European Journal of Accounting, Auditing and Finance Research, 14(3),105-131, 2026
Print ISSN: 2053-4086(Print),
Online ISSN: 2053-4094(Online)
Website: https://www.eajournals.org/
Publication of the European Centre for Research Training and Development-UK

Big Data Analytics and Tax Revenue Generation Efficiency in Nigeria

Theophilus Anaekenwa Aguguom
ORCID ID: https://orcid.org/0000-0002-5767-8010
Department of Accounting and Finance, Augustine University, Ilara-Epe, Lagos State Nigeria.

Olabisi Bolarinwa Odewole
ORCID ID: https://orcid.org/0000-0002-1975-0472
Department of Accounting and Finance, Augustine University, Ilara-Epe, Lagos State Nigeria.

Chinanu Emmanuel
ORCID ID: https://orcid.org/0009-0002-8275-7431
Department of Accounting and Finance, Augustine University, Ilara-Epe, Lagos State Nigeria.

Abulfatai Olanrewaju Nurudeen
ORCID ID: https://orcid.org/0009-0009-5395-8398
Department of Accounting, Crescent University, Abeokuta, Ogun State Nigeria

doi: https://doi.org/10.37745/ejaafr.2013/vol14n3105131 Published June 08 , 2026

Citation: Aguguom T.A., Odewole O.B., Emmanuel C., Nurudeen A.O. (2026) Big Data Analytics and Tax Revenue Generation Efficiency in Nigeria, *European Journal of Accounting, Auditing and Finance Research*, 14(3),105-131

Abstract: *This study examined the effect of Big Data analytics on the efficiency of tax revenue generation in Nigeria. Data were sourced from field surveys and analyzed using SPSS and SmartPLS software. A population of 16,500 was considered, and a sample size of 391 was determined using the Taro Yamane formula. Both descriptive and inferential statistical methods were employed for the analysis. The initial estimations confirmed the reliability and validity of the research instruments using Bartlett's Test of Sphericity and Cronbach's Alpha. Descriptive statistics revealed that the majority of respondents affirmed that Big Data significantly enhances the efficiency of tax revenue generation. Furthermore, regression analysis showed that Big Data had a significant effect on each of the four models of efficiency of company income tax revenue generation, efficiency of value-added tax revenue generation, efficiency of efficiency personal income tax revenue generation, and efficiency of efficiency information technology tax revenue generation. The study concluded that, big data enhances tax revenue generation in Nigeria. It recommended that, in response to the growing volume of electronic transactions and the need to remain relevant in the digital economy, the adoption of Big Data and other disruptive technologies in tax administration is imperative for enhancing efficiency, accuracy, and timely tax revenue generation in Nigeria.*

Keywords: big data, company income tax, efficiency of tax revenue, efficiency information technology tax, revenue generation**,** efficiency of value-added tax**.**

European Journal of Accounting, Auditing and Finance Research, 14(3),105-131, 2026
Print ISSN: 2053-4086(Print),
Online ISSN: 2053-4094(Online)
Website: https://www.eajournals.org/
Publication of the European Centre for Research Training and Development-UK

INTRODUCTION

Global economic uncertainties such as rising commodity prices, inflation, supply chain disruptions, and economic nationalism have significantly impacted Nigeria's economy. These challenges have pushed many businesses into financial strain, leading to tax aggressiveness, evasion, and unethical tax practices. Consequently, the Nigerian government struggles to meet fiscal obligations due to diminished revenue from taxes (Dada et al., 2025). Meanwhile, tax enforcement, a key mechanism for financing public infrastructure and services, has become ineffective in the face of widespread corruption, institutional dysfunction, and poor policy frameworks (Adekunle et al., 2025). Tax revenue generation in Nigeria, as in many developing countries, faces structural challenges. These include inefficient tax administration, lack of digital integration, corruption, and an over-reliance on external tax consultants who often prioritize personal gain over national interest (Aladebumoye, 2025). These consultants, operating without adequate oversight, enrich a select few while depriving the country of significant revenues. The need for reform in public finance management, improved transparency, and accountability in tax collection is urgent.

Studies reveal that major barriers to effective tax revenue include unclear government policies, excessive tax incentives, exclusion of informal economic activities from the tax net, and weak technological infrastructure (Yalamati, 2024; Adeusi et al., 2020). Tax laws are often complex and not easily understood by the average citizen or small business owner, leading to confusion, non-compliance, and evasion. Nigeria's system is further burdened by numerous overlapping and outdated tax authorities, which contribute to inefficiencies and taxpayer frustration. The adoption of "third-best" tax policies those designed with capacity constraints in mind may offer some temporary solutions (Knauer et al., 2020; Lin, 2021). However, these are often manipulated for the benefit of self-interested administrators. Poor prioritization of tax strategies, corruption among both tax officers and taxpayers, lack of awareness, and weak accounting practices contribute to declining revenue and in addition, poor infrastructure and outdated administration techniques hinder progress (Haleem et al., 2020; Adedokun, 2019).

Global tax administration now emphasizes digital solutions to monitor financial flows and verify transactions, which help reduce evasion. Unlike advanced countries where tax systems have become increasingly digitized, Nigeria lags behind. Nigeria's continued reliance on outdated methods leads to rising tax defaults, minimal enforcement, and ineffective reforms (Akhila et al., 2024; Ihenyen & Ogbise, 2022). Successive policies have focused on production efficiency instead of revenue optimization, often serving elite interests. The failure of Nigeria's tax system is exemplified in the inability to track tax leakages and recover owed funds. For example, despite increased VAT collections between 2019 and 2021 from ₦1.18 trillion to ₦2.07 trillion the revenue gains have not translated into improved fiscal stability due to inflation and leakages (Adekunle et al., 2025; Ihenyen & Ogbise, 2022). Government negligence allows defaulters to escape penalties, and many payments never reach the Treasury Single Account (TSA) and from

2015 to 2020, the TSA reportedly accrued ₦19 trillion, a figure believed to be lower than it should be due to corruption and poor oversight (Dada et al., 2025). Furthermore, tax revenue losses are not just administrative failures but are rooted in systemic corruption. Studies reveal that networks of fraudulent actors, often operating in tandem with state officials, collect informal taxes from small businesses and citizens without remitting same (Adegbie et al., 2025). These include levies at markets, motor parks, police checkpoints, and through false government agents. The Nigeria Extractive Industries Transparency Initiative (NEITI) found 77 companies with a combined tax debt of $6.8 billion, highlighting the scale of the problem (Adegbie & Akinyemi, 2020;

Nigeria's tax-to-GDP ratio is among the lowest in Africa—just 6% in 2019, which is well below the continental average of 16.6%. While VAT rates increased in 2020, structural issues remained unchanged. Many wealthy Nigerians do not pay taxes, especially in cities like Lagos, where there are numerous millionaires and even billionaires. Despite claims of increased subnational internally generated revenue (IGR), these gains are modest and do not reflect genuine reform. Early initiatives like the Voluntary Assets and Income Declaration Scheme (VAIDS) and the whistleblower program showed initial promise, recovering billions of naira in assets and cash. However, both programs are now largely inactive. Moreover, tax fraud remains rampant. For instance, Henley & Partners' 2022 report highlights Lagos as the fourth-richest city in Africa, with thousands of high-net-worth individuals, many of whom are not captured in the tax net. The broader implication is that Nigeria has consistently failed to modernize its tax systems. With heavy dependence on oil revenues in the past, taxation was neglected. Now, with dwindling oil income and increasing debt, the government spends over 90% of revenue on debt servicing. This unsustainable trend underscores the urgent need for reform.

Globally, tax authorities use big data sourced from social media, Internet of Things (IoT) devices, emails, and transactions to identify patterns and trace financial behavior. In Nigeria, such a system can strengthen tax enforcement and ensure that the informal sector is better integrated into the formal tax net. Analytics tools can provide valuable insights into taxpayer satisfaction, potential areas of evasion, and gaps in the system. One key recommendation is digital transformation especially the use of big data to enhance tax administration. Big data technologies can process massive volumes of information in real-time, helping tax agencies detect leakages, identify evaders, and streamline collection processes. Big data analytics allows for informed decision-making, accurate taxpayer profiling, and improved service delivery. It also reduces reliance on human discretion, thereby minimizing corruption. Some nations have already developed IT infrastructure to support digital tax administration, such as China's "Golden Three System." In Nigeria, setting up centralized platforms for inter-agency data sharing, improving transparency, and enhancing third-party data access can support precise tax services. Ultimately, precise taxpayer identification and needs analysis will result in more effective, fair, and sustainable revenue generation.

