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Information Communication Technology and Effective Tax Administration in Nigeria

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ABSTRACT

The aim of the study is to investigate the relationship between information communication technology (ICT) and effective tax administration, with Nigeria as a reference point. This is against the backdrop of the need to evaluate the workings of the current Nigeria tax system in readiness for digital transformation of the system which is becoming the global best practice. The study adopted the explanatory research design with the aim of isolating the causal relationship between information communication technology tools and effective tax administration. The population of the study is the 28,320 tax professionals registered with the Chartered Institute of Taxation of Nigeria as at June 2025. The sample size of 394 was scientifically determined using the Yamane (1977) approach. The primary source of data was adopted, with the aid of a questionnaire administered using the Google form. The univariate analysis, bivariate, and multivariate analyses were achieved using the multiple regression analysis. The result of the study shows a positive and statistically significant relationship between electronic payment, electronic tax clearance certificate, tax identification number, TaxProMax software solution and effective tax administration in Nigeria. The relationship between electronic receipt and effective tax administration was positive but not statistically significant. Without doubt, the study has advanced a methodological contribution to extant literature. Among others, this is about the very first attempt at crystalising the relationship between TaxProMax software solution and tax administration in Nigeria. Against the backdrop of the findings, the study recommends improved infrastructure in the payment system to avoid issues of network problems that usually crop up several times in payment platforms. In addition, the electronic tax clearance system should be improved upon through inter-agency collaboration such that digital transmission can be enhanced instead of the current download and submit. In addition, taxpayers' identification should be unified, instead of the current practice of multiplicity of identification in Nigeria. Finally, continuous improvement in the TaxProMax software solution is advised and there should be vigorous inclusive taxpayers' education on the use of the software.

Keywords: TaxProMax, Effective Tax Administration, Tax Identification Number, Electronic Payment

INTRODUCTION

The role of Information Communication Technology (ICT) in enhancing tax administration has gained significant attention in recent years, particularly in developing countries like Nigeria. Effective tax administration is crucial for mobilizing domestic revenue, which is essential for funding public services and fostering economic development. However, Nigeria's tax system has been plagued by challenges such as low tax compliance, inefficient tax collection, and widespread tax evasion (Adenugba & Ogechi, 2013; Odusola, 2017).

The integration of ICT into tax administration has been recognized as a key strategy for addressing these challenges (Alabede, 2012; Oladipupo & Obazee, 2016). ICT can automate and streamline various tax administration processes, such as tax registration, assessment, collection, and reporting, thereby improving efficiency, transparency, and taxpayer compliance (Eiya & Akhor, 2015; Onyekachi & Nwaiwu, 2018). Additionally, the use of digital platforms and e-filing systems can enhance taxpayer engagement, reduce administrative costs, and minimize the opportunities for corruption (Onu & Oats, 2014; Yusuf, 2017).

Therefore, in recent years, the Nigerian government has made significant efforts to implement ICT solutions in its tax administration. The Federal Inland Revenue Service (FIRS) has introduced various digital initiatives, such as the Integrated Tax Administration System (ITAS), the e-Tax platform, and the Tax Identification Number (TIN) system, to streamline tax processes and improve tax compliance (FIRS, 2021; Yusuf, 2017).

Nigeria has also embraced the global trend of digitalizing tax administration. The country has implemented digital systems and digital IDs in its tax processes. The 2017 tax reforms resulted in the introduction of six electronic tax services by the Federal Inland Revenue Service (FIRS) which is designed to enhance compliance and ease of tax remittance. These e-services include e-registration, e-stamp duty, e-tax payment, e-receipt, e-filing, e-tax clearance certificate and TaxProMax. The introduction of the Integrated System of Tax Administration (ITAS) was Nigeria's initial step towards digitizing tax revenue collection, with the goal of facilitating efficient information sharing and data exchange among the relevant tax authorities and other stakeholders

(Mas'ud 2019). However, the implementation of ICT in Nigeria's tax administration has faced several challenges, including inadequate infrastructure, limited digital literacy among taxpayers, and resistance to change from traditional tax administration practices (Alabede, 2012; Odusola, 2017). Nevertheless, the successful integration of ICT in tax administration can present significant opportunities, such as enhancing revenue mobilization, reducing administrative costs, and promoting taxpayer trust and compliance (Oladipupo & Obazee, 2016; Onyekachi & Nwaiwu, 2018).

Effective tax administration is crucial for governments to generate the necessary revenue to fund public services and support economic development. In recent years, the integration of information communication technology (ICT) has emerged as a critical enabler for enhancing the efficiency and effectiveness of tax administration (OECD, 2016). This study aims to explore the role of ICT in improving tax administration and review the latest research and empirical evidence on this topic.

The effectiveness of tax administration in Nigeria is hindered by inefficiencies and limitations in traditional manual systems, resulting in revenue losses, compliance challenges, and poor taxpayer services. Despite the potential of Information and Communication Technology (ICT) to enhance tax administration, the adoption and utilization of ICT tools such as e-payment, e-tax receipt, e-tax clearance certificate, Tax Identification Number (TIN), and TaxProMax remain underexplored. This study aims to investigate the impact of ICT on effective tax administration, exploring how these technologies can improve taxpayer compliance, reduce tax evasion, and enhance revenue collection.

LITERATURE REVIEW

Conceptual Framework

Effective Tax Administration in Nigeria

In compliance with Section 87 of the Personal Income Tax (Amendment) Act (2011), each State in Nigeria must establish a revenue board to administer taxes and levies. Tax administration encompasses all activities by tax authorities to implement government tax policies and laws. It involves core functions such as taxpayer registration, awareness, tax processing, audits, fraud investigations, appeals, and debt recovery and support functions including IT deployment, legal services, HR management, budgeting, procurement, strategic planning, and internal audits. Both functions must be effectively integrated for efficiency.

Tax administration in Nigeria entails tax assessment, collection, accounting, and enforcement of tax laws and policies (Akintoye & Tashie, 2013). It refers to the organs and agencies responsible for policy implementation (Abiola & Asiweh, 2012), operating at federal, state, and local levels (Akinbobola, 2021). State governments handle taxes from residents, except for armed forces personnel, foreign mission employees, and FCT residents.

