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Artificial Intelligence (AI) and Petroleum Profit Tax Administration in Nigeria Economy

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Abstract
This study examines the impact of Artificial Intelligence (AI) adoption on Petroleum Profit Tax (PPT) administration in Nigeria. The study looks into the level of AI deployment, the types of AI technologies now in use, their perceived efficacy, simplicity in usage, associated problems, and their impact on tax compliance and revenue collection. Data gathering was done with 98 individuals, who are officers in tax agencies, compliance officers, and AI professionals. Descriptive statistics and multiple regression analysis were used to assess the link between AI adoption and important tax outcomes. The findings showed that, while overall AI adoption is limited, techniques like machine learning, predictive analytics, and robotic process automation are becoming more popular. AI was discovered to greatly boost compliance efforts, improve the accuracy of tax reporting, and positively affect revenue predictions and audit results. The regression findings demonstrated that AI-powered data analytics and reporting systems had a statistically significant impact on PPT income production and tax compliance. However, constraints such as a lack of technical skills, aversion to change, and expensive implementation costs remain important obstacles. The study further discovered that when effectively applied and supported, AI will change tax administration. It suggests capacity building, enhanced infrastructure, data governance, and regulatory reforms to optimize the use of artificial intelligence in tax operations within Nigeria's petroleum sector.

Keywords: Artificial Intelligence, Petroleum Profit Tax, Tax Administration, Data Analytics, Compliance.

1. Introduction

The Nigerian economy remains heavily dependent on the petroleum sector, which accounts for about 90% of foreign exchange earnings and over 60% of government revenue (CBN, 2022). Petroleum Profit Tax (PPT), levied on profits derived from petroleum operations, constitutes a critical revenue stream for fiscal sustainability and national development (Adebayo & Okeke, 2020). Yet, despite its importance, the administration of PPT has long been undermined by inefficiencies such as manual assessment procedures, weak compliance monitoring, and persistent revenue leakages (Olanrewaju, 2019).

Artificial Intelligence (AI) has recently emerged as a transformative technology with potential applications in taxation and public finance. AI encompasses tools such as machine learning, predictive analytics, natural language processing, and robotic process automation, all designed to improve efficiency, accuracy, and transparency in data-driven decision-making (Brynjolfsson & McAfee, 2017). Globally, tax authorities are increasingly leveraging AI to enhance compliance, automate audits, and detect fraud in real time (OECD, 2021). For resource-dependent economies like Nigeria, adopting AI could revolutionize PPT administration by enabling real-time monitoring of production volumes, automating tax computations in line with fluctuating global oil prices, and strengthening transparency through cross-validation of production, export, and sales data (World Bank, 2020). Predictive models could also allow tax authorities to identify high-risk taxpayers and prioritize audits more effectively (KPMG, 2022).

Despite these opportunities, AI adoption in Nigeria's tax system remains limited, while infrastructural weaknesses, inadequate data management systems, regulatory bottlenecks, and low technological readiness continue to hinder its full-scale implementation (Adewale et al., 2021). Petroleum companies' opaque reporting practices and weak enforcement further exacerbate the compliance gap, resulting in substantial revenue leakages (NEITI, 2022; Ibe, 2018). These challenges raise critical questions about Nigeria's readiness to deploy AI in PPT administration, and the potential impacts such adoption could have on compliance and revenue generation.

The study therefore investigated the role of Artificial Intelligence in enhancing Petroleum Profit Tax administration in Nigeria. Specifically, it focuses on two dimensions: (i) the effect of AI-driven data analytics and reporting systems on PPT revenue generation, and (ii) the extent to which AI can improve tax compliance in the petroleum sector. Guided by these objectives, the study addresses the following research questions: (i) How does Artificial Intelligence influence the efficiency and accuracy of Petroleum Profit Tax collection in Nigeria? And (ii) In what ways does the application of AI tools enhance or hinder tax compliance in the petroleum industry? To empirically test these issues, the study formulates the following hypotheses:

H1: AI-driven data analytics and reporting systems have no significant effect on Petroleum Profit Tax revenue generation in Nigeria.