While Nigeria's past reform attempts have largely failed due to institutional and political inertia, the adoption of digital innovations particularly big data offers a transformative path forward.

Investing in such solutions would help reposition Nigeria's tax system from its archaic roots to a more modern, efficient, and transparent framework. While a good number of studies have considered the problems of tax collection and tax reforms in Nigeria, incidentally, there is a dearth of studies researching the possibilities of big data in solving the perennial problem of tax revenue generation and the other associated challenges in tax administration in Nigeria (Sulman et al., 2019). This study brings into perspective the flexibility of big data as tax administration in Nigeria can quickly evaluate information and make quick, educated choices with the aid of in-memory analytics' speed and the capacity to examine new sources of data, such as streaming data from IoT. In optimizing tax revenue generation efficiency, big data analytics offers tax agencies the flexibility and ability in efficiency to determine what taxpayers need and how satisfied they are, enabling them to deliver tax fairness and tax justice treatments at the right time. Big data analytics gives more businesses the chance to create cutting-edge new goods that cater for the shifting requirements of their customers (Wang et al., 2019).

The main objective of this study was a consideration of the significance of big data in enhancing the efficiency of tax revenue generation. Based on this, the study provided a timely solution to the problem of the efficiency of tax revenue generation by exploring big data in the Nigerian tax system and tax revenue generation drive. The study was motivated based on the dearth of studies that have considered Big Data in resolving the perennial problem of tax revenue generation n Nigeria. Consequently, in bridging the gap and providing novelty in research and the significance of big data in attempting the problem of efficiency of tax revenue generation in Nigeria, this study examined the effects of big data on the efficiency of tax revenue generation in Nigeria. In addressing this concern, this study tested and proffered solutions to the following research objective and hypotheses:

Research Objectives

Examine the effect of Big Data on efficiency of company income tax generation in Nigeria

Investigate the effect of Big Data efficiency of value-added tax revenue generation in Nigeria

Access the effect of Big Data on efficiency of efficiency personal income tax revenue generation in Nigeria

Ascertain the effect of Big Data on efficiency of efficiency information technology tax revenue generation in Nigeria.

Research Hypotheses

Research Hypothesis (H_1): Big Data do not significantly affect the efficiency of company income tax revenue generation in Nigeria

Research Hypothesis (H_2): There is no significant effect of Big Data on efficiency of value-added tax revenue generation in Nigeria

Research Hypothesis (H_3): Big Data do not significantly affect the efficiency of efficiency personal income tax revenue generation in Nigeria

Research Hypothesis (H_4): There is no significant effect of Big Data on the efficiency of efficiency information technology tax revenue generation in Nigeria.

The remaining study is fashioned as follows: In section 2, the study provided an extensive review of the literature along the frontiers of Big Data and the efficiency of tax revenue generation with the theoretical background. Section 3 described the methodology employed in the study. Section 4 analysed data and provided the measurement model used in the study. Finally, in section 5, the study concluded and provided recommendations and scope for future studies.

LITERATURE REVIEW/ THEORETICAL FRAMEWORK

Efficiency of Tax Revenue Generation

Public economics' fundamental finding is that tax systems ought to continue operating at full capacity even in subpar conditions. As a result, taxes on income, wages, and profits are permissible, but taxes on intermediate inputs, turnover, and trade are not. The outcome has had a significant impact on the policy recommendations made to developing nations, but one major issue with these recommendations is that the underlying theoretical presumptions are inappropriate for environments with constrained tax capacity (Dada et al., 2025; Uhuaba & Aguguom, 2019). The outcome is premised, in particular, on a scenario with flawless tax enforcement and zero tax evasion at zero administrative costs which is obviously incompatible with the reality in developing nations. The funding of government operations, such as the delivery of public services, comes from taxes levied against individuals and corporations. The important duties of government tax administrations include interpreting tax law, collecting different taxes and social security payments, and enforcing tax rules. Several governments have tightened restrictions on the funding available to tax-collecting organizations as they attempt to unify their budgets.

Efficiency improvements depend on how successfully these organizations build their internal organizational structures, distribute allocated monies to meet new or changing goals, utilize big data as a digital solution and e-government efforts to cut costs and decide on the levels, pay, and mix of resources (Hilbert & Lopez, 2011).The cost of collection ratio contrasts the total income received over the course of a fiscal year with the yearly administrative expenditures spent by a revenue authority. A declining trend over time might be an indication of decreased relative costs (i.e., more efficiency) and/or increased tax compliance (i.e. improved effectiveness). Up to 2007, the ratios for the great majority of revenue bodies showed a declining trend, which is most likely attributable to lower expenses (i.e., increased efficiency) or robust economies that raised tax revenues. In contrast, numerous revenue bodies saw their ratios rise in 2009, most likely as a result of decreased economic activity and tax revenues following the global financial and economic crisis.

Efficiency of Companies Income Tax: ECIT is a tax levied against a company's profit from all sources. The tax rate is 30% of a company's whole earnings. Certain gains are free from ECIT as

long as they don't come from the company's own trade or commercial operations, such as cooperative societies. Companies that are residents must pay ECIT on their worldwide revenue whilst non-residents must pay ECIT on their income that comes from Nigeria. For large businesses, defined as those with gross revenue of more than NGN 100 million and evaluated based on the prior year, the ECIT rate is 30%. (i.e. tax is charged on profits for the accounting year ending in the year preceding assessment). Investment income received from (Alade, 2015). Nigeria and remitted by a Nigerian resident to a non-resident is subject to a non-resident corporation with a fixed base or a PE in Nigeria that is not tax resident in a treaty nation and is taxed on the business earnings attributable to that fixed base. The profit attributable to the taxable presence in Nigeria will be taxed in Nigeria for non-resident digital enterprises with a significant economic presence (SEP) that are not tax residents in a treaty nation.

Efficiency of Value-Added Tax Rate: As of 1 February 2020, the regular VAT rate was raised from 5% to 7.5%. Items purchased by diplomats and products used in initiatives financed by charitable donations are examples of zero-rated items. Plants and machinery for use in free trade zones (FTZs) or export processing zones (EPZs), basic food items (based on a particular list), medical and pharmaceutical products, books and educational materials, and export services are among the exempt commodities. MTN, Airtel, government organizations, banks, and oil and petrol firms are obligated to deduct at source and remit VAT collected from their suppliers. For filing and payment to the tax office, all other organizations must get from their clients the VAT levied on their invoices (Amaefule et al., 2017; Akintoye et al., 2022).

Efficiency Personal Income Tax: Residents of Nigeria are subject to taxation on their international income. In the case of employment, a non-resident person is subject to tax in Nigeria if the employee's tasks are carried out entirely or in part there unless they are carried out on behalf of an employer-based abroad. Their compensation is not covered by a fixed base of the employer in Nigeria, and their compensation is subject to tax in that other country in accordance with the terms of an agreement to prevent double taxation (Asaju & Egberi, 2015) After a fixed base/taxable presence is established, Section 6 of the PIT Act (PITA) is used to tax foreign individuals who make commercial gains in Nigeria.

Efficiency Information Technology Tax: A business must pay an efficiency information technology tax equal to 1% of its pre-company income tax (pre-ECIT) earnings if its annual revenue is NGN 100 million or greater (Adegbie et al., 2020). When paid, this fee is deductible for ECIT (typically in the year of assessment following that in which the payment was made). Banks and other financial operations, such as capital and money market operators, mortgage institutions, and micro-finance banks, are subject to this tax. Activities related to insurance, such as brokerage, pension management, pension fund administration, and associated services-Telecommunication firms and Global System for Mobile Communications (GSM) service providers and suppliers of internet and cyber services.

Big Data

The idea of big data has been around for a while, and most organizations now realize that by capturing all the data that enter their organizations (perhaps in real-time), they can use analytics to get enormous value from them. Breur (2016) noted that when adopting other advanced methods like artificial intelligence, this is especially true. Speed and efficiency are two of big data analytics' main advantages. Businesses used to gather data, run analytics, and uncover the knowledge that might be utilized to guide future choices just a few years ago (Janvrin & Weidenmier, 2017). Tax administrators may now gather data in real-time and analyze big data to make choices quickly and with more knowledge. Organizations get a competitive edge they didn't have before by being able to operate more quickly while maintaining their agility. Lin (2022) opined that more statistical power is offered by data with more entries (rows) yet data with more characteristics (or columns) may have a higher false discovery rate (Kayser et al., 2018). The definition of big data that seems to best represent it is the one linked with a massive body of information that we could not understand when utilised just in smaller amounts, despite the fact that it is sometimes used imprecisely due to the absence of a formal definition (Knauer et al., 2020). The flexibility and data speed, volume capacity and varieties of the functionality of Big Data. The phrase "big data" is currently most often used to describe the application of sophisticated data analytics techniques to large data, such as predictive analytics, user behaviour analytics, and others that can be used to identify market trends, data processing to aid in tax administrative, reduce tax crimes, and other things.

