



Tax compliance and tax yield in Nigeria: Assessment of the contribution of the informal sector

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Abstract

The study investigates how tax compliance and yield in Nigeria are impacted by the informal sector, using an empirical approach. The research was prompted by an increase in government spending despite a decrease in revenue bases. Data were retrieved from the Central Bank of Nigeria (CBN) statistical bulletin and the National Bureau of Statistics (NBS) between the years 2011 and 2021 using a longitudinal research approach. The data was analyzed through descriptive statistics and regression analysis. Findings from the study suggest that personal income tax (PIT) has a limited effect on tax revenue in Nigeria, whereas direct assessment (DAS) has a notable positive influence on tax yield in the country. Road taxes in Nigeria do not significantly contribute to increasing tax revenue. Research indicates that imposing taxes directly on individuals in the informal economy has a more substantial positive impact on tax revenue. Conversely, taxes like personal income tax and road taxes imposed on the informal sector do not greatly affect tax collection in Nigeria. The study suggests that enhancing the government's strategies for assessing and collecting taxes from the informal sector could help boost tax revenues.

Keywords: Tax compliance, tax yield, road taxes, direct assessment, informal sector

1. Introduction

Government spending has continued to increase globally in recent time because of evolution of circumstances that require government response. Some of such circumstance include; increased rate of insecurity, pandemic, national disaster, wars, recession among others (Eze & Dike, 2021) ^[1]. These circumstances are alien to the norms of government responsibilities in the past and this has increased the financial obligations of government despite the decreasing revenue base. The scenario is worse in the Nigeria situation, because of increased level of insecurities due to insurgencies. With the rise in financial responsibilities, the government is challenged by the issue of limited revenue generated from oil sales (Meagher, 2018) ^[30], as well as the problem of insufficient tax revenue due to non-payment of taxes by tax payers.

The informal sector represents a vital component in driving the economic progress of the nation because of the high concentration of firms in this sector. According to NBS (2016), the participant of the sector represents about 41.13% of Nigeria (GDP). The high concentration of taxpayers in this sector is supposed to reflect in the revenue yield of government especially as it relates to taxes. It is however found that the sector support to the government revenue is insignificant (Mohammed, *et al.* 2019) ^[31]. The kind of the

informal sector financial information disclosure, coupled with unreliable business practice have posed serious tax compliance risks to tax agency all over the world, especially in developing countries (Mohammed, *et al.* 2019) ^[31].

Tax authorities encounter difficulties when determining and administering participants' tax obligations (Gurama & Mansor, 2015) ^[26]. Additionally, the majority of voters are found to be sector participants. As a result, efforts by tax agency to resort to aggressive tax enforcement are regularly not encouraged by authority, due to political risks this could pose to re-election of a ruling party. The effort to tax the participant in Nigeria is justified by the significance of good governance, economic growth, and greater revenue yield, all of which are supported by the new National Tax Policy of 2012. Despite the sector's increasing recognition as a source of income in many nations, there are still some issues that need to be resolved.

Earlier research has attributed the lack of tax compliance to the absence of statistical data caused by the failure to register businesses in the informal sector, poor record-keeping of financial transactions, challenges related to the location of taxpayers, the unpredictable nature of informal sector operations hindering the establishment of a tax base, and limited understanding of tax obligations in the developing nations such as Nigeria (Adekoya, *et al.* 2020,

Oyedokun, 2017, Kundt, 2017, Ohaka & Zukbee, 2015 and Oduwole & Sanni, 2014)^[6, 48, 29, 29, 35].

Obara and Nangih (2017)^[34] conducted a study to analyze the impact of introducing taxes on the informal sector in Nigeria, specifically in River State. The researchers found that taxing the unregulated sector resulted in increased revenue and had a beneficial effect on Nigeria's economic growth. Oyedokun (2016)^[47] conducted a study on promoting fair taxation and improving tax collection from the informal sector in Nigeria to boost revenue. Olabisi and his team (2020)^[40] conducted research that showed a strong connection between tax revenue from the informal sector and capital development in Lagos. The study found that contributions from various sources, such as associations, small traders, and market vendors, were crucial in the region's capital growth.

Studies by Oyedokun (2016)^[47], Ogundajo *et al.* (2019)^[38] Olabisi *et al.* (2020)^[40], Obara and Nangih (2017)^[34], Oshiomah (2021)^[45] and Adegbe (2020)^[1] presented that unorganized sector are not contributing to tax yield in Nigeria despite their contribution to (GDP). This study investigate tax compliance from informal sector with tax yield in Nigeria, considering variables such as, direct assessment, road taxes and personal income tax as a measure of tax compliance and interest rate, inflation rate and tax penalty as control variables. Hence, this research work will contribute to existing knowledge by empirically investigating tax compliance and yield focusing on the informal sector. The specific objectives are:

1. Examine the impact of direct assessment of informal sector on the Nigeria's tax yield
2. Determine how road taxes from informal sector affect Nigeria's tax yield.
3. Investigate how personal income tax affects tax yield in Nigeria

Other sections of this paper capture the literature review, Data and methods, Data Analysis, conclusion and recommendations.