The Federal Inland Revenue Service (FIRS) has improved collection and enforcement mechanisms through technology and data analytics (OECD, 2021), alongside better coordination with State Internal Revenue Services (The World Bank, 2021). Reforms have enhanced tax transparency via tax expenditure reports and taxpayer education (Deloitte, 2022), though accountability and corruption challenges persist (Transparency International, 2021).

Efforts to strengthen dispute resolution include the Tax Appeal Tribunal and alternative dispute resolution options (KPMG, 2021), yet concerns remain regarding efficiency and fairness (The World Bank, 2021).

Nigerian Tax System

Nigeria Tax System is a system that is characterized with tax policies, tax laws and as well as tax administration. These policies and laws are expected to work together in concord with one another in order to achieve the overall objective for economic growth of the country. However, the presidential committee set on National tax policy in (2008), the overall focus and primary objectives of Nigeria tax system is to provide and contribute to the social and economic wellbeing of Nigerian. This is to be done either directly by improving existing and formulating new tax policies, and indirectly to appropriately make optimum utilization of tax generated from revenue for the benefit and development of the citizen. In order to achieve these objectives through the revenue generated, therefore, the tax system was expected to minimize the economy distortion in the country.

Tax Reforms in Nigeria

According to PricewaterhouseCoopers (PwC, 2022), recent tax reforms in Nigeria have focused on revenue mobilization, tax base expansion, and system efficiency. Key reforms include the Voluntary Assets and Income Declaration Scheme (VAIDS), a 9-month tax amnesty program that encouraged voluntary disclosure of undeclared assets and income, thereby broadening the tax base. The Value Added Tax (VAT) rate was raised from 5% to 7.5% to diversify revenue beyond oil.

The Stamp Duty Act was revised to cover more transactions, such as electronic receipts, money transfers, and teller deposits, thereby boosting non-oil revenue. Tax incentive reforms reduced or eliminated some tax holidays and waivers to limit revenue leakages and enhance efficiency. Additionally, Nigeria introduced measures to improve the ease of paying taxes, notably through the Integrated Tax Administration System (ITAS), which automated processes and strengthened taxpayer–tax authority communication.

Overall, these reforms represent significant steps toward broadening Nigeria's tax base and improving domestic revenue generation (PwC, 2022).

However, The Nigerian government has undertaken various tax policy reforms in recent years, such as the introduction of the Taxpayer Identification Number (TIN) system and the implementation of the Voluntary Assets and Income Declaration Scheme (VAIDS) (KPMG, 2021). The government has

also focused on broadening the tax base, reducing tax evasion, and improving tax compliance through initiatives like the Integrated Tax Administration System (ITAS) (PwC, 2022).

Electronic Tax System in Nigeria

The electronic tax system enables tax collection online through internet-based platforms, allowing taxpayers to register, file returns, and apply for compliance certificates. Introduced in Nigeria in 2013, it offers services such as e-Registration, e-Payment, e-Filing, e-Receipt, e-Stamp Duty, Tax Identification Number, TaxProMax, and e-Tax Clearance Certificate (Akpubi & Igbekoyi, 2019; Deloitte, 2017). Payments are made via NIBSS, Remita, or Interswitch. To enhance efficiency, the Federal Inland Revenue Service launched the Integrated Tax Administration System (ITAS) in 2016 (Fowler, 2017), which automates tax offices and supports multiple languages, covering income tax, VAT, PAYE, excise duty, withholding tax, and others.

Procedures for E-Taxation Utilisation in Nigeria

According to Umenweke and Ifediora (2016), e-taxation in Nigeria involves six key procedures: electronic registration, where taxpayers complete forms online; tax identification number (TIN) verification and issuance, providing each taxpayer with a unique TIN; electronic filing, where returns are submitted online and acknowledged by email; tax payment, either manually at banks or electronically via mobile and internet platforms; electronic confirmation issuance, where tax authorities generate an invoice as proof of payment; and finally, tax refund, where excess payments are either refunded electronically or credited against future tax obligations. These procedures enhance transparency and efficiency in tax administration.

Benefits of Electronic Tax System

Awai and Oboh (2020) note that Nigeria's electronic tax system is a significant FIRS reform addressing challenges of manual taxation. It eases tax payment through ITAS, reduces time and paperwork, and improves administration efficiency and revenue generation. The system ensures safer data storage, enhances reliability, accountability, and taxpayer trust, lowers collection costs, and promotes voluntary compliance by providing convenience and maintaining a reliable taxpayer database.

Challenges of ICT in Nigeria's Tax System

The e-tax system faces challenges such as low computer literacy, resistance to change, poor internet accessibility, and limited public awareness. Additionally, concerns over data privacy and security persist, as mishandling taxpayer information may trigger lawsuits. These issues hinder adoption and efficiency despite enlightenment efforts by FIRS (Umenweke & Ifediora, 2016; Deloitte, 2017).

e-Payment

Electronic payment (e-payment) enables cashless transactions, reducing compliance costs and delays in manual tax payments (OECD, 2017). Its growth is fueled by digital wallets, rising from 33% in 2019 to 46% in 2021 (Capgemini, 2021), mobile payments projected at $2.5 trillion by 2024 (Statista, 2022), and secure innovations like biometrics (Markets & Markets, 2021). Increasing internet banking and commerce further drive adoption (Sandra, 2021).

E-Receipt

An electronic receipt (e-receipt) is a digital proof of transaction delivered via email or mobile apps, offering easier organization and integration with digital records (Omnichannel-Strategies, 2019). In Nigeria's e-tax system, e-receipts verify tax payments, providing instant notifications that enhance compliance, reduce evasion, and improve collection efficiency (Uguagu et al., 2023).

e-Tax Clearance Certificate

An e-tax clearance certificate is a digital document certifying that taxpayers have met obligations, required for licenses, registrations, and government tenders (Forbes, 2018). It enhances accessibility, reduces paperwork, and improves compliance monitoring. Studies show it promotes transparency, accountability, and revenue generation (Bergner et al., 2019). Despite challenges of data security, infrastructure, and awareness, these issues present opportunities for investment, education, and inter-agency collaboration (Alm et al., 2020).

e-Tax Identification Number

A Tax Identification Number (TIN) is a unique identifier issued by tax authorities after verifying taxpayer information (Nwoke & Onah, 2023). It enables tracking of taxpayers, processing returns, and ensuring compliance. Essential for individuals and businesses in tax filings and financial transactions, the TIN ensures accurate attribution of income and deductions. Confidentiality is crucial to prevent fraud, while guidance should be sought from tax professionals or relevant authorities.