Operational capability in Big Data implementation:

Enterprises are advancing their big data analytics capabilities to improve their company performance as a result of the big data revolution. According to the findings, business intelligence infrastructure is highly impacted by big data analytics which in turn has a favourable effect on operational and marketing performance (Gusc et al., 2022; Cappa et al., 2021). Moreover, the business intelligence infrastructure acts as a mediator between the capacity to use big data analytics and operational performance, and as a full mediator between the ability to use big data analytics and marketing performance (Liu & Vasarhelyi, 2014; Belahouaoui & Attak, 2024). This study gives justification for extending more extensive research in this area by contributing to the literature on information systems in areas including big data analytical capabilities, business, and company performance metrics.

Size and Strategies for Implementation of Big Data: The process of putting company strategy into action is difficult, and the majority of developed strategies are ineffective when put into practice (Rachinger et al., 2018; Akhila et al., 2024). The implementation process is more difficult when it comes to big data initiatives because of the problems related to technology and culture that are particular to this region. Important organizational decision-makers are in charge of developing a shared understanding of the strategy for big data analytics in enterprises and play a vital role in the success or failure of big data efforts. They may establish and maintain a data-driven culture that values making decisions based on solid evidence and promotes turning data into insights, insights into actions, and actions into effective execution. The knowledge acquired from data will

be of little value to a business if its management fails to foresee the potential of freshly extracted insights (Richin et al., 2017; Adegbie & Akinyemi, 2020).

Operating Experience in Analytical Capabilities Insight through Big Data: These activities are employed in analytics, which is the process of turning data into insights for better decision-making. Analytical operations are used to examine data in order to find significant trends and patterns that may be used to shed light on the issue under investigation. Acquiring knowledge of consumer behaviour patterns, precise customer segmentation, optimal macroeconomic trend analysis, improvements in service delivery techniques, and service customization are some aspects that improve operational efficiency (Snijders et al., 2012; Williams et al., 2020; Awofala et al., 2024).

Availability of New Tools and Technologies in Tax Administration: The digitalization of the economy and the rise of new business models and ways of working expose tax administrations, much like tax policymakers, to make change fast. The information and illustrations in Tax Administration 2019 demonstrate how new data sources, technology, and more international collaboration are giving tax administrations new chances to manage compliance more effectively, safeguard their revenue base, and ease administrative costs (Zhang et al., 2020). The Tax Administration Series, which was initially released in 2004, offers extensive comparative data on the performance of 58 advanced and emerging tax administrations in addition to a study of the key trends and advancements in tax administration. To better understand how and why taxpayers behave and utilize these insights to create useful policies and initiatives, several tax administrations now report using behavioural insights and analytics. Behavioural researchers are employed by more than 10 administrations while data scientists are employed by more than 35 administrations. Where feasible, tax administrations try to intervene prior to the filing of tax returns, adopting an increasingly proactive approach to compliance risk management (Aladebumoye, 2025; Richin et al., 2017). Formal cooperative compliance measures for big taxpayers either exist or are being proposed in roughly two-thirds of the administrations.

The Desirability for Accurate, Timely and Trustworthy Reports: A crucial component of these tax systems is the precise identification of corporate businesses (Sulman et al., 2019; Akintoye & Akinyemi, 2020). Simply put, taxation systems are significantly in danger without such procedures. In a typical business setting, revenue authorities rely on their ability to identify a taxpayer in order to have access to verified information about that taxpayer's tax affairs. In the case of direct taxes, like income tax, the taxpayer's precise identification assures that they pay tax on their own income and not the income of another person (Yalamati, 2024). Hence, accurate identification guarantees the avoidance of double taxes or unintended non-taxation. When it comes to consumption taxes, precise company identification helps to ensure that the proper jurisdiction receives the tax and that the taxpayer is not accidentally or purposefully exempt from paying it (Dada et al., 2025; Ihenye & Ogbise, 2022).

THEORETICAL REVIEW

The theory of digital diffusion is found on the assumption that spreading new ideas either naturally or deliberately is a necessary component of adopting an invention. It entails implementing a novel concept, behaviour, or item that is seen to be novel in (Yudkowsky, 2008). The big data in its framework deepens the tax digitalization and application of information technology and new innovation in tax administration efficiency in tax revenue generation. This is key to change on how people perceive tax payment and if an idea looks novel to a potential adopter. Then, it qualifies as an innovation. The diffusion theory reflects on the realities of digital solutions and the dissemination of information towards was giving credibility in support of this idea by Alles, 2015; Liu & Vasarhelyi, 2014). The studies showed that the theory of digital diffusion is capable of bringing revolution and new ways of doing things using new ideas, as well as the identification of the factors that affect the rate at which an innovation is adopted or the factors that prevent it from being adopted at all. It is also capable of bringing managerial innovations, system information innovations, and effective performance in managerial or administrative efforts. However, in critiquing the theory, some studies had demonstrated that that the effective managerial performance was not supported by this theory. For instance, Anindita and Yadav (2018) opined that the theory of digital diffusion could cause uncertainty and confusion in the minds of potential adopters and that uncertainty implies a lack of predictability and information in decision. In the literature on contemporary public finance, a field known as tax system economics has grown. Its definition is the total management of public revenue of a state or integration grouping's public revenues and expenditures in order to create sensible economic policies that encourage economic growth and development and safeguard against functional hazards for present and future generations.

Empirical Review

Adekunle et al. (2025) examined how top management support mediated the adoption of big data analytics. The quick advancement of information technology has altered the competitive landscape in many organizations. The technology acceptance model serves as the foundation for this study, which uses constructs like perceived benefits, technology complexity, data quality, and IT infrastructure to examine and model accountants' adoption of big data analytics. By creating and electronically distributing a questionnaire to accounting professionals employed by particular Nigerian organizations, a cross-sectional research design was used. Descriptive analysis was performed on the data from 264 responses, and regression analysis was used to estimate the research model and determine the relationships between the variables. The findings demonstrated that BDA adoption is positively and significantly impacted by perceived benefits, technology complexity, and data quality. The adoption of BDA is positively, but not significantly, impacted by IT infrastructure.

Similarly in a recent related study, Dada et al. (2025) examined the effect of data analytics on the efficiency of company income tax in Nigeria. The study employed survey research design, primary data obtained with the help of structured questionnaires obtained from retrieved and validated 400 respondents from the population of 2 million questionnaire administered through online platform.

The study explored descriptive and inferential statistics for the data analysis. The result of the descriptive analysis revealed that a significant proportion of the respondents affirmed that data analytics enhances efficiency of companies income tax revenue generation, while the regression analysis further confirmed that data analytics had a significant effect on company income tax revenue generation in Nigeria.

Rabbani et al. (2023) studied the moderating effect of artificial intelligence in the nexus between banks' tax management and administration, financial processes and the market share price of the banks. A survey research approach was adopted for the study, using structured equation modelling estimation techniques in estimating the validity and reliability of the instrument used for the study. The reliability and validity tests were confirmed well and based on the analysis conducted. The study demonstrated that digital solutions and new financial innovations greatly impacted the market performance of banks. Also, the study revealed that the study employed descriptive statistics and inferential analysis for the study. The outcome of the analysis revealed that the application of artificial intelligence had an insignificant moderating effect on the market share price of the banks investigated.

Gusc et al. (2022) studied big data, artificial intelligence and blockchain solutions and their effects on tax revenue maximization and true cost accounting management in the energy transition in selected countries in Europe. The study employed secondary data and primary sources from selected interviews conducted. The regression analysis using inferential analysis showed that the use of disruptive technologies of big data, artificial intelligence and blockchain solution brought huge true cost savings and efficiency in tax revenue optimization among the countries investigated in Europe. Lin (2021) studied the effect of the application of big data on the effectiveness and efficiency of tax management. Some firms in China in Pharmaceutical firms and SMEs were considered in the study. The study used data collected from the complete tax database and the regression conducted revealed that the application of information technology using big data in small and medium enterprises brought a huge relief in the efficiency of tax revenue and tax administration management. The study further showed that the coefficient of variation model with Pilka coefficient found that efficiency of value-added tax had the strongest correlation among the variables.

