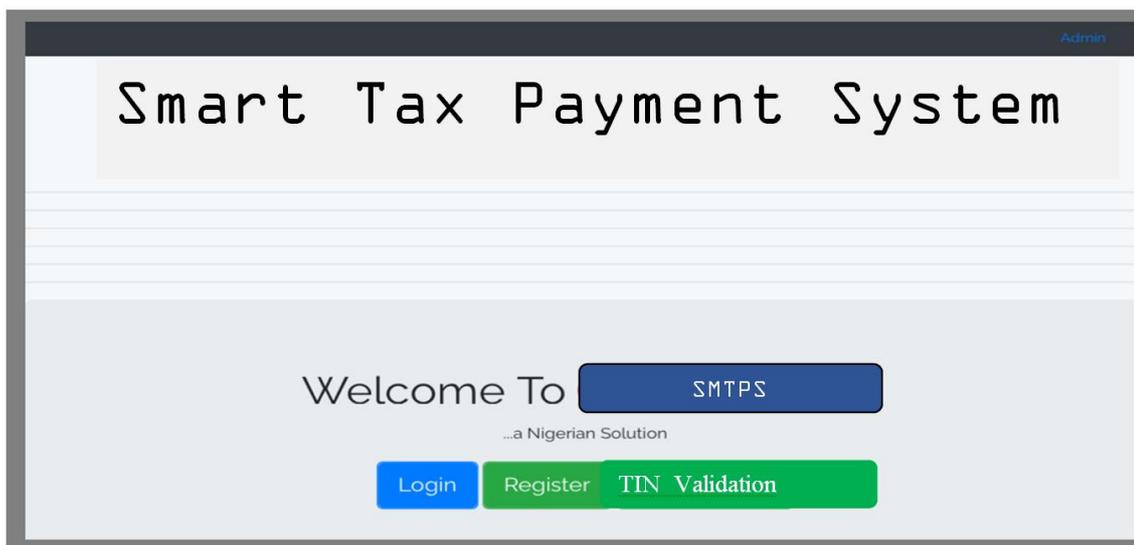


**Figure 3: Login page of the web based smart revenue system**

Figure 4 and Figure 5 depicts the registration and users' information as provided by the client respectively.
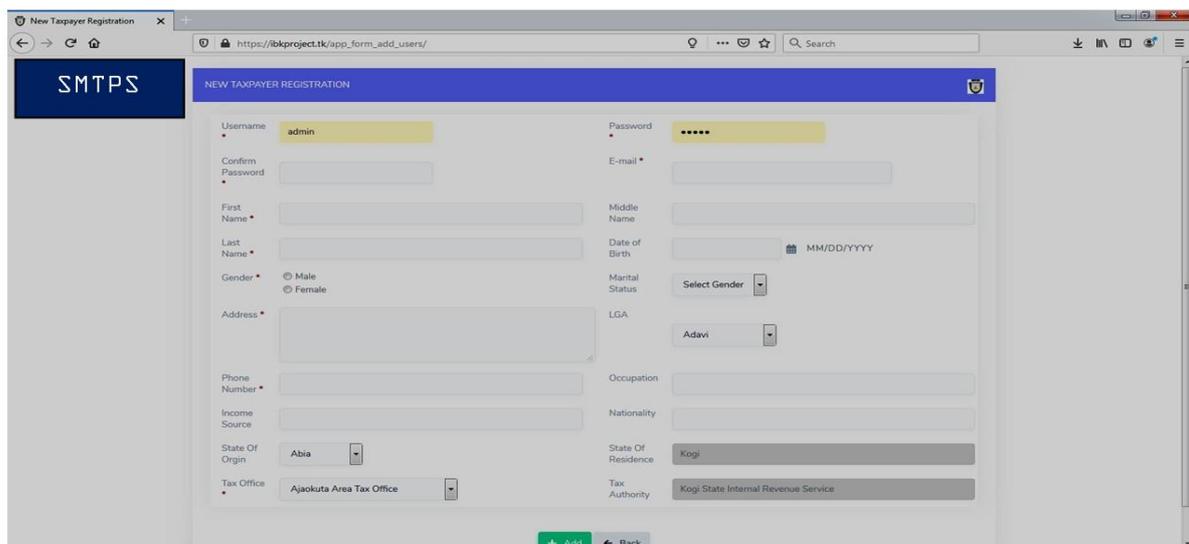