H2: The adoption of Artificial Intelligence does not significantly enhance tax compliance in the Nigerian petroleum sector.

2. Literature Review

Petroleum Profit Tax (PPT)

Petroleum Profit Tax (PPT), governed by the Petroleum Profits Tax Act (PPTA, 2004), is levied on the chargeable profits of companies engaged in upstream petroleum operations in Nigeria. The tax rate ranges between 50% and 85%, depending on the contractual arrangement (production sharing contracts or joint ventures). From the perspective of government, PPT is not merely a fiscal instrument but a lifeline of national revenue, accounting for a large share of Nigeria's foreign exchange earnings and public finance capacity (Phillips et al., 2024). Effective PPT administration is therefore central to fiscal stability, development planning, and macroeconomic management. However, persistent challenges—such as manual assessment procedures, opaque reporting systems, weak monitoring, and widespread non-compliance—undermine the ability of tax authorities to mobilize adequate revenue (Aondover, 2025; NEITI, 2022). In this context, adopting modern technological tools such as Artificial Intelligence (AI) provides a pathway to close leakages, improve compliance, and safeguard government revenue.

Artificial Intelligence (AI) and Tax Administration

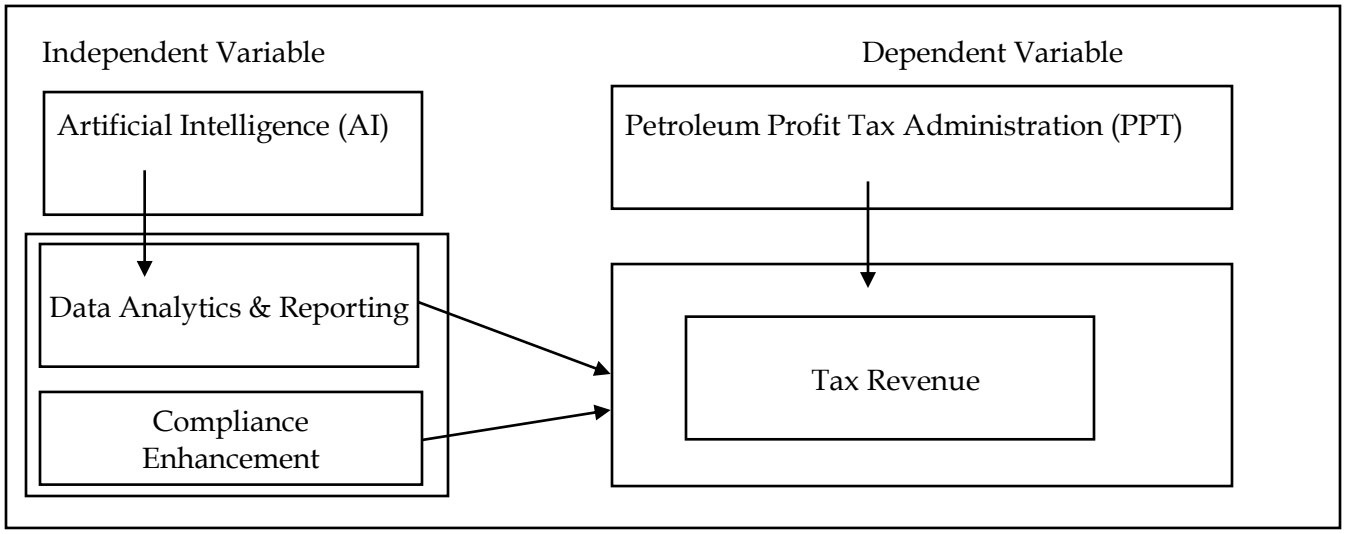
Artificial Intelligence (AI) refers to the simulation of human cognitive functions by computer systems, enabling machines to perform tasks such as learning, reasoning, decision-making, and adaptive problem-solving (Russell & Norvig, 2016). In the domain of taxation, AI incorporates a suite of technologies—machine learning, predictive analytics, robotic process automation (RPA), and natural language processing (NLP)—that collectively modernize tax administration by automating complex processes, improving data accuracy, and enabling proactive compliance monitoring (Kok et al., 2020; Sani et al., 2024). Artificial Intelligence (AI) refers to computational systems capable of simulating human intelligence to perform tasks such as learning, problem-solving, and decision-making (Russell & Norvig, 2016). Within tax administration, AI is not an end in itself but a transformative enabler that modernizes

each stage of the tax cycle—data collection, assessment, compliance monitoring, auditing, enforcement, and reporting.