TaxProMax

TaxProMax is sometimes used as a fictional tax software in training and presentations to illustrate tax preparation processes. However, **TaxPro-Max** is also the latest automated tax administration solution launched by FIRS on June 7, 2021, under the Finance Act 2020, replacing SIGTAS and ITAS (The Chartered Institute of Taxation, 2022). It offers taxpayers registration, filing, remittance, assessments, withholding tax management, capital allowance, loss management, and electronic tax clearance certificate downloads. Filing generates a Document Identity Number (DIN), required for tax payments (http://www.taxpromax.firs.gov.ng/). Manual submissions must be uploaded by FIRS staff, with taxpayers advised to submit early to avoid delays.

Benefits of TaxProMax in Nigeria

TaxProMax enhances convenience by enabling taxpayers to file returns and pay liabilities digitally, reducing in-person visits, costs, and errors, though some consider it overly detailed (www.businessday.ng, 2023). It provides a centralized system for tax collection and management, allowing real-time tracking, improved taxpayer database, and accountability (www.businessday.ng, 2023). The platform promotes tax compliance, with FIRS reports showing increased revenue partly due to its use; it also allows payments on account to avoid penalties for late filings (www.businessday.ng, 2023). Overall, TaxProMax boosts revenue collection while lowering enforcement costs through technological efficiency.

Shortcomings of TaxPro-Max

i. The TaxPro-Max is not yet configured to file corporate income tax returns for insurance companies and upstream oil and gas companies.

ii. Some of the declaration filing processes are repetitive and can be further compressed.

iii. The TaxProMax platform only recognizes Naira (NGN) as the reporting currency.

iv. A correction or change of tax returns is not intended.

v. The platform does not provide for payment in installments.

vi. Payment is expected within 24 hours after the initiation of payment / generation of the Remita Retrieval Reference (RRR) Number is completed.

vii. The platform does not create a message for the user after the registration process has been completed.

viii. The confidentiality and security of the taxpayer's information on the TaxPro Max are not adequately considered.

Conceptual Framework

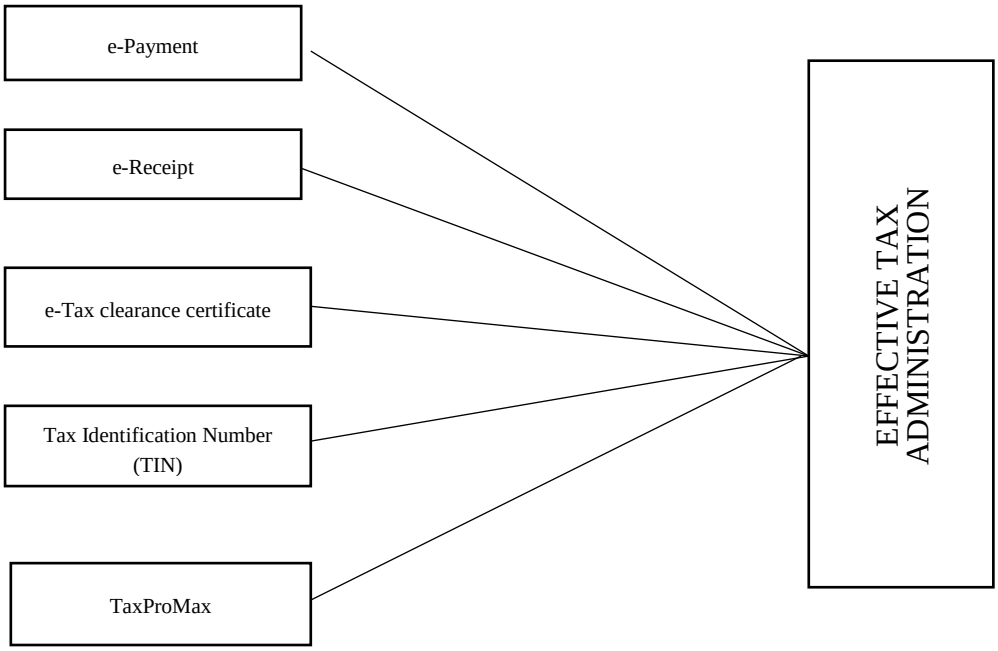

Figure 1: Conceptual Framework

Source: Researchers compilation, (2025)

Theoretical Framework

Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM), developed by Davies (1989) and later refined by Venkatesh and Bala (2008), explains how individuals accept and use technology. The theory emphasizes two key constructs: perceived usefulness (PU) and perceived ease of use (PEOU). PU reflects the extent to which an individual believes a system enhances job performance, while PEOU denotes the degree to which the system is free of effort (Davies, 1989). Both PU and PEOU shape attitudes toward technology, which influence behavioral intention and actual system use. Additionally, PEOU directly influences PU, while external variables also affect both constructs. TAM is one of the most influential models in information systems research, widely applied across organizational and user settings to predict technology adoption and acceptance. It has been particularly valuable in studying determinants of information system acceptance and comparing user groups. Measurement items typically include ease of use, usefulness, attitude, and behavioral intention, often framed as “Using (electronic tax system) would enhance my effectiveness” or “It is easy for me to use (electronic tax system).” Despite

its workplace focus, TAM is relevant to this study as it explains taxpayers' behavior toward adopting e-taxation, enhancing understanding of compliance and technology acceptance.