2. Literature review and hypothesis development

2.1 Conceptual review

2.1.1 Informal sector tax compliance

The informal sector includes individuals engaged in various trades and professions such as traders, market vendors, professionals, and artisans (Vingirayi, *et al.* 2020)^[55]. These individuals are typically self-employed and operate outside the formal legal framework, making it difficult to regulate their businesses. As a result, their business activities are not accurately reflected in tax systems due to their transient nature and lack of stability. This often leads to a low contribution to the national economy in terms of taxes, despite the profitability of their operations (Ogundajo, *et al.* (2019)^[38]. The informal economy refers to business activities that occur outside of government regulation, are not subject to taxation, and are not included in a country's GDP (Enahoro & Olabisi, 2014)^[21]. Oduwole and Sanni (2014)^[35] define the informal economy as businesses that do not use traditional accounting methods, leading to a higher level of underreporting and exclusion from economic measures like GDP due to lack of proper regulation of participants.

Adesoji and Chike (2016)^[7] state that in an unorganized economy, an enterprise typically employs around nine individuals and encompasses manufacturing, trading, and services. Adekoya *et al.* (2020)^[6] provide additional details on the informal sector, which encompasses traders, artisans like mechanics and technicians, cottage industries, small retailers, and microenterprises. Oduwole and Sanni (2014)^[35] suggest that fairness is a crucial element of a just tax system, where individuals are taxed according to their capacity to pay and their willingness to adhere to tax regulations. Nevertheless, the tax system in Nigeria is currently deemed inequitable, with formal sector employees paying taxes while those in the informal sector often evade or circumvent tax obligations. This results in small traders being burdened with multiple taxes, while wealthier informal business owners pay nothing. This lack of fairness in tax collection is inefficient.

Adekoya *et al.* (2020)^[6] describe tax compliance as the voluntary payment of taxes in a timely manner and in alignment with relevant tax regulations, without being forced by tax authorities. This includes accurately disclosing tax information promptly and settling tax debts with the appropriate tax agency in adherence to current laws and rules. Aremu and Siyanbola (2021)^[15] define tax compliance as adhering to tax obligations specified in tax laws, such as submitting tax returns and promptly paying taxes to the appropriate tax authority, as discussed in tax regulations by Sazir *et al.* (2021)^[52] and Saw (2017)^[51].

Ahmed and Kedir (2015)^[9] provided a definition of tax compliance as the level to which a taxpayer adheres to the tax regulations in their nation. It also involves following tax regulations, accurately reporting income, and paying taxes promptly without being influenced by tax officials (Sitardja & Dwimulyani, 2016)^[53].

Compliance to tax can be attained through either enforcement by tax authorities or willingly by taxpayers, according to Aremu & Siyanbola (2021)^[15]. Enforcement typically involves penalties and detection measures, while voluntary compliance relies on taxpayers willingly following tax regulations without feeling pressured or harassed by tax authorities (Muehlbacher & Kirchler, 2010)^[32]. According to Adekoya *et al.* (2020)^[6] and Oluwamayowa *et al.* (2018)^[43], faith in agent, authority power, and tax compliance were necessary for tax compliance. Taxpayers pay their taxes out of fear of being penalized and fined by the tax authority to avoid sanction by tax authorities.

2.1.2 Tax yield

This is the return in the form of revenue created in a nation by collection of taxes, as well as the regular returns collected by tax administrators as a source of revenue for a nation's government (Ogoun & Atagboro, 2019)^[37]. Income tax revenue can be influenced by either a decrease in taxes owed through the use of deductions, or an increase in taxes owed due to higher tax collection (Frank & Goyal, 2009)^[24]. Tax yield and tax revenue are the same thing; the term refers to tax generated revenue, which is defined as revenue that is forced to be collected from sources, such as, income, profits, payroll taxes, ownership, and disposal or transferred property (Adegbite, 2020)^[3]. For instance, because interest paid on debt can be deducted from taxes, it usually leads to

lower income tax payments.

It is describe as the revenue generated or realized by the authority of a nation through taxation with the help of its agency that is tax officers. This tax generation has been considered as the main and the relevant income source to the government irrespective of their levels (Awotomilusi, *et al.* 2021) ^[16]. The funding for public goods and services in economies driven by the private sector mainly comes from taxes, which governments prioritize globally (Awotunmilusi *et al.* 2021). Defaulting on taxes is considered a serious offense in strong tax-driven economies and is treated accordingly. Furthermore, the majority of tax revenue in these economies is generated from the profits of businesses of varying sizes (Adekoya *et al.* 2020) ^[6]. These economies driven by the private sector regularly employ taxation as a crucial tool for economic policy making and the advancement of the nation, as documented in current research. Thus, the level of tax yield depends greatly on business earnings and willingness to pay (Adekoya *et al.* 2020) ^[6].

The percentage of GDP that represents total tax income indicates the amount of a nation's revenue collected by the government from various taxes such as road taxes, personal income taxes, direct assessments, capital gains taxes, corporate taxes, stamp fees, and other forms of taxation imposed by the government. It can also be seen as one of the indicators of how much the government controls the economy's resources. This money can be used to manage the nation's affairs in relation to employment creation, economic stability and growth, and the development of the economy's underdeveloped areas so as to end job scarcity (Fasina *et al.* 2018) ^[23].