Key areas in which AI modernizes Petroleum Profit Tax administration include:

1. **Data Analytics & Revenue Forecasting:** AI integrates multiple datasets (production volumes, export records, financial statements) to provide accurate and real-time tax assessments. Predictive analytics improve revenue forecasting under volatile oil prices, enhancing fiscal planning (World Bank, 2020; KPMG, 2022). *Evidence:* Kok et al. (2020) found AI-driven analytics in South Africa improved processing times and forecasting accuracy.
2. **Compliance Monitoring:** Machine learning models flag irregularities in company declarations by comparing reported profits with production and export data. Natural Language Processing (NLP) scans large volumes of contracts, reports, and disclosures to detect hidden liabilities or discrepancies. *Evidence:* Okoye & Onyeka (2022) in Ghana showed predictive monitoring improved voluntary compliance by **15%**.
3. **Audit & Enforcement:** Robotic Process Automation (RPA) reduces manual audit bottlenecks by automatically reconciling production figures with tax filings. AI enhances audit precision, enabling targeted, risk-based audits that conserve resources while improving outcomes. *Evidence:* Elijah et al. (2021) reported audit times reduced by **30%** in Kenya after RPA adoption.
4. **Fraud Detection & Risk Profiling:** AI systems detect under-reporting of profits, inflated operating costs, and transfer pricing manipulation—common in petroleum taxation. By increasing the probability of detection, AI strengthens deterrence, consistent with Becker's (1968) deterrence theory. *Evidence:* OECD (2021) documents global use of anomaly detection to combat aggressive tax evasion.
5. **Administrative Efficiency & Transparency:** AI reduces fragmentation across institutions such as FIRS, NNPC, and NEITI by integrating data flows. Enhanced transparency builds confidence among stakeholders and reduces opportunities for discretionary manipulation. *Evidence:* Phillips et al. (2024) argue that AI-led integration of petroleum reporting platforms could significantly reduce leakages.

Figure 1: Conceptual Model



Sources: Researcher (2025).