Empirical Review

An electronic tax payment (E-tax payments) has to do with the use of electronic means in the collection and payment of tax. It refers to collection and administration of tax through electronic means. The collection of revenue through electronic medium has gained much prominence recently in developing countries of the world (Nwabachili, et al., 2024). At this point, when the amount of money to be paid as tax is ascertained, the taxpayer either goes to the designated bank of the revenue authority to pay manually or pays electronically by transferring the amount due from his account to the designated bank account through his mobile banking app, the internet, or master/credit card. Where the bank confirms payment, an alert is sent to the tax authority which subsequently generates an electronic invoice. Nwabachili, et al. (2024) observed that the introduction of electronic tax payment system has relatively enhanced tax compliance in Nigeria, Kenya and Tanzania.

The idea that the digitization of transactions through electronic payment technology can help increase tax compliance has been prominent in academic circles (Rogoff, 2016), in the policy advice provided by international organizations (OECD 2018; Gupta et al., 2017; World Bank 2016), and it is reflected in actual policy implementation, most prominently in India's 2016 demonetization campaign (Das et al. 2022). Unlike cash transactions, electronic transactions are processed by a third-party, distinct from the two transacting partners, creating a paper trail which governments can access for tax compliance purposes.

Monica, et al. (2017) in their study on the "Effects of Electronic Tax System on Tax Collection Efficiency in Domestic Taxes Department of Kenya Revenue Authority (KRA), find out that most tax payers strongly agreed that they were able to fully access and operate E- Tax system. Employee competence (X3) was a significant predictor of the tax collection efficiency.

Statista. (2022) examined Global mobile payment transaction value from 2019 to 2024 and find out that the global mobile payment transaction value is expected to reach $2.5 trillion by 2024, up from $1.3 trillion in 2019.

Mendes et al. (2021) found that the implementation of e-payment systems in Brazil led to a reduction in the processing time of tax returns, improved data accuracy, and reduced administrative costs for the tax authority. Similarly, Onyiriuba et al. (2020) reported that the use of e-payment in Nigeria has resulted in faster processing of tax payments, reduced leakages, and increased revenue collection.

Alm, et al. (2015) examined the impact of e-receipts on tax compliance in Ecuador. The study found that introducing e-receipts led to a significant increase in tax compliance rates among small businesses. Another study by Engström and Nordblom (2013) evaluated the effectiveness of e-receipts in Sweden. The study concluded that e-receipts improved tax compliance by providing more accurate and timely information to tax authorities.

However, recent advancements in technology, such as blockchain and digital payment systems, have further improved the feasibility and implementation of e-receipt systems in tax administration. These technologies offer secure and transparent transaction records, making it easier for tax authorities to monitor and verify transactions.

Chijioke, et al. (2018) looked at the impact of e–taxation on Nigeria's revenue and economic growth: a pre–post-analysis. Using secondary data obtained from Federal Inland Revenue Service, Central Bank of Nigeria Statistical and Economic Reports quarterly, covering the second quarter of 2013 to the fourth quarter of 2016. The outcome revealed that despite the implementation of electronic taxation, tax revenue has not improved in addition to federally collected revenue & tax-to-GDP ratio in Nigeria. However, the findings also revealed that the federally collected revenue and tax-to-GDP ratio significantly decreased following the implementation of e-taxation. Also, Tax Revenue decreased after the implementation, but the mean difference was not statistically significant.

Ayodeji (2014) examined the impact of electronic tax systems on tax administration in Nigeria. The aim of this study was to assess the impact of electronic taxation on tax administration in Nigeria. The researcher argued that declining global wealth has drawn the attention of the government and key players in the country to locally generated revenue due to the fall in the price of crude oil, the main source of wealth for Nigeria. But the daunting task of increasing internally generated revenue requires the adoption of electronic tax system technology to advance tax administration in the country. It is a change agent for accelerated growth and poverty reduction in Nigeria and across the African continent as a whole.

Olatunji and Ayodele (2017) examined the impact of information technology on tax administration in South West, Nigeria. The study specifically investigated the effect of information technology on tax implementation and planning. Data was collected through the means of structured questionnaires, while multiple regression and Pearson product moment correlation were used to analyze the data. Findings from the analysis revealed that information technology enhance the level of tax productivity and administration. The study recommended respective agencies (Federal, State and Local Governments) responsible for tax collection should carry out one on one awareness in the form of seminars and sensitization of the process and suitability of information technology on tax administration.

Chen, et al. (2021) conducted a study examining the implementation of E-tax clearance certificates in a developing country context. Their research found that the introduction of electronic clearance certificates significantly reduced the time required for tax compliance verification and increased the number of compliant taxpayers. This improvement in efficiency translated into a noticeable increase in tax revenue collection over the studied period.

Kim, et al. (2020) conducted a comparative study on the effectiveness of E-tax clearance certificates in two different countries with varying levels of digital infrastructure. Their findings revealed that while the adoption of electronic clearance certificates led to improved tax compliance rates in both

countries, the impact was more significant in the country with advanced digital capabilities. This suggests that technological readiness plays a crucial role in maximizing the benefits of E-tax clearance certificates. Singh and Sharma, (2019) investigated the challenges and opportunities associated with E-tax clearance certificates in a sample of small and medium enterprises. Their research highlighted the importance of taxpayer education and support in enhancing compliance with digital tax procedures. The study also underscored the need for continuous monitoring and evaluation of E-tax clearance certificate systems to ensure their effectiveness in promoting tax compliance.

Tax Identification Numbers (TINs) have been recognized as a critical component of efficient tax administration globally. A recent study by the International Monetary Fund (IMF, 2020) found that the implementation of comprehensive TIN systems can significantly improve tax compliance and revenue mobilization, particularly in developing countries. Ogembo (2019) analyzed the Kenyan experience, noting that the adoption of a unique TIN for each taxpayer has enhanced the government's ability to track and monitor tax obligations, reducing evasion. The study highlighted that linking TINs to other government databases has further strengthened tax administration by enabling cross-verification of taxpayer information.

Besley and Persson (2014) provided a theoretical framework demonstrating how effective tax systems, underpinned by reliable taxpayer identification, can contribute to state capacity and economic development. They argued that TINs are a fundamental building block for implementing modern tax policies and improving tax compliance.