2.1.3 Direct assessment and tax yield

Direct assessment is a type of income tax that self-employed individuals are required to pay. It is typically levied on individuals who own and operate small businesses (Awotomilusi & Adebayo, 2022) ^[17]. Emmanuel (2018) ^[20] defines direct assessment as a method in which individuals who work for themselves are evaluated and required to pay taxes based on the income they earn. This group includes professionals such as lawyers, architects, accountants, surveyors, and consultants, among others. It also encompasses contractors, politicians, mechanics, traders, welders, farmers, carpenters, tailors, butchers, hairdressers, bricklayers, artisans, athletes, and all individuals residing in a specific state who earn any form of income (Adekoya, *et al.* 2020) ^[6].

According to Ogundajo *et al.* (2019) ^[38] direct assessment is a legal way of tax collection. It refer to a process by which the assessable income of taxable persons from all source is being subjected to tax. Direct assessment can be self-assessment, government assessment and best of judgment assessment (BOJ) depending on the situation prevailing. A study was conducted by Adegbite *et al.* (2021) ^[4, 5] to investigate how road tax could help prevent a decline in revenue generation in states located in southwestern Nigeria. The research revealed a notable and positive correlation between direct assessment and revenue generation in these states. Fasina *et al.*, (2018) ^[23] confirm a direct significant effect of direct assessment on tax yield. In a relevant study by Adegbite (2017) ^[2], reported a positive

significant effect of direct assessment on government revenue. Hence, investigating the contribution of the participant of unorganized economy to tax yield become very important

2.1.4 Road taxes and tax yield

Road tax refers to a tax compulsory paid on wheeled vehicles using public roads. Every state require an annual registration fee from vehicle owners so as to permit the usage of such vehicle on roads (Adegbite, 2020) ^[3]. The way in which the road taxes been charge differs from one state to another state which rest on the type of vehicle, and also kind of the capacity, engine, and classes of vehicle. These classes of vehicle are passenger cars, lorry, truck, bus, motorcycle among others. Once a year, the vehicle owners, based on engine displacement, and year of productions, pay yearly road tax to the authority so that their contribution are felt by the government for effective discharge of fiscal roles. In Nigeria, every states collect twelve-monthly automobile road tax which possesses same rate on vehicle types as required by the state authority (Omondi, 2019) ^[44].

This tax is payable to revenue collectors in many ways that include: Vehicle registration tax which is encompassed in the new motor vehicle's retail purchased price and Motor vehicle imported from abroad which is taxed by the government and paid by the owner applying for registration (Fasina, *et al.* 2018) ^[23]. The Nigerian law has compulsory all vehicles (trucks, cars, tricycle, and motorcycle) that use Nigerian roads to get their vehicle registered for easy tracking of owners of the vehicles. Adegbite *et al.* (2021) ^[4, 5] investigated the impact of road taxes on mitigating the decline in revenue generation in southwestern states of Nigeria. Their research revealed a clear correlation between road taxes and revenue generation. In the same way, that road taxes had a beneficial and noteworthy effect on tax revenue. Additionally, concluded that road taxes significantly and positively influence the inflow of revenue generated, as supported by statistical analysis. Also, Adegbite (2017) ^[2] indicate that road tax had direct effect on government revenue. Led by the above studies there is need to investigate the involvement of participant of unorganized economy to tax yield.

2.1.5 Personal income tax and tax yield

The Personal Income Tax Act in Nigeria mandates individuals who earn income through employment or business ownership to pay taxes. This legislation applies to all income earners in the country, including employees, self-employed individuals, and others who are subject to personal income tax as outlined by Fasina, *et al.* (2018) ^[23]. The tax is regulated by the state internal revenue service and covers a range of income sources, including market trading, land registration fees, development levies, betting/gaming fees, and stamp duties (Akeju, 2018) ^[10].

Propose that taxation is utilized as a fiscal tool to improve income distribution and welfare. Fasina and team (2018) ^[23] corroborated this notion by discovering that personal income positively affects government income, suggesting that a rise in personal income should lead to an increase in overall income. Nassar and Fasina's research (2005) ^[23] highlights the importance of personal income in influencing tax revenues. Conversely, Adeyemi and Mieseigha's study

(2019) ^[8] suggests that personal income has a negative impact on Nigeria's economic growth.

2.2 Theoretical review

2.2.1 Economic utility/deterrence theory

Becker's deterrence theory, introduced in 1968, explores the relationship between crime and punishment, with tax evasion as a key application. The theory proposes that taxpayers consider the advantages of avoiding taxes successfully in comparison to the consequences (Sandmo, 2005) ^[50], emphasized on the importance of tax audits and penalties in deterrence, while argue that focusing on the likelihood of detection and severity of penalties in tax avoidance models can lead to undesirable behavior.

Some key studies on the impact of intervention on compliance are Hasseldine (2000) ^[27] and Torgler (2002) ^[54] tax morale: theory and examination of tax compliance, which investigated the relationship between compliance costs and taxpayer audits. Braithwaith (2003) ^[18] suggests that deterrence (such as being caught and the punishment involved) is a crucial factor in understanding compliance, as individuals may believe that most people will not comply due to the overall low level of deterrence. This approach recognizes non-compliance with the beneficiary's decision is a choice that should be identified and punished. In other words, deterrence theory deals with the level of punishment and the effect of the threat of punishment on bad behavior. Deterrence theory is used as a basis for the investigation of crimes that remain not involves tax evasion. In the negative view of taxpayers are weak resources that are affected by economic activities such as profit maximization and the ability to find yes.