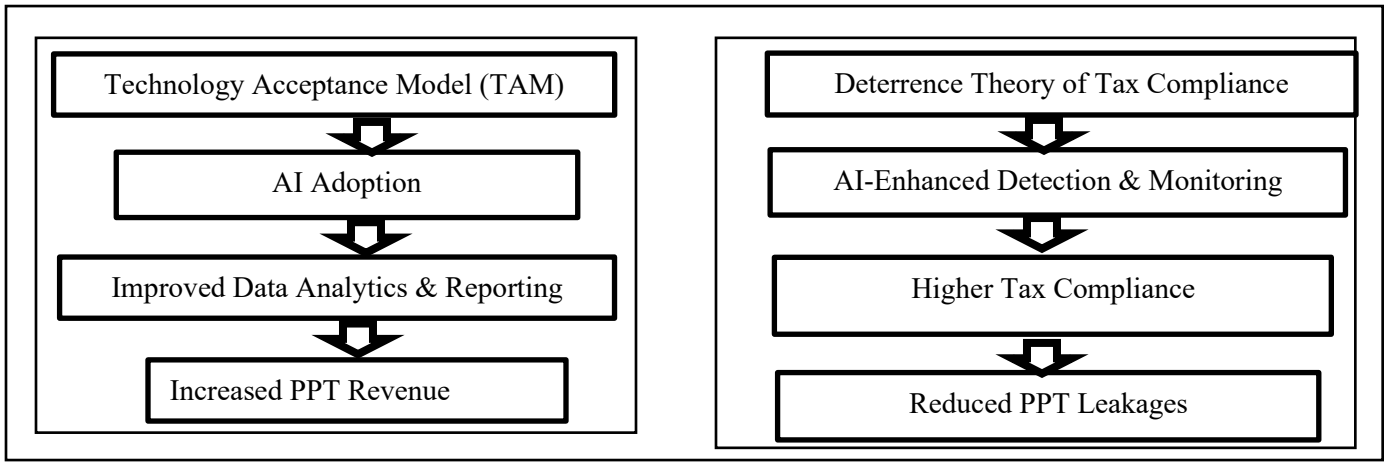
Theoretical Review

The theoretical foundation of this study is anchored on models that explain both the adoption of new technologies and the behavioral dynamics of tax compliance. Since the focus of this research is on how Artificial Intelligence (AI) can transform the administration of Petroleum Profit Tax (PPT) in Nigeria, two key theories provide relevant insights: the Technology Acceptance Model (TAM) and the Deterrence Theory of Tax Compliance.

Technology Acceptance Model (TAM), developed by Davis (1989), is one of the most widely applied frameworks in technology adoption research. It posits that users' decisions to embrace a new technology are largely determined by two factors: *perceived usefulness* (the extent to which a technology enhances performance) and *perceived ease of use* (the extent to which a technology is free of effort). In the context of this study, TAM provides a lens for understanding how tax administrators and petroleum companies may adopt AI tools such as predictive analytics, robotic process automation, and machine learning systems in PPT administration. If AI is perceived as useful in enhancing efficiency and accuracy in tax computation and reporting, and if it is seen as relatively easy to implement, adoption is more likely to be successful. This directly relates to the first objective of the study, which seeks to evaluate the effect of AI-driven data analytics and reporting systems on PPT revenue generation in Nigeria. Relevance: Understanding tax officers' and companies' willingness to use AI-based systems is key to evaluating AI's actual impact on PPT effectiveness.

The Deterrence Theory of Tax Compliance, rooted in Becker's (1968) economic theory of crime, asserts that individuals and firms are more likely to comply with tax obligations when the probability of detection of non-compliance is high and when penalties are sufficiently severe. In this regard, AI plays a crucial role by increasing the likelihood of detection through anomaly detection, risk profiling, and real-time data monitoring. For instance, AI-driven systems can cross-check petroleum production, export records, and tax declarations, thereby reducing the space for underreporting or misrepresentation. By enhancing detection capabilities, AI effectively strengthens deterrence, discourages tax evasion, and promotes compliance. This aligns with the second objective of this study, which examines the role of AI in enhancing tax compliance within the Nigerian petroleum sector. Relevance: AI tools like anomaly detection, predictive modeling, and risk profiling increase the likelihood of identifying non-compliant behavior, thus supporting deterrence.

Figure 2: Relevance of Theories



Source: Researcher's Conceptualization (2025).

Together, these two theories provide a robust framework for analyzing the role of AI in PPT administration. While TAM explains the willingness and readiness of stakeholders to adopt AI technologies, the Deterrence Theory clarifies how such adoption can lead to improved compliance and reduced revenue leakages. Thus, the integration of both perspectives offers a comprehensive theoretical foundation for evaluating the potential of AI to transform PPT administration in Nigeria.

Empirical Review

Empirical literature on the intersection of Artificial Intelligence and tax administration, especially within developing economies' growth. The following studies provide evidence relevant to this research:

Kok et al. (2020) found that integrating AI technologies into tax systems significantly improved processing times, reduced human errors, and increased operational efficiency in South Africa's Revenue Service. Similarly, Elijah et al. (2021) observed that robotic process automation improved audit speed by over 30% in government tax agencies in Kenya.

Okoye and Onyeka (2022) studied the use of predictive analytics and machine learning by tax authorities in Ghana and found a 15% increase in voluntary compliance due to improved risk profiling and monitoring systems. The study also showed that AI identified previously hidden evasion patterns, which supported more targeted audits.