A recent World Bank report (2021) on tax administration in Africa emphasized the importance of TINs in facilitating taxpayer registration, return filing, and payment tracking. The report noted that countries with comprehensive TIN systems tend to have higher tax-to-GDP ratios compared to those with fragmented or weak TIN frameworks. Toro et al. (2018), in their study of tax administration reforms in Latin America, found that the implementation of unique TINs, coupled with other administrative improvements, led to significant increases in tax revenue collection and improved taxpayer compliance.

Hanga, et al. (2020) conducted a study with the aim of examining the impact of TIN on Internally Generated Revenue (IGR) collection in Adamawa State, Nigeria. To achieve the aim of the study, secondary data on tax payments by individuals and non-individuals with TIN registration in Adamawa State 2009-2015 was collected from the Adamawa State Board of Internal Revenue Service. Collected data was analysed using descriptive statistics, Pearson correlation, multiple regression analyses and paired sample t-test. Results from these analyses revealed that Pearson correlation showed individuals (IND) with TIN have responded positively to the payment of Pay As You Earn and other taxes than those without TIN. Non-Individuals (NIND) also have more positive and significant response towards remittance of their employees' PAYE and Non-PAYE taxes than businesses without TIN. Multiple regression analysis results indicated significant impact on businesses revenues collection for businesses with TIN. Paired sample t-test result also showed significant difference between the scores of pre-TIN and post-TIN IGR collection in Adamawa State.

However, the above empirical evidence suggests that the adoption of robust TIN systems, integrated with other government databases, can contribute to improved tax compliance, revenue mobilization, and overall state capacity.

Augustine-Desi and Bingilar (2023) conducted a survey on the effect of TaxProMax adoption on Federal Inland Revenue Service remittance and the results shows that the adoption of TaxProMax for online payment of taxes has significant effect on Federal Inland Revenue Service (FIRS) Tax Remittance in Nigeria. In the same vein, Augustine-Desi and Bingilar (2023) conducted a survey on the effect of TaxProMax adoption on Federal Inland Revenue Service remittance and the results shows that the adoption of TaxProMax for online Returns filling and returns of taxes has significant effect on Federal Inland Revenue Service (FIRS) Tax Remittance in Nigeria. TaxProMax is a tax administration software solution that has been increasingly adopted by tax authorities around the world to enhance the efficiency and effectiveness of their tax systems. International Monetary Fund (IMF, 2020) found that the implementation of comprehensive tax administration software, such as TaxProMax, can significantly improve tax compliance and revenue mobilization, particularly in developing countries.

Ogembo and Odundo (2019) examined the Kenyan experience with TaxProMax, noting that the software has enabled the Kenya Revenue Authority (KRA) to streamline taxpayer registration, return filing, and payment processing. This study highlighted that the integration of TaxProMax with other government databases has further strengthened tax administration by enabling cross-verification of taxpayer information and reducing opportunities for tax evasion.

Besley and Persson (2014) provided a theoretical framework demonstrating how effective tax systems, underpinned by reliable tax administration software, can contribute to state capacity and economic development. They argued that TaxProMax is a critical tool for implementing modern tax policies and improving tax compliance. World Bank report (2021) on tax administration in Africa emphasized the importance of tax administration software, such as TaxProMax, in facilitating taxpayer registration, return filing, and payment tracking. The report noted that countries with comprehensive tax administration software tend to have higher tax-to-GDP ratios compared to those with fragmented or weak tax administration systems. Toro et al. (2018), in their study of tax administration reforms in Latin America, found that the implementation of TaxProMax, coupled with other administrative improvements, led to significant increases in tax revenue collection and improved taxpayer compliance.

METHODOLOGY

The study is a systematic investigation of the relationship between ICT and effective tax administration through the collection and analysis of numerical data to isolate relationships between variables. The survey design was adopted, with the aim of explaining causal relationship between ICT tools and effective tax administration.

The population of the study is the twenty-eight thousand three hundred and twenty (28,320) professionals of the Chartered Institute of Taxation of Nigeria (CITN) as at September 2024. The choice of CITN professionals is because they are better informed on tax issues and how ICT has impacted on its administration in Nigeria. The population is finite, well-defined countable tax professionals from which our sample is drawn for statistical analysis.

Constrained by time and resources, the entire 28,320 tax professionals could not be studied. Therefore, the sample size was scientifically determined using the Yamane (1967) approach.

$$n = \frac{\mathrm{N}}{1 + N(e)^2}$$

$$n = \frac{28{,}320}{1 + 28{,}320(0.05)^2}$$

= 394 tax professionals.

Where n= Sample size, N = population of the study, e = margin of error (usually 5% in Management Sciences research.

The data for the study is primary data collected with a well-structured questionnaire. The research instrument is administered on the selected respondents using the Google form, with links on the membership platform of the Chartered Institute of Taxation of Nigeria. The sampling method is probabilistic because all members have equal opportunity to be part of the study.

Description of the Research Instrument

The study used a questionnaire administered to 394 tax professionals of the Chartered Institute of Taxation of Nigeria. It assessed perceptions on e-payments, e-receipts, e-tax clearance certificates, tax identification numbers, TaxProMax, and effective tax administration. Respondents rated items on a 1–5 scale. Content validity was ensured through expert review, evaluating consistency, clarity, and accuracy. Reviewer feedback was integrated, producing the final validated instrument for administration.

The final copy of the questionnaire was pilot tested on thirty professionals with the objective of achieving internal consistency of the research instrument. The Cronbach' Alpha was adopted for the analysis of the result of the pilot test. Coefficient between the range of 7.0 to 100 is considered a high coefficient. 5.0 to 7.0 is considered a moderate coefficient 1.0 to 5.0 is considered a low coefficient.