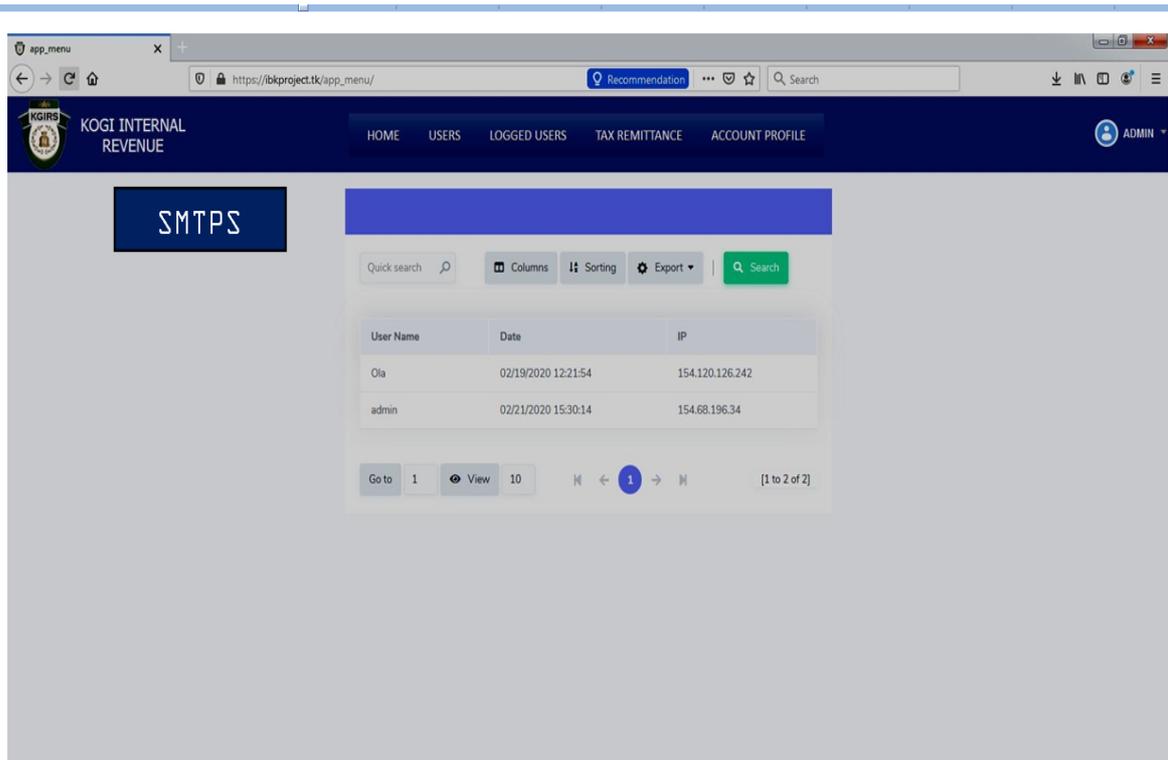**Figure 4: User's Registration for Information Uploads**

**Figure 5: User's Information**

### 4.1.2: Payment Information Module

Payment information in the smart revenue system involves displaying those that have paid their tax and those that have pending tax remittance as well as how to pay tax into the system.

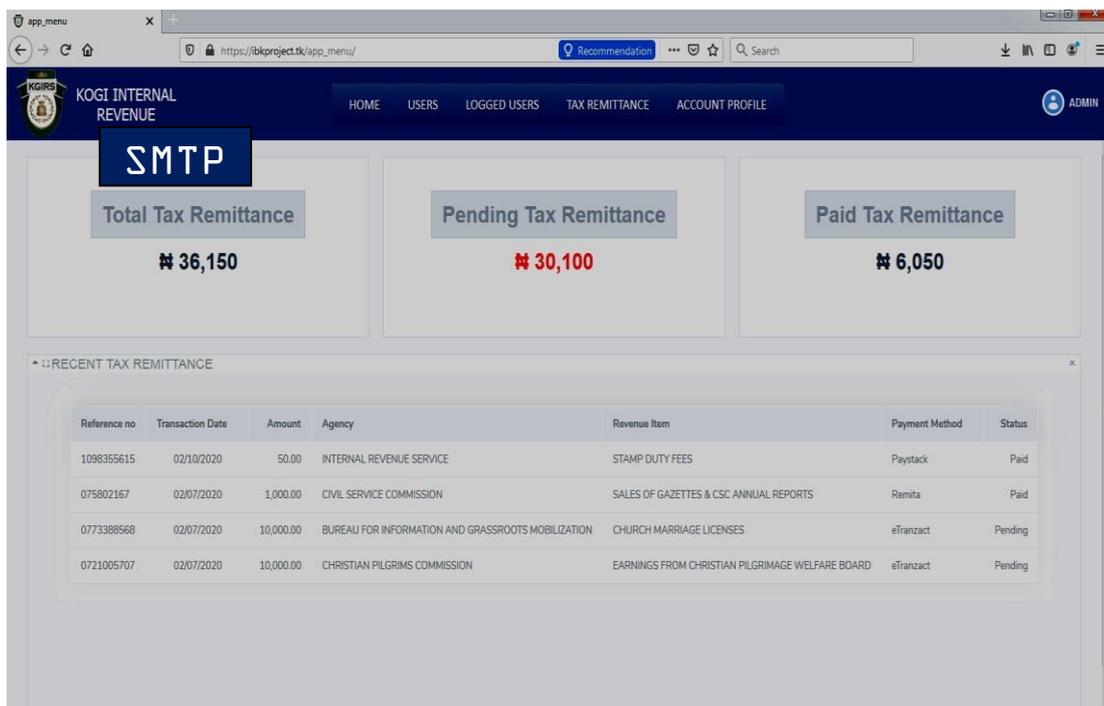Figure 6 shows the payment information page.