In the Nigerian context, AI tools can help identify evasion patterns and enforce compliance in the petroleum sector. Aondover (2025) reports that up to 20% of petroleum companies in Nigeria engage in underreporting or cost manipulation due to weak oversight and poor data integration across tax and production monitoring systems. Phillips et al. (2024) emphasize that integrating AI into tax and production platforms could drastically reduce leakages and improve trust in the tax system. Adewale et al. (2021) highlighted barriers to AI adoption in public institutions in Nigeria, including lack of skilled personnel, poor infrastructure, and legal uncertainty. Despite AI's potential, its benefits are limited without institutional reform. Implication: Effective implementation of AI in PPT administration must be supported by capacity-building and regulatory updates.

While existing studies in South Africa, Kenya, and Ghana provide evidence of measurable efficiency gains from AI adoption, Nigeria's case is distinct. AI adoption in Petroleum Profit Tax (PPT) administration is still limited, with most processes relying on manual or semi-automated systems. This study therefore situates itself as a pioneering empirical investigation into the Nigerian context, focusing on: (i) Assessing the current level of AI readiness and partial adoption in PPT administration; (ii) Evaluating the potential effects of AI-driven tools (e.g., predictive analytics, robotic process automation) on tax revenue generation; and (iii) Examining AI's role in compliance enhancement under Nigeria's unique structural and institutional constraints.

3. Methodology

Research Design

This study adopts a quantitative research design to provide a comprehensive evaluation of the impact of Artificial Intelligence (AI) on Petroleum Profit Tax (PPT) administration in Nigeria. The design focuses on analyzing numerical data related to tax collection, compliance levels, and revenue performance. Structured data from government databases and AI systems are utilized to statistically measure the relationship between AI adoption and PPT outcomes.

Population and Sampling

The study population comprises tax administrators from the Federal Inland Revenue Service (FIRS), who are directly involved in Petroleum Profit Tax administration. Since AI adoption in Nigerian tax administration is still emerging, the study adopts a purposive sampling technique to ensure that only officers with relevant experience and exposure to PPT operations are included. A total sample of 100 FIRS officials was selected, representing key departments such as tax assessment, compliance monitoring, audit, and ICT support.

Data Collection Methods

Primary data on Petroleum Profit Tax collection, compliance rates, audit outcomes, and revenue performance over the past five years were obtained from official records within the FIRS and the Federal Ministry of Finance. Additionally, AI system performance logs and analytics reports were reviewed to evaluate operational efficiency and technological impact on tax administration.

Data Analysis Techniques

Statistical techniques such as descriptive statistics, correlation analysis, and regression modeling were employed to test the research hypotheses and assess the relationship between AI adoption and Petroleum Profit Tax compliance and revenue outcomes. Data analysis was conducted using the Statistical Package for the Social Sciences (SPSS).

Model Specification

To empirically examine the relationship between Artificial Intelligence (AI) adoption and Petroleum Profit Tax (PPT) administration outcomes, this study specifies a linear regression model. The model is designed to measure the effect of key dimensions of AI—such as data analytics, automation, and compliance enhancement—on PPT revenue generation and tax compliance.

The functional form of the model is expressed as:

$PPTit=\beta_0+\beta_1DAit+\beta_2CEit+\beta_3AIUit+\epsilon it$ ……………………………………………….…………… (1)

Where:

PPTit = Petroleum Profit Tax revenue for entity i at time t (dependent variable)
DAit = Data Analytics and Reporting capacity (AI-based systems)
CEit = Compliance Enhancement (AI-driven monitoring and enforcement)
AIUit = General AI Usage in tax administration
β_0 = Constant term
β_1,β_2,β_3 = Coefficients measuring the effect of each independent variable
ϵit = Error term accounting for unobserved factors

The model estimation was done using Ordinary Least Squares (OLS) regression with data processed through SPSS version 25. The choice of OLS is based on its suitability for explaining linear relationships and the continuous nature of the dependent variable (tax revenue).