Taxpayers analyze compliance alternatives such as tax avoidance, probability of detection and resultant effect of penalty then choose the option that files their after-tax returns before the risk arises. This phenomenon is referred to as "participating in the lottery". Therefore, this concept suggests that implementing tax audits and penalties for non-compliance is necessary to improve adherence to tax regulations. This theory has important relevance to this study because the application of taxes ensures that the government receives adequate revenue to carry out all its publicly beneficial services and find lasting solutions to all society's ills.

2.2.2 The benefits received theory

The theory of benefits received was initially formulated by Swedish economist and later reinterpreted. This principle calculates the approval of politicians who are ready to use the tax paid or use the money paid for public goods in conversation for benefits received. Consequence theory predicts contractual and exchange relationships between most taxpayers and governments. The authority made available certain goods and chattels which include road construction to the public, and taxpayers must finance the government in relation to the benefits obtained.

This road which is always used by road users (vehicle owners) must be constantly monitored by the agency of government. This can be supplemented by road taxes that is income from road users. Theory also states that taxpayers must provide the appropriate tax money to help them reimburse the value of the services. However, this theory

does not include the equal delivery of income and wealth; it uses income as an inequality for the delivery of taxes. It also failed to demonstrate the diversity of tax strategies implementation to guarantee economic and social stability in the affected states (Adegbite & Azeez 2021) ^[4, 5]. Since there is mutual agreement exists among the taxpayers and government, this study is anchored on benefit received theory. The government builds roads for the people, and the people pay taxes to help the government fulfill its responsibilities.

2.3 Empirical review

Sazir and his team (2021) ^[52] carried out a study on tax compliance. They collected data from multiple sources and employed a variety of research designs and methods. The research included 14 employees and 96 informal traders. The results indicated that there was not a significant relationship between tax compliance and informality.

Adegbite *et al.* (2021) ^[4, 5] conducted a study on the impact of road tax on offsetting reduced revenue generation in the south western states of Nigeria. The research utilized panel data analysis with fixed and random models from 2010 to 2019. The results indicated that all factors examined had a positive and significant effect on revenue generation in the states surveyed. Specifically, an increase in road tax was found to have a statistically significant positive effect on revenue in all states studied.

Appiah (2021) ^[14] conducted a study on tax revenue in the informal sector, specifically in the Sunyani tax district. The research used a combination of quantitative and qualitative methods for data collection and analysis. The study focused on the informal sector in Ghana, with a sample of 100 entrepreneurs/operators from diverse backgrounds. Data analysis involved categorizing respondents using tables to calculate percentages within each group. Statistical Package for Social Sciences (SPSS) was used for analysis, and Epi-Info software was used for data collection. The findings indicated that the level of education influenced factors related to non-compliance.

Cordelia's research in 2020 investigates the impact of income taxation, corruption, and informal sector activities in Nigeria compared to other African nations. Through analyzing data from 2000 to 2018 and using multi-regression analysis, the study finds that corruption impedes tax revenue collection, while the informal economy does not have a significant effect on tax revenue during the time period examined.

Iormbagah and his team (2020) conducted a study in Nigeria to explore the connection between informal taxation and economic progress. They utilized a survey method, distributing 200 online questionnaires with a 5-point Likert scale. Out of these, 48 responses were completed and used as the study's sample size. The data analysis involved inferential statistics such as averages and percentages. The findings indicate that informal taxation in Nigeria contributes to social justice and improves tax benefits for infrastructure development, except for healthcare. However, there is a lack of accountability in the informal taxation process due to limited awareness and accountability measures among community members.

A study conducted by Adekoya *et al.* (2020) ^[6] examined the challenges and benefits of tax compliance in Nigeria's

informal economy. The research utilized an investigative methodology, focusing on literature related to taxation, accounting, and finance. The study concluded that taxing the informal sector is crucial for the progress of developing countries as it helps in generating revenue, promoting growth, and improving governance.

Olabisi and her team (2020) ^[40] carried out research examining how tax revenue from the informal sector influences capital development in Lagos. They used an ex-post facto design and utilized Ordinary Least Square (OLS) regression to analyze the data. Their findings showed that tax revenue from associations, small-scale traders, and market vendors has a notable effect on capital development in Lagos.

Guillermo and Deyve (2019) ^[25] conducted research on the informal economy in different countries such as Peru, Latin America, and OECD countries. Their focus was on examining the influence of the informal economy on tax revenue and economic growth. Using the Multiple Indicator and Multiple Cause (MIMIC) model, they found that the informal economy in Peru represented 37.4% of GDP, 34% in Latin America, and 19.89% in OECD countries. This indicates that the informal economy in OECD countries is smaller than the average in Latin America.

Ogundajo *et al.* (2019) ^[38] conducted a study on the effects of taxation on revenue generation in Nigeria's informal sector. They distributed 73 structured questionnaires to selected participants and utilized regression analysis to analyze the data. The findings indicated that elements such as tax assessment and collection approaches, compliance levels, financial transactions, and economic activities in the informal sector significantly impacted tax revenue in Nigeria.

Adeyemi and Mieseigha (2019) ^[8] conducted a study examining how personal income tax impacts the economic growth and development of Nigeria. The research used data from the Federal Inland Revenue Service and the CBN Statistical Bulletin from 1987 to 2017, employing an ex-post facto research design. The findings from the Vector Autoregression model indicated that personal income tax has had a significant negative impact on the growth of the Nigerian economy.