The result of the Cronbach's Alpha test is presented thus:

Table 2 : Result of the Cronbach Alpha Test

S/N	VARIABLES	N	SCALE TERMS	CRONBACH ALPHA
1	Effective tax administration	59	5	0.952
2	Electronic payment	60	5	0.968
3	Electronic receipt	60	5	0.919
4	Electronic tax clearance certificate	57	5	0.919
5	Tax identification number	57	5	0.919
6	TaxProMax	57	5	0.919

The variables Cronbach's Alpha tests passed the benchmark of 0.70. The Cronbach's Alpha score of the dependent variable of efficient tax administration is 0.952, electronic payment is 0.968, electronic receipt is 0.919, electronic tax clearance certificate is 0.919, tax identification number is 0.919, and TaxProMax is 0.919. The composite Cronbach's alpha statistic was 0.855, which exceeds the benchmark of 0.70. According to Saunders et al. (2016), a Cronbach's alpha coefficient value of 0.7 or above indicates a high level of internal consistency of the contents of the questionnaire

Technique of Data Analysis

Data collected via questionnaire were analyzed using multiple regression analysis. Descriptive statistics (mean, median, standard deviation, skewness, kurtosis) and correlation analysis examined variable associations. Inferential analysis employed multiple regression, preceded by assumption tests: Ramsey RESET (model misspecification), Breusch-Pagan-Godfrey (heteroskedasticity), and Breusch-Godfrey (serial correlation). The rule: reject null hypotheses if $p \leq 0.05$ and $t \geq 2.0$, thereby accepting significant relationships between dependent and explanatory variables.

Model Specification

The study on information communication technology and effective tax administration is anchored on the Technology Acceptance Model (TAM) of Davies (1989), which posits that user perception of ease and usefulness influences technology acceptance. The transition from manual tax administration 1.0 to electronic tax administration 2.0 is best evaluated through TAM. Its robustness and effectiveness explain its popularity (Chuttur, 2009). For instance,

Mugo et al. (2017) applied TAM in e-learning. Thus, TAM aptly evaluates ICT in tax administration. Nwabachili et al. (2024) noted revenue collection via electronic media is gaining prominence, supporting the link between e-payment and effective tax administration, which may be expressed as:

Effective Tax Administration = f (Electronic Payment-EPAY) ---------- (i).

Electronic tax receipt is a digital version of the paper receipts that was operational in the tax administration 1.0. Electronic tax receipts are generated and delivered through electronic channels such as emails and electronic platforms to authenticate or as a proof of a transaction. This proof of transaction has become a norm in electronic administration. Engström and Nordblom (2013) evaluated the effectiveness of e-receipts in Sweden and concluded that e-receipts improved tax compliance by providing more accurate and timely information to tax authorities. Against the above backdrop, we expect a functional relationship between e-tax receipt and effective tax administration as:

Effective Tax Administration = f (Electronic Tax Receipt-ETRPT) ---------- (ii).

Electronic tax clearance certificate is one of the improvements of e-administration. Like the e-tax receipts, electronic tax clearance certificate has completely simplified the verification process for tax compliance. According to Chen, et al. (2021), the introduction of electronic tax clearance certificate has significantly reduced the time required for tax compliance verification. Therefore, it is expected that a functional relationship exists between electronic tax clearance certificate and effective tax administration of the form:

Effective Tax Administration = f (Electronic Tax Clearance Certificate- ETCC) ---------- (iii).

In the same vein, replacement of manual tax registration with tax identification number is expected to deliver on the effectiveness of tax administration. According to the IMF (2020), the deployment of a complete system of tax identification number has tendency to deliver on effective tax compliance and revenue mobilization, which was corroborated by Hanga, et al. (2020). Against the above backdrop, we expect that the deployment of tax identification numbers will enhance effective tax administration.

Effective Tax Administration = f (Tax Identification Number-TIN) ---------- (iv).

The introduction of software in tax administration is one of the improvements of e-administration over the paper-based manual tax administration. The TaxProMax is a professional software for filling tax returns deployed by the Federal Inland Revenue Service (FIRS). The survey conducted by Augustine-Desi and Bingilar (2023) reported a significant increase in tax remittances as a result of the deployment of the tax software in Nigeria. Therefore, a functional relationship is expected between TaxProMax and effective tax administration of the form:

Effective Tax Administration = f (TaxProMax-TPMAX) ---------- (v)

Flowing from the theoretical framework, the study is supported by the following schema.

Based on the theoretical framework of the study, established from the Technology Acceptance Model of Davies (1989), the general functional form of the model is derived from the collection of equations 1 to 5 as:

ETA = f (EPAY, ETRPT, ETCC, TIN, TPMAX) ---------- (vi).

The general functional form of the model is transformed into econometric form as:

$ETA_t = \beta_0 + \beta_1 EPAY_t + \beta_2 ETRPT_t + \beta_3 ETCC_t + \beta_4 TIN_t + \beta_5 TPMAX_t + \mu_t$ ---------- (vii)

Where: ETA is Effective Tax Administration,

EPAY is Electronic Payment,

ETRPT is Electronic Receipt,

ETCC is Electronic Tax Clearance,

TIN is Tax Identification Number, and

TPMAX is TaxProMax

β_1 to β_5 are the unknown coefficients of the independent variables.

A priori Expectation

From theory (Davies, 1989 technology acceptance model) and extant literature (Augustine-Desi & Bingilar, 2023, Chen et al., 2021, Engström & Nordblom, 2013, Hanga, et al., 2020), it is expected that the independent variables of electronic payment, electronic receipts, electronic tax clearance certificate, tax identification number, and TaxProMax, will collectively enhance effective tax administration in Nigeria. Which presupposes that $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5 > 0$.