4. Results and Discussion

Socio-Demographic Characteristic of Participants

Table 1: Descriptions of socio-demographic characteristics of the participants

S/N	Variable	Frequency	Percentage
1	Descriptions of Participants by their Gender		
	Male	69	70.4
	Female	29	29.6
	Total	**98**	**100.0**
2	Descriptions of Participants by their role		
	Tax official	30	30.6
	Compliance officer	29	29.6
	AI Technology Specialist	39	39.8
	Total	**98**	**100.0**
3	Descriptions of Participants by their experience		
	less than 2 years	21	21.4
	2-5yr	54	55.1
	6-10yr	18	18.4
	Above 10yer	5	5.1
	Total	**98**	**100.0**
4	Descriptions of Participants by Age		
	18-30	27	27.6
	31-40	25	25.5
	41-50	29	29.6
	51and above	17	17.3
	Total	**98**	**100**
5	Descriptions of Participants by education qualification		
	BSc/B.A	72	73.5
	MSc/MBA	20	20.4
	PHD	4	4.1
	OTHERS	2	2.0
	Total	**60**	**100**

The gender category of participants in table 1 revealed that 69(70.4%) of the participants in the study area were males. while 29(29.6%) were females. The Descriptions of Participants by their roles in the table 1 indicated that 30(30.6%) of the respondents were tax official, 29(29.6%) of the participants were compliance officer and 39(39.8%) were AI Technology Specialist. More so, the experience category of the participants in table 1 revealed that 21(21.4%) of the participants were of less than 2 years' experience. 54(55.1%) of the respondents have 2-5 years' experience. 18 respondents had 6-10 years' experience. 5(5.1%) respondents are more experienced.

The Age category of participants in table 1 revealed that 27(27.6%) of the participants in the study were within the age of18-30years, while 25(25.5%) and 29(29.6%) were within 31-40 years and 41-50 years respectively. 17 participants representing 17.3% of the respondents were aged 51 years and above. 72(73.5%) of the participants in the study area are B.Sc./B.A. degrees, while 20(20.4%) of the participants have M.Sc./MBA certificates, 4(4.1%) respondents were PhD holders, while 2(2.0%) respondents had other qualifications.

To what extent has your organization adopted AI tools in tax administration

TABLE 2: **Results of organization's adopted AI tools in tax administration**

S/N	**Question**	not at all (%)	to a small extent (%)	to a moderate extent (%)	to a large extent (%)
1	to what extent has your organization adopted AI tools in tax administration	23(38.3)	21(35.0)	4(6.7)	6(10.0)

Table 2 serial 1 elicited the participants' opinion on what extent has their organization adopted AI tools in tax administration, 23(3.8%) of the participants affirmed that AI tools have not been adopted in tax administration in their organisations. 21(35.0%) participants adopted them to a little extent, while 4(6.7%) respondents adopted AI tools moderately. 6(10.0%) participants affirmed that AI usage had been adopted to a large extent.

What AI technologies are currently in use

TABLE 3: **Results of AI technologies currently in use**

S/N	**Question**	Machine learning (%)	Data analytics tools (%)	Robotic Process Automation (RPA)(%)	Predictive analytics (%)	At least 2(%)	Other (%)
1	What AI technologies are currently in use? (Select all that apply)	12(12.2)	9(9.2)	7(7.1)	9(9.2)	51(52.0)	10(10.2)

Table 3 serial 1 elicited respondents' position on what AI technologies are currently in use within their organisations, the study revealed that 12(12.2%) of the participants used Machine in learning. 9(9.2%) participants were using Data analytics tools. While 7(7.1%) respondents are using Robotic Process Automation, 9(9.2%) participants are using Predictive analytics AI and 51(52.0%) participants acknowledged that they were using at least 2 of AI technologies, while 10(10.2%) participants were using other AI technologies.

Rate the effectiveness of AI in the following areas

TABLE 4: Results of effectiveness of AI in the areas

S/N	**Question**	not effective (%)	somewhat effective (%)	Neutral (%)	Effective (%)	very effective (%)
1	**Detecting non-compliance**	8(8.2)	24(24.5)	4(6.7)	11(11.2)	27(27.6)
2	**Automating tax audits**	7(7.1)	12(12.2)	15(15.3)	26(26.5)	38(38.8)
3	**Improving revenue forecasting**	7(7.1)	9(9.2)	12(12.2)	27(27.6)	43(43.9)
4	**Enhancing reporting accuracy**	6(6.1)	6(6.1)	8(8.2)	35(35.7)	43(43.9)