A study conducted by Akeju (2018) ^[10] examined the impact of belonging to an association in the informal sector on tax compliance in the southwestern region of Nigeria. The research surveyed 600 artisans in Ekiti, Ondo, and Oyo states and utilized logit regression to analyze the data. The findings indicated a significant relationship between being a member of an association and tax compliance among informal sector taxpayers.

Julius and Lucky (2019) ^[28] studied how government accountability affects voluntary tax compliance in the informal sector, focusing on fiscal exchange. They surveyed 919 respondents, which made up about 73% of total participants, and used descriptive and inferential statistics to analyze the data. The results showed a positive connection between government accountability and voluntary tax compliance. The research also pointed out the low levels of voluntary tax compliance in the informal sector of Edo State.

In a study conducted by Oluyombo and Olayinka (2019) ^[38], the relationship between tax compliance and government

revenue growth in Nigeria was examined. Secondary data from the Federal Inland Revenue Service was collected and ordinary least square regression was used for analysis. The results showed that tax compliance positively impacts tax revenue, while tax default can lead to significant fluctuations in government revenue.

Fasina *et al.* (2018) ^[23] researched the correlation between personal income tax and government revenue in Ekiti State by analyzing data from state budgets between 2003 and 2012. They utilized statistical methods such as descriptive and inferential statistics, employing Ordinary Least Square (OLS) to assess the variables. The results indicated that PAYE, Direct assessment, and Road tax had a beneficial effect on revenue generation for the government in Ekiti State.

Ameyaw *et al.* (2016) ^[12] conducted a study on tax compliance in Ghana's informal sector and its effects on economic growth. They utilized a survey methodology involving 600 informal sector taxpayers from all regions of Ghana and analyzed the data using regression analysis. The researchers also investigated the correlation between taxes and GDP in Ghana from 1980 to 2015 using the Augmented Dickey Fuller Unit Root test.

Oladapo (2015) ^[41] conducted a study on the potential for creating jobs in Nigeria's informal sector. The research involved gathering primary data from interviews and surveys with people in six randomly chosen areas in Ilorin metropolis, Kwara State, Nigeria. The data was analyzed descriptively and showed that the informal sector in Nigeria can provide employment opportunities for individuals with different educational backgrounds.

Ramot and Ichihashi (2015) ^[49] conducted a study analyzing data from 65 countries between 1975 and 2011 to investigate the correlation between tax structure, economic growth, and income inequality. Utilizing the Ordinary Least Square method, they found that higher Company Income Tax (CIT) rates were associated with decreased economic growth and increased income inequality. In contrast, Personal Income Tax (PIT) rates did not have a significant impact on either economic growth or income inequality. As a result, the study suggested the implementation of a more balanced tax system in Nigeria.

According to the literature review, some gaps have been found. Previous studies by Ogundajo *et al.* (2019) ^[38], Ameyam *et al.* (2016) ^[31], Oladapo (2015) ^[41], and Mohammed and Muritala (2019) focused on tax compliance through examining subjective perceptions and human attitudes using primary data sources. This study will utilize secondary data from the National Bureau of Statistics (NBS). Additionally, Olabisi *et al.* (2020) ^[40] used secondary data to examine the informal sector in Lagos state, focusing on associations, petty traders, and market vendors. This study will consolidate these variables into one and incorporate road taxes and personal income tax as new variables, in addition to tax rate and tax penalty as control variables, and expand the time period. Panel data from the NBS will be analyzed to assess the informal sector's contribution to tax revenue.

This study's hypotheses were stated as follow

Ho1: Direct assessment does not significantly affect tax yield in Nigeria.

- Ho2:** Road taxes do not have a significant impact on tax revenue in Nigeria.
- Ho3:** Personal income tax does not have a significant impact on tax revenue in Nigeria.

3. Materials and Methods

This study utilized a longitudinal method to investigate tax compliance and revenue in Nigeria, focusing on the informal sector. Information was gathered from secondary sources such as the Central Bank of Nigeria (CBN) statistical bulletin and National Bureau of Statistics (NBS) from 2011 to 2021, starting from 2011 due to alterations in the personal income tax Act. The data was analyzed using descriptive statistics and regression techniques.

3.1 Model specification

The model was designed to show the relationship between tax compliance and tax revenue, based on the benefit received theory. It was tailored to align with the model proposed by Olabisi *et al.* (2020) [40] in their study on informal sector tax revenue and capital development in Lagos. However, this research made modifications by replacing association, market men and women, and petty trader with direct assessment, road taxes, and personal

income tax, and also included tax rate and tax penalty as control factors. Thus, the below is this study model in equations i and ii respectively.

$$TY = f(TC)$$

$$TY_{it} = f(DA_{it}, RT_{it}, PIT_{it}, INR_{it}, IFR_{it}, TP_{it}) \dots \dots \dots Eq.(i)$$

$$TY_{it} = \alpha_0 + \alpha_1 DA_{it} + \alpha_2 RT_{it} + \alpha_3 PIT_{it} + \alpha_4 INR_{it} + \alpha_5 IFR_{it} + \alpha_6 TP_{it} + e_{it} \dots \dots Eq.(ii)$$