Cappa et al. (2021) examined big data and its effect on creating economic values in a digitalized environment in enhancing managerial efficiency and improvement in volume and variety and accuracy in financial performance. The study employed primary data collected with the help of interviews conducted across a selection of firms. Based on the number of respondents, the study carried out a regression analysis and the result revealed that the adoption of big data and other digital systems brought a significant effect on the financial performance of the firms investigated.

Haleen et al. (2020) studied the application of big data in the efficiency of tax management during the Covid-19 pandemic. The study was conducted using online survey research as primary data were collected through questionnaires administered through an online survey where respondents responded to the question in relation to the relevance of big data in the efficiency of tax revenue generation and tax administration. The regression of the responses from the respondents showed

that big data applications had a significant effect on the efficiency of tax revenue and tax administration. Similarly, Abramowicz (2019) investigated the problems and randomized control trials for tax policy which are similar to those frequently used for medical treatments, the research then looked at studies that did not impact the overall amount of tax paid when compared to a control group but instead produced benefits for particular taxpayers. The paper went on to explore several important aspects of experimentation such as assessment techniques, as well as a number of possible problems, most notably the difficulty to conceal a subject's placement in a treatment group which may have an impact on their behaviour. The study discovered that many policies were scaled up for adoption using revenue-neutral tax experiments. Ganyam et al. (2019) assessed the effect of information technology on tax revenue generation and tax administration in Nigeria. The study employed a survey research design using questionnaires administered to selected respondents living in Benue State of Nigeria. The data collected was analysed with the help of descriptive statistics, mean, median and standard deviations. The study showed that the majority and percentage of respondents showed that information technology had an impressive and significant effect on tax revenue generation and tax administration in Benue State Nigeria.

METHODOLOGY

The study explored field survey research design, using primary data from standard self-structured questionnaires in relation to big data impacting tax administration towards efficient tax revenue generation in Nigeria. The study considered selected tax administrators and senior managers of Federal Inland Revenue Services and Lagos State Inland Revenue as the baseline units of study. Standards self-structured questionnaires used were administered through online platforms (Google form and face-to-face administration to selected tax administrators who were familiar and with the probable managerial and financial competence in the significance of analytical abilities of big data) in tax revenue generation analyses.

Population & Sample Size: A combination of senior and managerial cadre in the office of the Federal Inland Revenue Services and Lagos Inland Revenue of 16,500 respondents formed the population of the respondents in Nigeria having regular access to the Internet among the strata and spetrum of accounting firms and practising accountants in the agencies with a clear understanding of the dynamics and good knowledge of big data analytics tools from the perspective of (i) operational capability in Big Data implementation (SEBI), (ii) Size and strategies for implementation of Big Data (SSIB), (iii), operating experience in analytical capabilities insights through Big Data (OACB), (iv), availability of new tools and technologies in tax administration (ATTA), (v), desirability for accuracy, timely and trustworthy reports (DATR). From the population of 16, 500, a total of 391 questionnaires were retrieved and validated for the study from the respondents.

Sample Size Technique: The study employed Yaro Yamane to estimate and determine the appropriate sample size for the study

Using Yaro Yamane formula:

$N = N/1+n(\varrho)^2$
Where
N = sample size, N = Population, ϱ = Level of significance.

$$n = \frac{16,500}{1+ 16,500\ (0.05)^2}$$

$$n = \frac{16,500}{42.25}$$

$n = 390.53 \cong 391$

Dependent variables: The efficiency of tax revenue generation was measured by tax revenues generated resulting from efficiency of companies' income tax (ECIT), efficiency of value added tax rate (EVTR), efficiency personal income tax (EPIT), and Efficiency information technology tax (EFTR) as quantitative variables of data obtained through secondary sources.

Independent variable: Big data is the independent variable of the study which is measured by the standard structured questionnaires based on Al-Dmour et al (2018). The variables explored for the study as measures of tax generation included: Operational Capability in Big Data implementation (SEBI), Size and strategies for Implementation of Big Data (SSIB), Operating Experience in Analytical Capabilities Insights through Big Data (OACB), Availability of new Tools and Technologies in Tax Administration (ATTA), The desirability for Accuracy, Timely and Trustworthy Reports (DATR).These questionnaires were considered the most appropriate for Nigerian revenue generation analysis since they were previously used or produced in similar emerging economies which may have traits in common with Nigeria's tax revenue generation statistics Alade, 2018). Strong Cochrane Alpha coefficients and the questionnaire's goodness of fit both lend credence to this argument.

Validity and Reliability of Research Instrument

This section presents in Table 1, the results of the reliability and validity tests conducted using Bartlett and Cronbach Alpha. The pre-test, reliability and validity of the instrument were carried out using an appropriate tests of Bartlett Test and Cronbach Alpha in Table 1. For the descriptive statistics, some tests of Hausman tests, Heteroskedasticity tests and Normality tests would be carried out for the study. Acceptance or rejection of the specified model/hypotheses was based on a 5% significance level. The results of the re-test confirmed the validity and reliability of the instrument.

Table 1: Results of the Reliability and Validity Tests

Constructs	No of Items	Bartlett Test: Chi^2 (Sig)	Cronbach's Alpha
Efficiency of companies income tax (ECIT)	5	92.374 (0.000)	0.872
Efficiency of value-added tax rates (EVTR)	5	90.124(0.000)	0.795
Efficiency personal income tax (EPIT)	5	120.324(0.000)	0.892
Efficiency information technology tax (EFTR)	5	123.430(0.000)	0.948
Operational capability in Big data implementation (SEBI)	5	142.120(0.000)	0.878
Size and strategies for implementation of Big data (SSIB)	5	114.523(0.000)	0.904
Operating experience in analytical capabilities insight through Big data (OACB)	5	102.317(0.000)	0.896
Availability of new tools and technologies in tax administration (ATTA)	5	147.250(0.000)	0.904
The desirability for accuracy, timely and trustworthy reports (DATR)	5	101.512	0.962

Source: Pilot Study, 2025.

In Table 1, using face validity, the study's instruments for assessing how Big-data affects the efficiency of revenue generation in Nigeria were shown to be reliable. The Bartlett test results were all significant at a 5% level of significance, confirming the suitability of the data. Also in Table 1, the validity result of the Cronbach Alpha coefficients has values between 0.795 and 0.962. The outcome further demonstrates that the desirability of accuracy, timely and trustworthy reports (DATR) has the greatest Cronbach Alpha coefficient of 0.962 and the Efficiency of value-added tax rates (EVTR) has the lowest, with a coefficient of 0.795. Based on these findings, the scales created for this study were regarded as trustworthy and competent to deliver dependable results.

Model Specification

$$Y_i = \alpha_0 + \beta_1 x_{1i} \ldots + \mu_i \quad (1)$$

Models

$$ECIT_i = \alpha_0 + \beta_1 SEBI_i + \beta_2 SSIB_i + \beta_3 QACB_i + \beta_4 AITA_i + \beta_5 DATR_i + \mu_i \quad (2)$$

$$EVTR_i = \alpha_0 + \beta_1 SEBI_i + \beta_2 SSIB_i + \beta_3 QACB_i + \beta_4 AITA_i + \beta_5 DATR_i + \mu_i \quad (3)$$

$$EPIT_i = \alpha_0 + \beta_1 SEBI_i + \beta_2 SSIB_i + \beta_3 QACB_i + \beta_4 AITA_i + \beta_5 DATR_i + \mu_i \quad (4)$$

$$EFTR_i = \alpha_0 + \beta_1 SEBI_i + \beta_2 SSIB_i + \beta_3 QACB_i + \beta_4 AITA_i + \beta_5 DATR_i + \mu_i \quad (5)$$

Where: ETRG = Efficiency of Tax Revenue Generation, EVTR = Efficiency of value added tax revenue, EPIT = Efficiency of personal income tax, EFTR = Efficiency of information technology tax revenue, SEBI = Operational Capability in Big Data implementation, Size and strategies for Implementation of Big Data, OACB = Operating Experience in Analytical Capabilities Insights through Big Data, AITA = Availability of new Tools and Technologies in Tax Administration, DATR = Desirability for Accuracy, Timely and Trustworthy Reports, α = constant, β = regression intercepts (coefficients), μ = error terms, *i*=cross-sectional

DATA ANALYSIS, RESULTS AND DISCUSSIONS

This section presented the descriptive and regression analysis considering data analysis, results and interpretations, discussions, conclusions, and recommendations, as well as the limitations and suggestions for further studies.

Descriptive Statistics

The output in Table 2 presents the frequency counts and percentage distributions of four variables - Age, Work Experience, Education, and Professional Qualifications - among a sample of 391 individuals.