Table 4 serial 1 detailed the participants' opinion on the effectiveness of AI. The study revealed that 8(8.2%) of the participants were of the opinion that AI have not effectively in detecting non-compliance. 24(24.5%) participants were of the opinion that AI application is somewhat effective, 4(6.7%) respondents had neutral opinion, 38(38.8%) participants affirmed the effectiveness of AI in detecting non-compliance. Serial 2 in table 4 showed that Participants' opinion on the Rate the effectiveness of AI in automating tax audits, with this, 7(7.1%) of the participants were of the opinion that AI have not been effectively applied

in Automating tax audits, 12(12.2%) participants were of the opinion that AI have somewhat effective in Automating tax audits, while 15(15.3%) respondents had neutral opinion. 64(65.31%) of the participants affirmed the effectiveness of AI in Automating tax audits.

Table 4 serial 3 elicited respondents' opinions on the effectiveness of AI in improving revenue forecasting, the study revealed that 7(7.1%) of the participants were of the opinion that AI have not effectively Improving revenue forecasting. 9(9.2%) participants were of the opinion that AI have somewhat effective in Improving revenue forecasting, 12(12.2%) respondents had neutral opinions, while 70(71.4%) participants affirmed the effectiveness of AI in Improving revenue forecasting.

Serial 4 in table 4 showed that Participants' opinion on the effectiveness of AI in enhancing reporting accuracy. The study revealed that 6(6.1%) of the participants were of the opinion that AI have not effectively enhanced reporting accuracy, another set of 6(6.1%) are of the opinion that it had somewhat effectively enhancing reporting accuracy respectively, 8(8.2%) participants were of neutral opinion, and 78(79.6%) participants affirmed the effectiveness of AI in Enhancing reporting accuracy.

How would you rate the ease of use of AI systems in your organization

TABLE 5: **Results of rating the ease of use of AI systems organizations**

S/N	**Question**	very difficult (%)	Difficult (%)	Neutral (%)	Easy (%)	very easy 2(%)
1	How would you rate the ease of use of AI systems in your organization?	27(27.6)	34(34.7)	20(20.4)	13(13.3)	4(4.1)

Table 5 serial 1 elicited information on the participants' opinion on rating the ease of use of AI systems, the study revealed that 61(62.2%) of the participants rated it difficult to use, 20 (20.4%) respondents were of neutral opinion, while 17(17.3%) participants rated it easy to use.

What are the main challenges with AI adoption in tax administration

TABLE 6: **What are the main challenges with AI adoption in tax administration**

S/N	**Question**	Lack of technical skills (%)	Resistance to change (%)	High implementation cost (%)	Data quality issues (%)	Legal or ethical concerns (%)
1	**What are the main challenges with AI adoption in tax administration**	26(26.5)	26(26.5)	21(21.4)	17(17.3)	8(8.2)

Table 6 serial 1 of the Participants' opinion on rating the main challenges with AI adoption in tax administration, the result revealed that 26(26.5%) of the participants identified Lack of technical skills and Resistance to change as the main challenges respectively. 21(21.4%) participants identified High implementation cost. While 17(17.3%) respondents identified Data quality issues and 8(8.2%) participants identified Legal or ethical concerns

U*se of AI in FIRS operations*

TABLE 7: **Use of AI in FIRS operations**

S/N	Question	yes (%)	no (%)	not sure (%)
1	**Has the use of AI in FIRS operations increased your company's compliance efforts Detecting non-compliance**	62(62.5)	22(22.7)	14(14.3)
2	**Have audit incidences increased since AI-based systems were introduced**	22(22.4)	51(52.0)	25(25.5)

Table 7 serial 1 detailed respondents' opinion on may be the use of AI in FIRS operations has increased company's compliance efforts Detecting non-compliance**,** the result revealed that 62(62.5%) of the participants agreed that the use of AI in FIRS operations has increased company's compliance efforts by saying yes, 22(22.7%) participants said no and 14(14.3%) participants were not sure. Serial 2 in the same table 7, the finding showed that 22(22.4%) of the participants acknowledged that audit incidences has increased since AI-based systems were introduced by saying yes.51(52%) said no to the statement and 25(25.5%) were not sure