Where

- TY – Tax Yield (N’ billion)
- TC – Tax Compliance
- DA – Direct Assessment (N’ billion)
- RA – Road Taxes (N’ billion)
- PIT – Personal Income Tax (N’ billion)
- INR – Interest Rate
- IFR – Inflation Rate
- TP – Tax Penalty
- e = Epsilon or error term
- α_0 = Coefficient of the constant variable
- $\alpha_1 - \alpha_5$ = coefficient of the independent variables
- it – time series (2011–2021)
- Apriori expectation in equation i, ii and iii based on literature review is stated thus;
- $\alpha_1 > 0, \alpha_2 > 0, \alpha_3 > 0, \alpha_4 > 0, \alpha_5 > 0$

Table 1: Measurement of Variables

Variables	Descriptions	Measurement	Source
Dependent Variable			
Tax yield TY	Tax yield refer to revenue generated in a country by tax collection	Total annual tax revenue.	Awotomilusi, <i>et al.</i> (2021) [16]
Independent Variable			
Direct Assessment DA	Tax which is imposed on self-employed person	Total annual tax collected from direct assessment	Fasina <i>et al.</i> and (2018) [23], Adegbite (2017) [2]
Road Taxes RT	Refer to tax imposed on wheeled vehicle	Total annual tax collection from road taxes	Fasina <i>et al.</i> (2018) [23]
Personal Income Tax PIT Control Variable Interest Rate INR Inflation Rate IFR Tax penalty TP	Refer to tax imposed on the income of individual other than PAYE. The rate charged by banks on loans. The rate at which price of commodities rise. Is a fine charged for late filing of tax return	Total annual tax collected from PIT Lending interest rate The degree of inflation in each year. Interest on late or non-filing.	Adeyemi and Mieseigha (2019) [8] and Nassar and Fasina (2005) [23] Ogbonna and Appah (2016) [36] Ogbonna and Appah (2016) [36] Oladele (2016) [42]

Source: Author’s compilation (2023)

4. Data analysis and discussion of findings

4.1 Descriptive statistics

The information presented in table 2 indicates that the average tax yield for the country is 27.099 over the years, with a standard deviation of 0.38481 showing moderate variation. The coefficient of variation is 0.01419, indicating a 1.4 percent variation over the 11-year period. The total tax yield is 298.099, with a minimum of 26.11 and a maximum of 27.535. The data for this variable is negatively skewed, with a skewness statistic of -1.5502 and a kurtosis value of 5.0653. Additionally, the table displays that the personal income tax has an average value of 24.995 and a standard deviation of 1.183, suggesting significant variability from the mean. The sum of personal income tax is 274.947, ranging from a minimum of 21.895 to a maximum of 25.8985. The variable exhibits negative skewness (-1.8910) and a kurtosis value of 5.414, indicating a non-normally distributed data following a mesokurtic distribution. Furthermore, Table 2 shows that the direct assessment (DAS) has an average of 23.545 and a standard deviation of

.8701, indicating moderate variability. The coefficient of variation is 3.6%. The total sum of the direct assessment is 259.0, with a minimum value of 21.323 and a maximum value of 24.514. The data displays negative skewness (-1.495) and a kurtosis value of 4.983, indicating non-normal distribution as the kurtosis value exceeds the threshold of 3. On the other hand, the average road taxes (RDT) collected over 11 years is 22.752, with a standard deviation of 1.0622, suggesting significant variation in annual road tax collections (coefficient of variation is 4.6%). The total sum of road taxes collected is 250.2, with a range of 20.491 to 23.911. The data for road taxes shows negative skewness (-.8329) and a kurtosis value of 2.765, indicating that it is normally distributed. Table 2 presents statistics for tax penalty (TPY), interest rate, road taxes, and inflation rate across the study periods. The average tax penalty is 2.3025 with no variation (standard deviation of zero). The total sum of tax penalties is 25.32, ranging from 2.30 to a maximum of 2.30. The interest rate has an average of 2.758 with a standard

deviation of 0.1255, indicating a significant variation. The total sum of road taxes is 30.34, with a minimum interest rate of 2.440 and a maximum of 2.8650. The inflation rate is

2.4733 with a standard deviation of 0.25995, suggesting moderate variation. Skewness and kurtosis values are used to describe the distribution of the data.

Table 2: Descriptive Statistics

Variables	TYD	PIT	DAS	RDT	TPY	ITR	IFR
Observations	11	11	11	11	11	11	11
Mean	27.09	24.995	23.54	22.75	2.3025	2.75	2.473
Std. Deviation	.3848	1.183	.8701	1.062	0	.125	2599
Sum	289.09	274.94	259.00	250.27	25.328	30.34	27.20
Coeff. Variation	0.141	.0473	0.3695	0.4655	0	.0455	.10518
Minimum	26.11	21.895	21.323	20.491	2.3025	2.440	2.086
Maximum	27.53	25.89	24.514	23.911	0	2.865	2.830
Skewness	-1.550	-1.891	-1.495	-.83292	0	-1.732	-0.724
Kutosis	5.065	5.414	4.983	2.765	0	4.837	1.812

Researcher’s Computation (2023)

4.1.1 Normality Test

In linear modeling, with residuals that are identically and independently distributed. The normality of residuals was assessed using the Shapiro-Wilks test, and the results can be found in table 3. This test helps determine if the data distribution deviates from normality. A non-significant finding ($p > .05$) suggests that the data distribution is similar to a normal distribution. To validate the results, the Shapiro-

Wilk test was used in conjunction with the SK test, chosen for their superior performance compared to other normality tests such as the Kolmogorov-Smirnov test. The results in table 3 show that the residuals for the explanation and tax yields variables have p-values above 0.05 at a significance level of 5%. However, the Shapiro-Wilk test indicates that the quick ratio variable does follow a normal distribution.