**Figure 6: Payment Information Page**

### 4.1.3 Payment Notification and Receipt

When a client made a payment via any payment mode, the client receives a notification and a printable receipt is generated for the payment automatically. Figure 7 shows the payment information and receipt for any payment made.
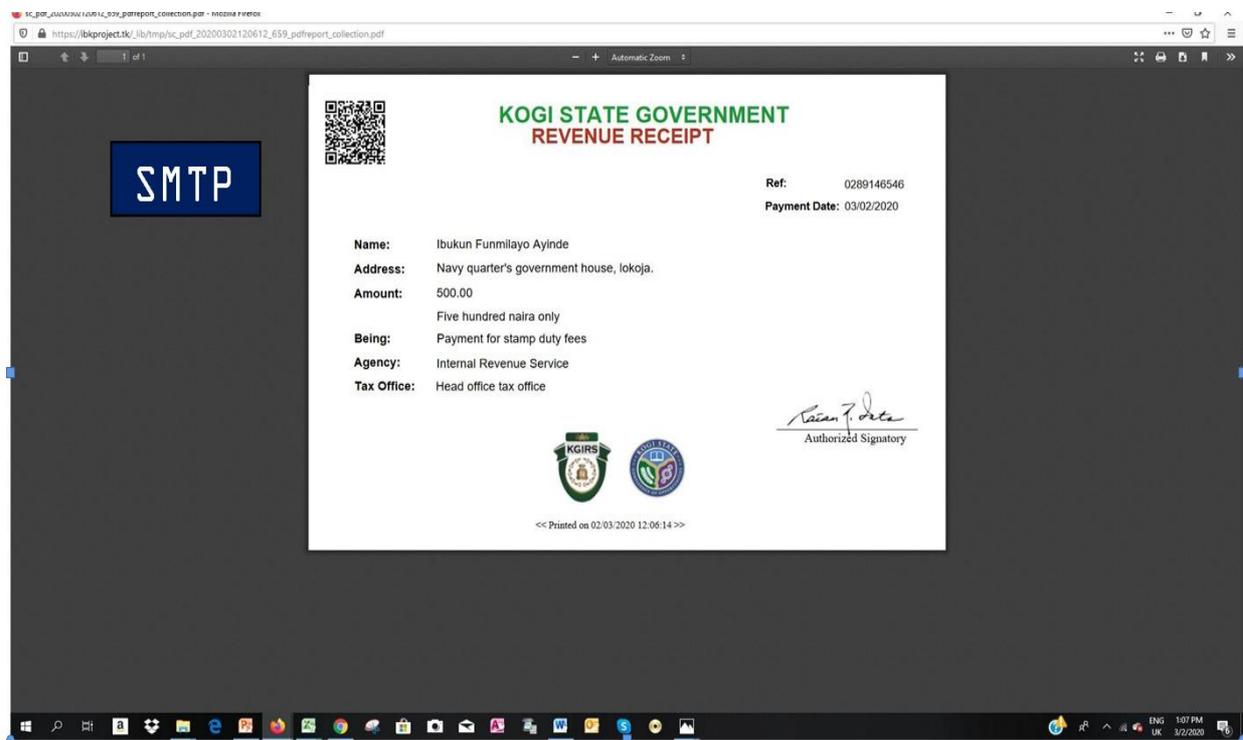


**Figure 7: Payment Information and Receipt**

### 4.2 Performance Evaluation of the System

Generally, Computer System performance metrics include response time, latency, completion time, service time, throughput, relative efficiency, reliability etc. The system's performance in this work was assessed based on efficiency, reliability, security, user experience, and financial impact. The response time was 2seconds, with a reliability of 97%. Fraud detection reached 95%, user satisfaction was at least 85%, and the revenue collection efficiency rate was 90%.. These results suggest that the system can improve tax management and increase public trust.

### 4.3 Hardware and Software Requirements

The smart revenue system developed is compatible with Mozilla Firefox and any of the latest operating systems. The minimum hardware requirement of the smart revenue system is 1.6 GHZ processor and above, 2GB RAM and above and hard disk size of 500 GB.

## V. CONCLUSION

This study has demonstrated that the development of a Smart Tax Payment and Monitoring System (STPMS) provides a viable solution to the persistent challenges facing tax administration in Nigeria. The system prototype which was developed by integrating structured system analysis and design methodology (SSADM) with modern technologies such as HTML and MySQL effectively enhanced the efficiency, reliability, transparency, and fraud detection within tax processes when tested. The evaluation results indicate that the model significantly outperforms the traditional system. The findings further affirm that the deployment of an innovative and technology-driven approach to tax administration will not only improve revenue generation but also strengthen public confidence in the government. If fully implemented, the STPMS has the potential to mitigate corruption, curb tax evasion, and foster a more sustainable and accountable tax management framework not only in Nigeria, but in other Sub-Sahara African tax system. However, the work opens doors for future enhancements, using more inputs, larger databases and other viable features.

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