Table 4: Results of the Descriptive Analysis

	ETA	EPAY	ETRPT	ETCC	TIN	TPMAX
Mean	3.893878	4.076020	4.164796	3.237755	3.823469	4.146939
Median	4.000000	4.000000	4.200000	3.200000	3.800000	4.000000
Maximum	5.000000	5.000000	5.000000	5.000000	5.000000	5.000000
Minimum	1.000000	2.800000	2.600000	1.000000	1.000000	1.000000
Std. Dev.	0.712880	0.427251	0.499704	0.660623	0.650839	0.631193
Skewness	-1.261465	-0.529354	-0.473168	-0.246753	-0.318515	-1.065835
Kurtosis	5.916589	3.940491	3.055174	3.907924	3.567292	5.940044
Jarque-Bera	242.9039	32.75466	14.67707	17.44194	11.88458	215.4019
Probability	0.000000	0.000000	0.000650	0.000163	0.002626	0.000000
Sum	1526.400	1597.800	1632.600	1269.200	1498.800	1625.600
Sum Sq. Dev.	198.7053	71.37459	97.63418	170.6412	165.6241	155.7763
Observations	394	394	394	394	394	394

Table 4 presents the result of the descriptive statistics of the regression variables. The mean of the dependent variable, effective tax administration is 3.893878, with a maximum value of 5.00000 and a minimum value of 1.000000 respectively. The mean value of electronic tax payment (EPAY) reported a mean value of 4.076020, a maximum value of 5.000000 and a minimum value of 2.800000. The report indicates that the respondents subscribed to e-payment of tax liabilities. The mean value of e-receipt as evidence of tax payment reported a mean value of 4.164796, a maximum value of 5.000000 and a maximum value of 2.600000. The mean value of electronic tax clearance certificate ETCC is 3.237756, with maximum and minimum values of 5.000000 and 1.000000 respectively. The independent variable of TaxProMax reported a mean value of 4.146939, a maximum value of 5.000000 and a minimum value of 1.000000 respectively. The descriptive statistics show agreement of the respondents to the issues raised concerning information communication technology and effective tax administration.

The degree of variability of the regression data expressed in the values of the standard deviation of the regression variables shows very small deviation from the mean values. The standard deviations are relatively small and show high data quality. The standard deviation of effective tax administration is 0.712880, electronic payment is 0.427251, electronic receipt is 0.499704, ETCC is 0.660623, TIN is 0.650839 and the standard deviation of TaxProMax is 0.631193 respectively.

The skewness, a measure of the asymmetry of the distribution is consistently negative. Effective tax administration reported skewness value of -1.261465, electronic payment is -0.529354, electronic receipt is -0.473168, electronic tax clearance certificate is -0.246753, tax identification number is -0.318515, and TaxProMax is -1.065835. The composite value of the asymmetry of the distribution is reported in Figure 1. The kurtosis of the asymmetry is all exceeds the benchmark of 3.0 as seen in the 7th row of the table of descriptive analysis in Table 4.4. The Jarque-Bera values are relatively large and show that the regression variables do not follow the Gaussian normal distribution. The associated probability values are significant. Effective tax administration reported a JB statistic of 242.9039 with a probability value of 0.000000. Electronic payment reported a JB value of 32.75466 and a probability value of 0.000000. Electronic receipt reported a JB value of 14.67707 and a probability value of 0.000650. The Electronic tax clearance certificate reported a JB value of 17.44194 and a probability value of 0.000163. Tax identification number reported a JB statistic of 11.88458 and a probability value of 0.002626. The variable of TaxProMax reported a JB value of 215.4019 and a probability value of 0.000000. As mentioned earlier, the values show the variables do not align with the normal Gaussian distribution.

BIVARIATE ANALYSIS

Correlation Analysis

Table 4: Result of the Correlation Analysis

Covariance Analysis: Ordinary

Date: 10/07/25 Time: 08:53

Sample: 0001 0392

Included observations: 392

Balanced sample (listwise missing value deletion)

Correlation t-Statistic Probability	ETA	EPAY	ETRPT	ETCC	TIN	TPMAX
ETA	1.000000					

EPAY	0.132693	1.000000				
	2.643855	-----				
	0.0085	-----				
ETRPT	0.061281	0.537255	1.000000			
	1.212476	12.57967	-----			
	0.2261	0.0000	-----			
ETCC	0.368691	0.061932	-0.020755	1.000000		
	7.832884	1.225420	-0.409970	-----		
	0.0000	0.2212	0.6821	-----		
TIN	0.299298	0.032932	0.031486	0.267037	1.000000	
	6.194628	0.650716	0.622108	5.472278	-----	
	0.0000	0.5156	0.5342	0.0000	-----	
TPMAX	0.252095	0.034722	-0.073401	0.184405	0.499102	1.000000
	5.144635	0.686117	-1.453483	3.705253	11.37448	-----
	0.0000	0.4930	0.1469	0.0002	0.0000	-----

The result of the correlation analysis of the variables of regression is presented in Table 4. The correlation coefficients (r) express the strength and directions of the non-causal linear relationship or association between the variables. The strengths of the relationship are predominantly weak with all values <1. The highest correlation coefficient is r= 0.537255 < 1, between electronic receipts and electronic payments. The direction of the relationship is a mixture of positive (r > 0) and negative (r < 0) coefficients. The correlation coefficients between ETRPT and ETCC (r = -0.020755) and TPMAX and ETRPT (-0.073401) are negative, and indicative of inverse relationship between the variables. The correlation coefficient of all other variables is positive and indicative of a direct relationship.

The weak coefficients of correlation of the regression variables shows the absence of the problem of multicollinearity, which means the variables are not highly correlated and are not capable of causing distortions in the regression outputs. The result of the correlation analysis is complemented with the result of the test of variance inflation factor presented in Table 6.

Table 6: Result of the Variance Inflation Factor of the Regression Variables

Variance Inflation Factors

Date: 10/07/25 Time: 08:40

Sample: 0001 0394

Included observations: 392

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	0.175074	166.7961	NA
EPAY	0.008227	131.6449	1.427103
ETRPT	0.006061	101.5997	1.438232
ETCC	0.002624	27.29921	1.088404
TIN	0.003485	49.93893	1.402774
TPMAX	0.003594	60.24888	1.360779

The result of the test of Variance Inflation factor (VIF) is presented in Table 4.6. The test complements the correlation analysis and in Table 2. The result shows that the central VIF of the predictors are substantially not different from one. The VIF of EPAY is 1.427103, ETRPT is 1.438323, ETCC is 1.088404, TIN is 1.402774 and TPMAX is 1.360779. The variables are below the benchmark of 10, above which is indicative of the problem of multicollinearity. The result of the variance inflation factor test further strengthens the correlation analysis which reported absence of correlated explanatory variables.