Table 3: Shapiro-Wilk W Test for Data Normality

Variables	Obs	W	V	z	Prob>z
Residuals	11	0.92742	1.175	0.291	0.38539
Skewness/Kurtosis tests for Normality					
Variables	Obs	Pr(Skewness)	Pr(Kurtosis)	-----Joint----- adj chi2 (2)	Prob>chi2
Residuals	11	0.5844	0.9209	0.31	0.8568

Source: Researchers’ Computation (2023)

4.2 Correlation analysis

The study utilized the pairwise correlation coefficient to examine linear connections between different variables. This analysis also helped to detect the potential for multicollinearity among the variables, which could affect the standard error. Table 4 shows a strong and positive relationship between tax yield and Personal Income Tax (PIT). The coefficient value is 0.6566 and the p-value is 0.0282, indicating that a one unit increase in PIT will result in a 65.66% increase in tax yield. Direct Assessment (DAS) is also positively associated with tax yield, with a coefficient value of 0.7855 and a p-value of 0.0042, suggesting that a one unit increase in DAS will lead to a 78.55% increase in tax yield. Road taxes (RDT) show a positive correlation with tax yield, with a coefficient value of 0.2613. However, this correlation is not statistically significant, as indicated by a p-value of 0.4376. Multicollinearity prevents a significant relationship between tax penalty and tax yield, so this variable will not be included in the model.

The correlation between interest rate (ITR) and tax yield (TYD) is weak and negative, with a coefficient of -0.0909, suggesting that a rise in interest rates leads to a 9.09 percent decrease in tax yield. However, this correlation is not statistically significant at the 5 percent level, with a probability value of 0.7904. Conversely, the correlation between inflation rate (IFR) and tax yield (TYD) is positive, with a coefficient of 0.0008, indicating that an increase in

inflation rate results in a 0.08 percent decrease in tax yield. Similar to the interest rate correlation, this relationship is not statistically significant at the 5 percent level, with a p-value of 0.9998. Furthermore, there is no evidence of multicollinearity among explanatory variables as shown in table 4, as the correlations did not exceed the threshold of 0.7.

Table 4: Correlation Analysis of Study Variables

	TYD	PIT	DAS	RDT	TPY	ITR	IFR
OBS	11	11	11	11	11	11	11
TYD	1.000						
PIT	0.6566* 0.0282	1.000					
DAS	0.7855* 0.0042	0.8077* 0.0026	1.000				
RDT	0.2613 0.4376	0.3106 0.3526	0.3817 0.2467	1.000			
TPY	0 -	0 -	0 -	0 -	1.000		
ITR	-0.0909 0.7904	-0.1472 0.6659	0.0788 0.8179	-0.2381 0.4808		1.000	
IFR	0.0008	0.1954	0.4261	-0.2346	-0.3810		1.000

Source: Researchers’ Computation (2023)

4.3 Tax Compliance and tax yield in Nigeria

Table 5 presents the findings of a regression analysis that explores the relationship between tax compliance in the informal sector and tax yield in Nigeria. The R-Squared

value of 0.8436 indicates that 84.36% of the variation in tax yield can be explained by the explanatory variable, leaving 15.64% unexplained. This suggests that there may be additional factors impacting tax collection from the informal sector that could potentially enhance tax yield. The F-statistics support the validity of the model, with a significant probability value of 0.0440. However, the null hypothesis that all coefficients are zero is rejected.

The overall findings suggest that tax compliance in the informal sector significantly impacts tax revenue. Further analysis of specific factors reveals that Personal Income Tax (PIT) does not strongly influence tax yield in Nigeria, as indicated by a z-statistic of -2.09 and a probability value of 0.091. This indicates that only a small portion of informal sector workers are following personal income tax regulations. This lack of adherence may be due to inadequate record-keeping practices and limited interaction with tax professionals, leading to uncertainty about tax calculations. These results are consistent with Adeyemi and Mieseigha (2019) [8] but contrast with the findings of Fasina *et al.* (2018) [23] who observed a positive impact.

The results of the data analysis show that direct assessment has a noticeable positive effect on tax revenue in Nigeria for those involved in the informal economy, particularly MSMEs. This finding is consistent with previous research by Fasina *et al.* (2018) [23] and Adegbite (2017) [2], but differs from the conclusions reached by Ohaka and Zukbee (2015) [39]. On the other hand, road taxes appear to have a lesser impact on tax revenue in the informal sector, potentially due to issues with how these taxes are collected by the drivers' union. According to the available data, it seems that personal income tax and road taxes do not have a significant impact on tax revenue in Nigeria. This implies that tax officials in Nigeria mainly rely on direct assessment for handling micro, small, and medium enterprises (MSMEs). The regression analysis in table 5 shows that the inflation rate has a t-statistic of -3.20 and a p-value of 0.024, indicating that inflation negatively affects tax compliance in the informal sector, resulting in lower tax revenue. These findings suggest that tax administration in the informal sector in Nigeria is not effective, leading to low levels of tax compliance.