Table 2: Demographic Characteristics

Variables	Category	Freq.	Percentage
Age			
	26 - 35 years	190	48.7
	36 - 45 years	135	34.4
	46 years and above	66	16.9
	Total	**391**	**100**
Work Experience			
	2 - 5 years	147	37.6
	6 - 9 years	222	56.7
	10 years and above	22	5.6
	Total	**391**	**100**
Education			
	HND/BSc	11	2.9
	M.sc/M.Phil.	255	65.3
	PHD	22	5.6
	Others	103	26.2
	Total	**391**	**100**
Professional Qualification(s)	ACA/ACCA/ACMA/ACTI/COREN/ANAN	190	48.7
	Others	201	51.3
	Total	**391**	**100**

***Source**: Researcher's Computation (2025)*

Looking at the age distribution, we see that almost half of the sample falls in the age group of 26-35 years, followed by 4.4% in the age group of 36-45 years, and 16.9% aged 46 years and above. No individual in the sample is less than 26 years old. In terms of work experience, over half of the sample (56.7%) has 6-9 years of work experience, followed by 37.6% with 2-5 years of work experience. Only 5.6% of the sample has 10 or more years of work experience. Moving to the education variable, majority of the sample (65.3%) holds an M.sc/M.Phil degree, followed by 26.2% with "Others" education category which is not specified in the table. Only a small percentage (2.9%) holds a HND/BSc degree, and 5.6% hold a PhD. Again, the distributions in the sample are not evenly distributed across the categories with a higher concentration of individuals. Finally, the table shows the distribution of professional qualifications among the sample. Almost half of the sample (48.7%) holds a professional qualification such as ACA/ACCA/ACMA/ACTI/COREN/ANAN while the other half (51.3%) holds "Other" professional qualifications, which are not specified in the table.

Efficiency of Tax Revenue Generation

The estimated frequency counts and percentages of each response category are presented in Table 2 for each year, along with the total number of responses and the mean and standard deviation that shows the degree of variability in the response for each category.

European Journal of Accounting, Auditing and Finance Research, 14(3),105-131, 2026
Print ISSN: 2053-4086(Print),
Online ISSN: 2053-4094(Online)
Website: https://www.eajournals.org/
Publication of the European Centre for Research Training and Development-UK

Analysis of the Respondents Responses on Efficiency of Tax Revenue Generation

Table 3: Efficiency of Tax Revenue Generation

	Very Low	Low	Undecided	High	Very High	Total	Mean(StD)
Efficiency of companies income tax (ECIT)							
Difference between 2017 & 2018	0(0)	6(1.5)	61(15.5)	207(53.1)	117(30)	391(100)	4.12(0.71)
Difference between 2018 & 2019	0(0)	9(2.2)	33(8.5)	76(19.5)	273(69.8)	391(100)	4.57(0.74)
Difference between 2019 & 2020	0(0)	9(2.4)	84(21.5)	129(32.9)	16(43.3)	391(100)	4.17(0.84)
Difference between 2020 & 2021	0(0)	4(1.1)	108(27.5)	130(33.3)	149(38.2)	391(100)	4.09(0.83)
Difference between 2021 & 2022	16(4)	16(4.2)	58(14.9)	154(39.5)	147(37.5)	391(100)	4.02(1.03)
Value Added Tax Rate (EVTR)							
Difference between 2017 & 2018	9(2.2)	22(5.6)	84(21.5)	145(37.1)	131(33.6)	391(100)	3.94(0.99)
Difference between 2018 & 2019	6(1.5)	18(4.5)	57(14.5)	98(25.1)	212(54.4)	391(100)	4.26(0.97)
Difference between 2019 & 2020	3(0.7)	29(7.5)	53(13.5)	150(38.4)	156(40)	391(100)	4.09(0.94)
Difference between 2020 & 2021	12(3.3)	18(4.7)	60(15.3)	129(32.7)	172(44)	391(100)	4.09(1.03)
Difference between 2021 & 2022	4(1.1)	11(2.9)	71(18.2)	117(29.8)	188(48)	391(100)	4.21(0.91)
Efficiency personal income tax (EPIT)							
Difference between 2017 & 2018	18(4.7)	22(5.5)	96(24.5)	174(44.4)	82(20.9)	391(100)	3.71(1.01)
Difference between 2018 & 2019	0(0)	19(4.9)	44(11.3)	125(32)	203(51.8)	391(100)	4.31(0.86)
Difference between 2019 & 2020	4(1.1)	24(6.2)	108(27.5)	113(29.1)	142(36.2)	391(100)	3.93(0.99)
Difference between 2020 & 2021	39(10)	29(7.3)	76(19.5)	126(32.2)	121(31.1)	391(100)	3.67(1.26)
Difference between 2021 & 2022	21(5.3)	42(10.7)	75(19.1)	85(21.8)	168(43.1)	391(100)	3.87(1.23)
Efficiency information technology tax (EFTR)							
Difference between 2017 & 2018	11(2.9)	36(9.1)	100(25.5)	140(35.8)	104(26.7)	391(100)	3.74(1.04)
Difference between 2018 & 2019	10(2.5)	14(3.5)	80(20.5)	105(26.9)	182(46.5)	391(100)	4.11(1.01)
Difference between 2019 & 2020	9(2.2)	45(11.5)	72(18.4)	117(30)	148(38)	391(100)	3.9(1.1)
Difference between 2020 & 2021	14(3.6)	18(4.7)	67(17.1)	124(31.6)	168(42.9)	391(100)	4.05(1.06)
Difference between 2021 & 2022	7(1.8)	16(4.2)	76(19.5)	85(21.6)	207(52.9)	391(100)	4.2(1.01)

***Source**: Researcher's Computation (2025), Note: percentages in parentheses.*

In Table 3, analyzing the results, it is observed that the majority of the respondents had a High (H) or Very High (VH) performance of the organization in terms of Efficiency of companies income tax (ECIT) in all categories. In addition, the mean response for each category was relatively high, ranging from 4.02 to 4.57 with a standard deviation ranging from 0.71 to 1.03. This indicates that there was a high level of agreement among the respondents. For Value Added Tax Rate (EVTR), there was a considerable variation in the responses among the respondents. However, the mean response for each category was also relatively high, ranging from 3.94 to 4.26, with a standard deviation ranging from 0.94 to 0.99. In terms of Efficiency personal income tax (EPIT), the respondents had a relatively high perception of the performance of the organization, with most of the responses in the High (H) and Very High (VH) categories.

However, there was a considerable variation in the responses among the respondents, especially in 2020 and 2021. The mean response for each category ranged from 3.67 to 4.31, with a standard deviation ranging from 0.86 to 1.26. For Efficiency information technology tax (EFTR), the majority of the respondents had a High (H) or Very High (VH) perception of the performance of the organization, with the mean response for each category ranging from 3.74 to 4.11, and a standard deviation ranging from 1.01 to 1.04. Overall, the results suggest that the respondents had a positive perception of the performance of the organization in terms of tax policy. However, there was a considerable variation in the responses, especially in some of the years analyzed. This indicates that there may be some areas where the organization needs to improve its tax policy to meet the expectations of the respondents.

Big Data Implementation in Tax Revenue Generation

The output presented in Table 3 provides the results of a survey conducted on the opinions of respondents regarding various aspects of big data implementation in tax revenue generation in Nigeria. The responses were recorded on a 5-point Likert scale, where 1 represents "Strongly Disagree" and 5 represents "Strongly Agree." The output includes the estimated frequency counts and percentages for each response, the total number of responses, and the mean and standard deviation for each question.

In Table 3, the statistical values of mean and standard deviation in the output suggest that the respondents had a generally positive opinion of big data implementation in tax revenue generation in Nigeria. For example, the mean score for "Familiarity with big-data" was 4.53, indicating that respondents tended to agree or strongly agree with the statement. Similarly, the mean score for "Big data enhances tax revenue generation" was 4.49, indicating that respondents believed that big data could positively impact tax revenue generation in Nigeria. On the other hand, the mean score for "Size and strategies for implementation of big data sufficiently affecting tax revenue generation in Nigeria" was 3.79, indicating that respondents were more neutral or slightly disagreed with the statement. The estimated frequency counts and percentages provide additional insights into the responses.