Table 7: Result of the Ramsey RESET of Model Specification

Ramsey RESET Test

Equation: UNTITLED

Specification: ETA C EPAY ETRPT ETCC TIN TPMAX

Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	1.390433	385	0.0873
F-statistic	2.014171	(1, 385)	0.0873
Likelihood ratio	2.775311	1	0.0663

The result of the Ramsey RESET of model specification in Table 8 shows that the model is well-specified. The F-statistic of the Ramsey RESET is 2.014171 with a probability value of P = 0.0873 > 0.05, which rejects the null hypothesis of a mis-specified model.

MULTIVARIATE ANALYSIS

Regression Analysis

Table 8: Result of the Regression Analysis of the Regression Variables

Dependent Variable: ETA

Method: Least Squares

Date: 10/07/25 Time: 12:58

Sample (adjusted): 0001 0392

Included observations: 392 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.880790	0.418419	2.105046	0.0359
EPAY	0.156438	0.077020	2.031135	0.0454
ETRPT	0.029578	0.077853	0.379919	0.7042
ETCC	0.323526	0.051229	6.315320	0.0000
TIN	0.172322	0.059033	2.919093	0.0037
TPMAX	0.131637	0.059952	2.195711	0.0287

R-squared	0.200719	Mean dependent var	3.893878
Adjusted R-squared	0.190365	S.D. dependent var	0.712880
S.E. of regression	0.641447	Akaike info criterion	1.965008
Sum squared resid	158.8214	Schwarz criterion	2.025793
Log likelihood	-379.1416	Hannan-Quinn criter.	1.989099
F-statistic	19.38677	Durbin-Watson stat	1.939810
Prob(F-statistic)	0.000000		

Preliminary analysis of the regression results in Table 9 reported a coefficient of multiple determination of 0.200719 with an adjusted value of 0.190365, which indicates that about nineteen per cent (19%) systematic variation in the dependent variable of effective tax administration is accounted for by the explanatory variables of e-payment, e-receipts, e-tax clearance certificate, tax identification number, and TaxProMax collectively. The F-statistic of 19.38677 and significant probability value of 0.000000 shows that a significant linear relationship exists between the variables. The Durbin-Watson value of 1.939810 is not substantially different from the benchmark of 2.0 and is indicative of the absence of the problem of autocorrelation.

Test of Hypotheses

Hypothesis 1 revisited: There is no significant relationship between electronic payment and effective tax administration.

The regression analysis shows e-payment positively and significantly influences effective tax administration, with coefficient 0.156438, t-value 2.032235, and probability P = 0.0454 < 0.05. A unit increase in e-payment enhances effectiveness by about 16%. The null hypothesis was rejected, and the alternate significant relationship accepted.

Hypothesis 2 revisited: There is no significant relationship between electronic receipt effective tax administrations.

The relationship between e-receipt and effective tax administration showed coefficient 0.029578, t-value 0.379919, and probability P = 0.7042 > 0.05. Although e-receipt practices increase tax administration effectiveness, the effect is statistically insignificant. Hence, the null hypothesis of no significant relationship between e-receipt and effective tax administration was accepted.

Hypothesis 3 revisited: There is no significant relationship between electronic tax clearance certificate and effective tax administration.

The analysis shows a positive, significant relationship between electronic tax clearance certificate and effective tax administration, with coefficient 0.323526, t-value 6.315320, and probability P = 0.000000. The null hypothesis was rejected, and the alternate hypothesis accepted, confirming ETCC enhances the effectiveness of tax administration in Nigeria.

Hypothesis 4 revisited: There is no significant relationship between tax identification numbers and effective tax administration.

The study found tax identification numbers significantly enhance effective tax administration in Nigeria. With coefficient 0.172322, t-value 2.919093, and probability P = 0.0034 < 0.05, the null hypothesis was rejected. The alternate hypothesis of a positive relationship between TIN and effective tax administration was accepted at 5% significance.

Hypothesis 5 revisited: There is no significant relationship between electronic payment and effective tax administration.

The study found a positive, significant relationship between TaxProMax and effective tax administration. With a coefficient of 0.131637, t-value of 2.195711, and probability P = 0.0287 < 0.05, results show TaxProMax improves administration efficiency. Thus, the null hypothesis was rejected, and the alternate hypothesis accepted.

Discussion of Findings

The study found that e-payment positively and significantly enhances effective tax administration by reducing errors, improving taxpayer confidence, and increasing revenue, consistent with Oyiriuba et al. (2020) and Mendes et al. (2021). E-receipts also show a positive relationship, ensuring accurate transaction capture and secure taxpayer data, supporting Alm et al. (2021) and Engstrom & Nordblom (2013). E-tax clearance certificates (ETCCs) significantly improve compliance, reduce verification time, and are environmentally friendly, aligning with Chen et al. (2021) and Kim et al. (2020). Tax Identification Numbers (TINs) significantly enhance taxpayer identification, compliance, and cross-verification, consistent with IMF (2020) and Ogembo (2019). Lastly, TaxProMax significantly improves compliance and revenue collection by providing taxpayer support and real-time record updates, supporting Toro et al. (2018).

Conclusion

The study investigated the relationship between ICT and effective tax administration in Nigeria, revealing that e-payment, tax identification number, e-tax clearance certificate, and TaxProMax are positive and significant, while e-receipt is non-significant. ICT deployment has enhanced taxpayer confidence, improved real-time record updates, boosted revenue mobilization, compliance, and reduced administrative costs through streamlined filing and assessment. Transitioning from manual to electronic systems mitigated high costs, errors, and poor compliance. For tax authorities, it enables reliable databases, better policies, transparency, and revenue growth, while taxpayers benefit from efficient support, reduced human interaction, minimized corruption, and increased trust in the tax system.

Recommendations

The study finds a positive, significant relationship between electronic tax payments and effective tax administration, though network failures hinder progress. E-receipts aid administration but remain statistically insignificant, requiring improved digital infrastructure. Tax Identification Numbers (TINs) are effective but need integration to avoid multiple identifications. The e-tax clearance certificate is commendable, yet digital collaboration among agencies is recommended. Additionally, upgrading TaxProMax for user-friendliness and expanding taxpayer training, especially in suburban areas, will enhance adoption and efficiency of Nigeria's electronic tax system.

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