The findings of this study are consistent with Ogundajo *et al.* (2019) [38], but differ from the results of Adegbite *et al.* (2021) [4, 5] and Adeyemi and Mieseigha (2019) [8]. The methodologies employed in these earlier studies are not the same as the one used in this study.

Table 5: Ordinary Least Square Regression Results

Tax Yield	Coef.	Std. Err.	Z	P>z
PIT	-123.8197	59.32809	-2.09	0.091
DAS	388.996	59.32809	4.10	0.009
RDT	81.81205	133.0194	0.62	0.565
ITR	-385.7355	300.7123	-1.28	0.256
IFR	-635.7189	198.5753	-3.20	0.024
_cons	-4729.242	3409.281	-3.20	0.024
Number of Obs = 11 R-squared = 0.8436 Adj R-squared = 0.6872 F(5, 5) = 5.39 Prob > F = 0.0440				

Source: Researcher's Computation (2023)

4.4 Post estimation tests

4.4.1 Multicollinearity test

The multicollinearity test results, as shown in table 7 using variance inflation factors, suggest that there are no major issues related to multicollinearity. The tolerance values surpass the commonly accepted threshold, suggesting that the variables have VIF values below 10 and tolerances above 0.10. This means that it is appropriate to use regression coefficients to forecast the influence of independent variables on dependent variables, yielding reliable results.

4.4.2 Heteroskedasticity test

The heteroskedasticity test was performed to check if the assumption of homoscedasticity holds true, where the variance in the residuals remains constant. Detecting heteroscedasticity is important as it can violate the assumptions of linear regression and potentially lead to inaccurate conclusions. The heteroscedasticity test was performed using the Breusch-Pagan / Cook-Weisberg test, yielding a probability value of 0.0512, which suggests that there is no heteroscedasticity present. Autocorrelation in the residuals of statistical models or regression analyses is evaluated through the Durbin-Watson (DW) statistic, which ranges from 0 to 4. A DW value of 2.0 indicates no autocorrelation in the sample. Values between 2 and 4 signify negative autocorrelation, while values below 2 indicate positive autocorrelation.

Table 6: Multicollinearity Test

Tolerance and VIF Value		
Null Hypothesis	VIF	1/VIF
There is no multicollinearity among the variables (1/VIF > 0.10)		2.74
Breusch-Pagan / Cook-Weisberg test for Heteroscedasticity		
Null Hypothesis	Statistics	Probability
Constant variance across the Variables residuals ($p > 0.05$)	3.80	0.0512
Durbin-Watson d-statistic test		
Null Hypothesis	Statistics	Statistics
No autocorrelation ($F > 2$)		2.1212

Researcher's Computation (2023)

Table 7: Tolerance and VIF Value

Variable	VIF	1/VIF
DA	5.05	0.197824
PIT	3.63	0.275638
IFR	2.13	0.468485
RDT	1.56	0.641724
ITR	1.33	0.751497
MEAN VIF	2.74	

Source: Researcher's computations (2023)

4.5 Policy implication of findings

The study confirmed that participants in the sector play a significant role in Nigeria's economic development through direct assessment, which covers various aspects of individual income tax. It is recommended that the government focus on direct taxes in its tax strategies. Efforts should be made to identify and register eligible taxpayers in the informal economy, particularly those with high incomes, and provide them with tax identification numbers (TINs) to

ensure their inclusion in the tax system. Collaboration with banks, professional organizations, trade associations, and artisan groups is also suggested to ensure all members are accounted for in the tax system.

In addition, evidence has presented that fiscal exchange is unique and most important drivers of taxpayer compliance attitude as indicated by road taxes and personal income tax. As a result, governments should increase their focus on extensive infrastructure projects and the provision of social services in order to garner public approval and encouragement, leading to a greater willingness among citizens to pay taxes willingly. Also, as presented by the control variable, inflation negatively affects the compliance of the unorganized sector actor, government at higher level should promote strategies that ensure low inflation or increase the tax compliance of the sector operator and also implement policies to increase the income of the participant of the sector operator in Nigeria. Tax regulations should be simplified, and according to the understanding of entrepreneurs in the field, paying taxes must be simple and easy, the tax process should be simplified and the electronic tax scheme should be encouraged. This increases voluntary compliance and increases tax yield.

5. Conclusion and Recommendations

This study analyzed the influence of the informal sector on tax compliance and revenue generation in Nigeria between 2011 and 2021 through a longitudinal research approach. Data from the Central Bank of Nigeria (CBN) statistical bulletin and the National Bureau of Statistics (NBS) was examined using descriptive statistics and regression analysis. The study revealed that directly assessing participants in the informal sector, particularly Micro, Small, and Medium Enterprises (MSMEs), has a significant impact on tax revenue in Nigeria. However, other types of taxes in the sector, such as personal income tax and road taxes, do not notably affect tax yield in Nigeria. This indicates that only direct assessment is effectively enforced among MSMEs in Nigeria. In light of these findings, the study suggests the following actions:

1. The tax authorities should carry out an income tax survey in order to identify all taxpayers and increase tax revenue. Governments should maintain a current database of taxpayers, including those in the informal economy, to better monitor and enhance individual income tax compliance among participants in the informal sector.
2. The government should improve its methods of assessing and collecting taxes from high-demand sectors to increase revenue and offer tax incentives to incentivize informal businesses to register with the Corporate Affairs Commission (CAC).
3. Effort should gear towards administration of road taxes in order to increase revenue from the participant of sector.

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