European Journal of Accounting, Auditing and Finance Research, 14(3),105-131, 2026
Print ISSN: 2053-4086(Print),
Online ISSN: 2053-4094(Online)
Website: https://www.eajournals.org/
Publication of the European Centre for Research Training and Development-UK

Table 4: Big Data Implementation in Tax Revenue Generation

	SD	D	U	A	SA	Total	Mean(StD)
Operational capability in Big-data implementation							
Familiarity with big-data	0(0)	6(1.6)	29(7.3)	108(27.5)	248(63.6)	391(100)	4.53(0.7)
Not aware of operational capability in big data implementation in tax revenue generation.	2(0.4)	22(5.6)	58(14.7)	119(30.5)	190(48.7)	391(100)	4.22(0.9)
Big data enhances tax revenue generation	0(0)	4(1.1)	45(11.6)	94(24)	248(63.3)	391(100)	4.49(0.7)
Operational capability in big data implementation improved the efficiency of tax revenue generation in Nigeria.	0(0)	11(2.9)	76(19.3)	152(38.9)	152(38.9)	391(100)	4.14(0.8)
Size and strategies for implementation of big data							
Size and strategies for implementation of big data sufficiently affecting tax revenue generation in Nigeria	11(2.9)	43(10.9)	70(18)	159(40.5)	108(27.6)	391(100)	3.79(1.1)
Tax revenue generation is enhanced by the size and strategies for the implementation of big data.	6(1.6)	32(8.4)	89(22.7)	66(16.5)	198(50.7)	391(100)	4.06(1.1)
Tax revenue generation is greatly affected by the size and strategies for the implementation of big data in Nigeria.	13(3.3)	16(4)	60(15.3)	182(46.5)	120(30.9)	391(100)	3.98(1)
Size and strategies for implementation of big data are available for efficient tax revenue generation in Nigeria	7(1.8)	15(3.8)	57(14.5)	77(19.6)	235(60.2)	391(100)	4.33(1)
Availability of new tools and technologies in tax administration							
The availability of new tools and technologies in tax administration can affect the efficiency of tax revenue generation	7(1.8)	3(0.7)	63(16)	148(37.8)	170(43.6)	391(100)	4.21(0.9)

Taxpayers comply better with the availability of new tools and technologies in tax administration in Nigeria.	6(1.5)	10(2.5)	63(16)	120(30.9)	192(49.1)	391(100)	4.24(0.9)
Tax compliance by taxpayers is enhanced with the availability of new tools and technologies in tax administration that impacts the efficiency of tax revenue generation in Nigeria.	0(0)	10(2.5)	41(10.4)	109(28)	231(59.1)	391(100)	4.44(0.8)
The efficiency of tax revenue generation is enhanced with the availability of tools and technologies in tax administrations.	10(2.5)	16(4.2)	73(18.7)	13534.4)	157(40.2)	391(100)	4.05(1)
The desirability for accurate, timely and trustworthy reports							
The efficiency of tax revenue generation is impacted by the desirability for accurate, timely and trustworthy reports.	14(3.6)	38(9.6)	68(17.5)	142(36.4)	129(32.9)	391(100)	3.85(1.1)
The desirability for accurate, timely and trustworthy report impact the efficiency of tax revenue generation in Nigeria	0(0)	21(5.3)	72(18.4)	118(30.2)	180(46.2)	391(100)	4.17(0.9)
Tax administrators' desirability for accurate, timely and trustworthy reporting affects the efficiency of tax revenue generation in Nigeria.	0(0)	13(3.3)	67(17.1)	102(26.2)	209(53.5)	391(100)	4.3(0.9)
The application of Big data and the desirability for accurate, timely and trustworthy reports affect the efficiency of tax revenue generation in Nigeria.	0(0)	20(5.1)	64(16.4)	135(34.5)	172(44)	391(100)	4.17(0.9)

***Source**: Researcher's Computation (2025), Note: percentages in parentheses.*

From Table 4, familiarity with big data received the highest "Strongly Agree" of 63.6 %. Also, for instance, the response "Tax revenue generation is greatly affected by the size and strategies for the implementation of big data in Nigeria" received the highest percentage of "Agree" responses (46.5%) and the lowest percentage of "Strongly Disagree" responses (3.3%). In contrast, the response "Taxpayers comply better with the availability of new tools and technologies in tax administration in Nigeria" received the lowest percentage of "Agree" responses (30.9%) and the highest percentage of "Strongly Disagree" responses (1.5%). Overall, the output suggests that respondents had positive opinions about the potential benefits of big data implementation in tax revenue generation in Nigeria. However, there were some areas where opinions were more neutral or slightly negative. For example, respondents were less convinced about the impact of the size and strategies for the implementation of big data on tax revenue generation. The output provides valuable insights into the opinions of respondents which can be used to guide future research and policymaking decisions.

4.2 Regression Results

The multiple regression models in the Table aim to examine the relationship between the four dependent variables (Efficiency of companies income tax (ECIT), Value Added Tax Rate (EVTR), Efficiency personal income tax (EPIT), and Efficiency information technology tax (EFTR)) and the four independent variables (SEBI, SSIB, AITA, and DATR).

Table 5: Regression Results

Variable	Vif	(1) ECIT	se	(2) EVTR	se	(3) EPIT	se	(4) EFTR	se
SEBI	1.11	0.1467***	0.050	0.2005***	0.065	-0.0395	0.071	0.1356	0.071
SSIB	1.20	0.2863***	0.037	0.3084***	0.040	0.4166***	0.053	0.3474***	0.047
AITA	1.61	0.1595***	0.051	0.3523***	0.060	0.3604***	0.067	0.5816***	0.063
DATR	1.58	-0.0084	0.046	0.1155**	0.056	0.1369**	0.069	-0.0843	0.061
Constant		1.7579***	0.304	0.0356	0.381	0.2960	0.344	-0.1045	0.391
Obs		**391**		**391**		**391**		**391**	
R-squared		0.297		0.365		0.343		0.384	
F-test		28.70		52.89		69.17		62.23	
Prob > F		0.000		0.000		0.000		0.000	
Mean VIF	1.38								
Het. test		110.21[0.000]		57.74[0.000]		16.30[0.000]		23.55[0.000]	

Source: Researcher's Computation (2025). ***Dependent Variables***: Efficiency of companies income tax= ECIT, Value Added Tax Rate = EVTR, Efficiency personal income tax = EPIT, and Efficiency information technology tax = EFTR. ***Independent variables***: SEBI = Operational Capability in Big Data implementation, SSIB = Size and strategies for Implementation of Big Data =, OACB = Operating Experience in Analytical Capabilities Insights through Big Data,

AITA = Availability of new Tools and Technologies in Tax Administration, DATR= Desirability for Accuracy, Timely and trustworthy Reports *Note: Sig. value in square brackets *** p<0.01, ** p<0.05, * p<0.1*

Interpretations

Table 5, the estimated coefficients for the explanatory variables suggest that SEBI has a positive and statistically significant effect on Efficiency of companies income tax (ECIT) [coef. = 0.147; P-value<0.01] and Value Added Tax Rate (EVTR) [coef. = 0.201; P-value<0.01] at the 1% level but not on Efficiency personal income tax (EPIT) and Efficiency information technology tax (EFTR). This implies that an increase in the operational capability in big data implementation leads to an increase in Efficiency of companies' income tax (ECIT) and Value Added Tax Rate (EVTR). Similarly, SSIB has a positive and statistically significant effect on all dependent variables ECIT [coef. = 0.287; P-value<0.01], EVTR [coef. = 0.308; P-value<0.01], EPIT [coef. = 0.417; P-value<0.01] and EFTR [coef. = 0.347; P-value<0.01] at the 1% level. This suggests that an increase in size and strategies for the implementation of big data leads to an increase in tax revenue generation.

AITA has a positive and statistically significant effect on all dependent variables ECIT [coef. = 0.160; P-value<0.01], EVTR [coef. = 0.352; P-value<0.01], EPIT [coef. = 0.360; P-value<0.01] and EFTR [coef. = 0.582; P-value<0.01] at the 1% level. This implies that the availability of new tools and technologies in tax administration leads to an increase in tax revenue generation. However, the effect of DATR on the dependent variables is not consistent. It has a statistically insignificant negative effect on Efficiency of companies' income tax (ECIT) [coef. = -0.008; P-value>0.01] and Efficiency information technology tax (EFTR) [coef. = - 0.084; P-value>0.01] at the 5% level but a positive and statistically significant effect on Value Added Tax Rate (EVTR) [coef. = 0.116; P-value<0.05] and Efficiency personal income tax (EPIT) [coef. = 0.137; P-value<0.05] at the 5% level, respectively. This suggests that the desirability for accurate, timely and trustworthy reports affects different types of taxes differently.

Model 1: Efficiency Company Income Tax (ECIT): The individual construct revealed that each of the (operational capacity in big data implementation, size and strategic for implementation of big data and availability of new tools and technologies) exerted positive and significant effects, while desirability for accuracy, timely and trustworthy reports exhibited negative significant effect. The R-squared of the model revealed 0.297, F-Statistics 28.70 and p-value of 0.000, suggesting that big data truly had a significant effect on companies income tax in Nigeria.

Model 2: Efficiency of Value-Added Tax (EVTR): Individual parameters revealed that measures of big data (operational capacity in big data implementation, availability of new tools and technologies in tax administration) revealed insignificant effects while size and strategic for implementation of big data exerted a significant effect at a 5 % level of significance. The model revealed that the R-squared = 0.365; the F-statistics of 52.89 and the p-value of the F-statistics showed 0.000. This implied that big data had a positive significance on Efficiency of value-added tax (EVTR).

Model 3: Efficiency Personal Income Tax (EPIT): The t-statistics of the individual members showed that all the explanatory variables of Big Data (operational capacity in big data implementation, size and strategic for implementation of big data, availability of new tools and technologies in tax administration and desirability for accuracy, timely and trustworthy reports) exerted an insignificant effect on efficiency personal income tax (PIT). However, the F-statistics of the combined explanatory variables showed that big data had a positive significant effect on PIT (R-squared = 0.343; F-Statistics = 69.17; p-value = 0.000).

Model 4: Efficiency Information Technology Tax (EFTR): All the individual parameters revealed that all the explanatory variables of operational capacity in big data implementation, availability of new tools and technologies in tax administration, and desirability for accuracy \, timely and trustworthy report exhibited an insignificant effect, however, SSB had a significant effect on efficiency information technology tax (R-square = 0.384; F-Statistics = 62.23; p-value = 0.000. The model has an overall good fit as indicated by the R-squared values which range from 0.297 to 0.384, suggesting that the model explains a substantial proportion of the variance in the dependent variables. The F-statistics are also significant at the 1% level indicating that the regression models are significant.

Post-Estimation Tests

Heteroskedasticity: The heteroskedasticity tests also show significant results, indicating that there is a problem with heteroskedasticity in the models. Therefore, the reported robust standard errors are used to correct for heteroskedasticity in the models.

Variance Inflation Factor (VIF): One indicator of the degree of multicollinearity in regression analysis is the variance inflation factor (VIF). In a multivariate regression model, multicollinearity occurs when there is a correlation between several independent variables. The regression findings may suffer as a result. The variance inflation factor may therefore be used to calculate the degree to which multicollinearity has inflated the variance of a regression coefficient. The VIF values for all variables are below 2, indicating that there is no significant multicollinearity problem in the model.

Discussions: In model 1, the study found mixed results, while operational capacity in big data implementation (SEBI), size and strategic for implementation of big data (SSIB), and desirability for accuracy, timely and trustworthy reports (DATR) exerted significant effects on the efficiency of company income tax revenue generation, but availability of new tools and technologies in tax administration (AITA) revealed a marginal insignificant effect of 0.51 based on a 0.05 level of significance. However, the joint statistics of the F-statistics that considered the effect of combined explanatory variables revealed a positive significant effect. In model 2, the model showed that operational capacity in big data implementation (SEBI), availability of new tools and technologies in tax administration (AITA), and desirability for accuracy, timely and trustworthy reports (DATR) had insignificant effects on Efficiency of value-added tax. However, the joint statistics of the entire explanatory variables of the model showed that big data had a positive significant effect on the efficiency of value-added tax revenue generation in Nigeria. Also, in model 3, the results

showed that all the measures of big data (operational capacity in big data implementation (SEBI), size and strategic for implementation of big data (SSIB), availability of new tools and technologies in tax administration (AITA) and desirability for accuracy, timely and trustworthy reports (DATR) exerted an insignificant effect on efficiency personal income tax . Lastly, model 4 showed that only SSIB had a significant effect, but the joint F-statistics revealed that big data had a positive significant effect on the efficiency of efficiency personal income tax revenue generation in Nigeria.

The results were consistent with previous studies that had documented positive effects (Ionescu, 2019; Kayser et al., 2018; Cockroft, 2018; Dedic & Stanier, 2017). In addition, the studies by Rabbani et al. (2023); Cappa et al. (2021); Haleen (2020); Ganyam et al. (2019). For instance, Haleen et al. (2020) studied the application of big data in the efficiency of tax management during the Covid-19 pandemic. And the regression analysis from the responses from the respondents showed that big data applications had a significant effect on the efficiency of tax revenue and tax administration, while Rabbani et al. (2023) studied the moderating effect of artificial intelligence in the nexus between banks' tax management and administration, financial processes and the market share price of the banks and thee study demonstrated that digital solutions and new financial innovations greatly impacted the market performance of banks. Also, the study revealed that the study employed descriptive statistics and inferential analysis for the study. The outcome of the analysis revealed that the application of artificial intelligence had an insignificant moderating effect on the market share price of the banks investigated.

5. Conclusion, Recommendations and Suggestions for Further Studies.

In conclusion, the study highlights the importance of big data and technology in tax revenue generation in Nigeria. The results suggested that improving operational capability in big data implementation, increasing the size and strategies for implementation of big data, and ensuring the availability of new tools and technologies in tax administration are crucial for increasing tax revenue generation. The study also highlighted the need for accurate, timely and trustworthy reports in enhancing tax revenue generation but the effect may vary across different types of taxes.

Based on the findings, the following recommendations were offered:

i. The study recommended that tax authorities in Nigeria should embrace big data applications in all tax administrations and tax related matters to enhance tax revenue generation.
ii. The application of e-taxation, big data and other digital solutions have become a global trends in business transactions and tax administrations, as such in meeting with the growing information usefulness and the significance of new innovations, in enhancing operational efficiency, the application of big data has become imperative in tax revenue generation in Nigeria.
iii. Additionally, tax authorities should mandate real-time data reporting from financial and commercial institutions to improve compliance monitoring.

iv. Furthermore, to enhance the efficiency of tax revenue generation in Nigeria through big data, the government should establish a centralized, integrated tax data system that consolidates information from banks, telecoms, corporate registries, and digital platforms to ensure accurate taxpayer profiling and reduce evasion. Investment in big data infrastructure and the training of tax personnel in data analytics, artificial intelligence, and cyber security is essential to maximize the potential of these technologies.
v. The informal sector, which remains largely untaxed, should be integrated into the system using mobile platforms linked to biometric and transaction data to estimate incomes and assign tax obligations fairly.
vi. Predictive analytics should be deployed to identify high-risk taxpayers, streamline audits, and detect fraud.
vii. Policymakers should consider that legal reforms should also support inter-agency data sharing, and a dedicated big data analytics unit should be created within tax agencies to drive innovation and tax intelligence.
viii. Finally, periodic evaluation using measurable indicators will ensure transparency, promote accountability, and improve policy outcomes.

Limitations/Suggestion for Further Studies: The present study considered only five measures of tax revenue generation while only big data was considered among the other disruptive technologies available in enhancing efficiency of tax revenue generation and tax service performance. Future research may consider other disruptive technologies and their impact on performance efficiency. In addition, the effect of artificial intelligence, cloud accounting and other Internet of Things (IoTs) on the efficiency of tax revenue generation in Nigeria may be considered in future studies.

References

Abramowicz, M. B. (2019). Blockchain-based insurance, in blockchain and the constitution of a new financial order: legal and political challenges. *GWU Legal Studies Research Paper* 6(2), 21-42. Available at SSRN: https://ssrn.com/abstract=3366603

Adegbite, F, F., & Akinyemi O. O. (2020) Electronic payment system and revenue generation in Lagos State. *Journal of Accounting and Financial Management, 6*(1), 59–85.

Adedokun, A. (2019). Can non-oil incomes outride oil incomes in Nigeria? Evidence fromAutoregressive integrated moving average. *African Journal of Economic Review, 7*(1),188 -205

Adekunle, S. A., Usman, T. O., Okere, O. O., Kokogho, E., Isaiah, C. M., & Isibor, N. J. (2025). Modelling the adoption of big data analytics among accounting practitioners in Nigeria. *Nigerian Journal of Management Studies, 27*(1), 134-149.

Adeusi, A.S., Uniamikogbo, E., & Erah, O.D. (2020). Non-oil revenue and economic growth inNigeria. *Research Journal of Finance and Accounting, 11*(8), 95-106

Adegbie F, F., Ajala, M. O., & Aguguom, T. A. **(**2025) Tax justice and tax compliance: empirical evidence from South West Nigeria. *Journal of Management World*, 6(32), 2994-3191: https://www.managementworld.online/index.php/mw/issue/view/44

Akhila, N., Bansal, A., Mohammed, N. Q., Al-Khuzaie, M. Y., Almulla, A. A., & Agarwal, S. (2024, May). An automatic instinctive optimizing technique for tax filing via ai-driven based compilation system. *Innovative Technologies in Engineering, 5*(2), 973-977).

Alade, B.J. (2018). E-Taxation adoption and revenue generation in Nigeria. *Research Journal ofFinance and Accounting, 19*(24), 116-124.

Alade, O.R. (2015). Revenue generation as a major source of income for the State government:An empirical analysis of two parastatals. *International Journal of Economic andManagement, 3*(6), 1346-1366.

Aladebumoye, T. (2025). The role of AI in enhancing tax transparency and reducing evasion *World Journal of Advanced Research and Reviews, 25*(01), 206-212. DOI: https://doi.org/10.30574/wjarr.2025.25.1.0023

Alles, M. G. (2015). Drivers of the use and facilitators and obstacles of the evolution of big data by the audit profession. *Accounting Horizons, 29*(2), 439-449.

Amaefule, L.I., Onyekpere, U.R., and Onyekperem, V.A. (2017). The 2011 Efficiency personal income tax and non-oil revenue generation in Nigeria: An Empirical evaluation. *International Journalof Operations and Logistics Management, 6*(1), 10-28.

Anindita & Yadav, R. (2018). Employee engagement uplifts the revenue: An evidence study. In*Advances in Management Research and Innovation, 1*. 92-105. Bloomsbury PublishingPvt. Ltd.

Asaju, K. & Egberi, T. (2015). Federal character and national integration in Nigeria: the needfor discretion and interface. *American Research Institute for Policy Development. Review of History and Political Science, 3*(1), 126-134.

Awofala, T. B., & Bilikis, L. A. (2024). Parental health education and its influence on early childhood learning. *World Journal of Biology Pharmacy and Health Sciences, 20*(03), 241-247

Belahouaoui, R., & Attak, E. H. (2024). Digital taxation, artificial intelligence and Tax Administration 3.0: improving tax compliance behavior–a systematic literature review using textometry (2016–2023). *Accounting Research Journal, 37*(2), 172-191.

Breur, T. (2016). Statistical power analysis and the contemporary "crisis" in social sciences. *Journal of Marketing Analytics*, 5(2), 1-21.

Cappa, F., Oriani, R., Peruffo, E., & McCarthy, I. (2021). Big data for creating and capturing value in the digitalized environment: Unpacking the effects of volume, variety, and veracity on firm performance. *Journal of Product Innovation Management. 38*(1): 49–67. doi:10.1111/jpim.12545. ISSN 0737-6782. S2CID 225209179

Cockroft, S. (2018). Big data opportunities for accounting and finance research: big data in accounting and finance“,retrieved 23rd January 2020 from https://www.researchgate.net/publication/322938351_big_data_opportunities_for_accounting_and_finance_practice_and_research_big_data_in_accounting_and_finance.

Dada, S. O., Olayinka, M. I., Mba, O. O. (2025). Data analytics and efficiency of companies income tax revenue generation in Nigeria. *International Journal of Economics, Business and Management Research, 9*(5), 535-553. doi.org/10.51505/IJEBMR.2025.9534

Dedic, N., & Stanier, C. (2017). Towards differentiating business intelligence, big data, data analytics and knowledge discovery. Innovations in enterprise information systems management and engineering. *Springer International Publishing. 114*–122. doi:10.1007/978-3-319-58801-8_10. ISBN 978-3-319-58800-1. ISSN 1865-1356

Ganyam. A. I., Ivungu, J. A., & Anongo, E. T. (2019) Effect of tax administration on revenue generation in Nigeria: Evidence from Benue State tax administration (2015–2018). *International Journal of Economic and Commercial Management, 7*(7):394–414

Gusc, J., Bosma, P., Jarka, S., & Biernat-Jarka, A. (2022). The big data, artificial intelligence, and blockchain in true cost accounting for energy transition in Europe. *Energies* 20(2), 1-21.Haleem, A., Javaid, M., han, I., & Vaishya, R. (2020). Significant applications of

big data in COVID-19 Pandemic. *Indian Journal of Orthopaedics, 54* (4), 526–528. doi:10.1007/s43465-020-00129-z. PMC 7204193. PMID 32382166

Hilbert, M., & Lopez, P. (2011). The world's technological capacity to store, communicate, and compute information. *Science. 332*(6025)60–65. Bibcode:2011Sci...332...60H. doi:10.1126/science.1200970. PMID 21310967. S2CID 206531385.

Ihenyen, C. J., &Ogbise, T. A.S. (2022) Effect of tax revenue generation on economic growth in Nigeria. *International Journal of Business and Management Review, 10(5),* 44-53Ionescu, L. (2019). Big data, blockchain, and artificial intelligence in cloud-based accounting information systems. Analysis and Metaphysics, 18, 44-49. https://doi.org/10.22381/AM1820196

Janvrin, D. J., & Weidenmier, W. M. (2017). "Big Data": A new twist to accounting. *Journal of Accounting Education, 38*(1), 3-8.

Kayser, V.; Nehrke, B.; Zubovic, D. (2018). Data science as an innovation challenge: From big data to value proposition. *Technology, Innovation and Management Reviews, 8*(5), 16-25.

Knauer, T., Nikiforow, N., Wagener, S. (2020). Determinants of information system quality and data quality in management accounting. *Journal of Management Control. 31*(3), 97–121.

Lin, L (2021). Application of big data model in financial taxation management. hindawi scientific programming Volume 2021, Article ID 7001456, 10 pages https://doi.org/10.1155/2021/7001456

Liu, Q., & Vasarhelyi, M. A. (2014). Big questions in AIS research: measurement, information processing, data analysis, and reporting. *Journal of Information Systems, 28*(1), 1-17

Rabbani, M. R., Lutfi, A., Ashraf, M. A., Nawaz, N., & Ahmad, W. (2023), Role of artificialintelligence in moderating the innovative financial process of the banking sector: a research based on structural equation modeling. *Frontiers Environmental Science, 10*:978691.doi: 10.3389/fenvs.2022.978691

Rachinger, M., Rauter, R., Müller, C., Vorraber, W., & Schirgi, E. (2018). Digitalization and its influence on business model innovation. *Journal of Manufacturing Technology Management. 2*(1), 32-54

Richins, G., Stapleton, A., Stratopoulos, T. C., & Wong, C. (2017). Big data analytics: opportunity or threat for the accounting profession*? Journal of Information Systems, 31*(3), 63-79.

Samue, O.J., Adewole, J.A., & Idih, O. E. (2019) Implications of tax revenue on economy growth in Nigeria. *Am International Journal of Economic and Financial Research, 1*(2), 1-16.

Snijders, C., Matzat, U., & Reips, U, D. (2012). Big data: Big gaps of knowledge in the field of Internet. *International Journal of Internet Science. 7*(1), 1-5. Archived from the original on 23 November 2019. Retrieved 13 April 2013.

Sulman, R.T., Akintayo, S, Kasum, A. S,, Bamigbade, D. (2019). Effect of taxpayers' identification number on revenue generation in Lagos State, Nigeria. *Journal of Public Administration, Finance and Law 16*:106–117

Uhuaba, O., & Aguguom T. A**.** (2019). Nigerian Tax Structure and Economic Development: GDP per Capital Perspective. *Enugu State University of Technology ESUT Journal of Accountancy, 10*(1), 1-12.

Wang, S., Ouyang, L., Yuan, Y., Ni, X., Han, X., & Wang, F.Y. (2019). Blockchain-enabled smart contracts: Architecture, applications, and future trends. *IEEE TransportSystem Management Cybernation System* 49, 2266–2277.

Williamson, P. J., Wan, F., Yin, E., & Lei, L. (2020). Is disruptive innovation en emerging economies different? Evidence from China. *Journal of Engineering and technology management, 57*(6), 10-19.

Yalamati, S. (2024). Impact of artificial intelligence in supervision of enterprises reduce tax avoidance. *Transactions on Latest Trends in Artificial Intelligence, 5*(5), 12-34.

Yudkowsky E., (2008) Artificial intelligence as a positive and negative factor in global risks. Miri Machine Intelligence Research Institute, Cikovic. New York Oxford University Press. 308–345.

Zhang, Y., Xiong, F., Xie, Y., Fan, X., & Gu, H. (2020). The impact of artificial intelligence and blockchain on the accounting profession. *IEEE Access Research*, 8(3), 110461–110477.