In your opinion, how has AI affected the accuracy of Petroleum Profit Tax filing

TABLE 8: **In your opinion, how has AI affected the accuracy of Petroleum Profit Tax filing**

S/N	Question	Greatly reduced accuracy (%)	Slightly reduced (%)	No change (%)	Slightly improved (%)	Greatly improved (%)
1	**In your opinion, how has AI affected the accuracy of Petroleum Profit Tax filing**	5(5.1)	22(22.4)	17(17.3)	27(27.6)	27(27.6)

Table 8 showed Participants' opinion on how AI has affected the accuracy of Petroleum Profit Tax filing. Findings showed that 27(27.6%) participants acknowledged that AI had greatly reduced accuracy of Petroleum Profit Tax filing in one way or the other, 17 (17.3%) respondents affirmed no change and 54(55.1%) respondents acknowledged that AI had slightly improved and greatly improved accuracy of Petroleum Profit tax filing respectively.

Rate the impact of AI on the following PPT outcomes

TABLE 9: Rate the impact of AI on the following PPT outcomes

S/N	Question	no impact (%)	small impact (%)	Moderate Impact (%)	High Impact (%)	Strong Impact (%)
1	**Compliance rate**	3(3.1)	7(7.1)	7(7.1)	44(44.9)	37(37.8)
2	**Timely filing**	4(4.1)	13(13.3)	11(11.2)	35(35.7)	37(37.8)
3	**Error reduction in reporting**	8(8.2)	9(9.2)	10(10.2)	50(51.0)	21(21.4)
4	**Audit outcomes**	7(7.1)	12(12.2)	13(13.3)	41(41.8)	25(25.5)

Table 9 serial 1 of the Participants' opinion on the Rate of impact of AI on the PPT outcomes in the study revealed that 3(3.1%) of the participants were of the opinion that the Compliance rate of AI has no impact. 7(7.1%) participants were of the opinion that AI Compliance rate have small impact and moderate impact respectively, while 44(44.9%) and 37(37.8%) respondents' opinion on timely filing by revealing that 4(4.1%) of the participants were of the opinion that the Timely filing,11(11.2%) respondents affirmed

moderate impact, 35(35.7%) and 37(37.8%) of the respondents affirmed the high and strong impacts respectively.

Table 9 question 3 revealed that 8(8.2%) of the participants saw no impact in Error reduction in reporting, 9(9.2%) participants saw small impact, 10(10.2%) respondent rated moderate impact, while 50(51.0%) and 21(21.4%) rated the impacts as high and strong respectively.

Table 9 question 4 on the Participants' opinion on the Rate of impact of AI on the PPT outcomes in the study revealed that 7(7.1%) of the participants were of the opinion that the Audit outcomes of AI have no impact. 12(12.2%) and 13(13.3%) participants were of the opinion that AI had a small and moderate impact on audit outcomes respectively, while 41(41.8%) and 25(25.2%) respondents affirmed a high and strong impact on audit outcomes respectively.

Hypotheses Testing

H1: AI-driven data analytics and reporting systems have no significant effect on Petroleum Profit Tax revenue generation in Nigeria.

Table 10: Regression Result

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Error Reduction In Reporting	0.249155	0.008991	27.71295	0.0000
Compliance Rate	0.237606	0.012005	19.79164	0.0000
Audit Outcomes	0.235851	0.010075	23.40852	0.0000
Timely Filing	0.252521	0.008810	28.66302	0.0000
C	0.105889	0.070309	1.506042	0.1354
R-squared	0.972098	Mean dependent var		3.829082
Adjusted R-squared	0.970898	S.D. dependent var		0.585033
S.E. of regression	0.099803	Akaike info criterion		-1.721557
Sum squared resid	0.926346	Schwarz criterion		-1.589671
Log likelihood	89.35630	Hannan-Quinn criter.		-1.668212
F-statistic	810.0144	Durbin-Watson stat		2.120034
Prob(F-statistic)	0.000000			

Table 10 revealed that AI –driven data analytics and reporting system had positive and significant effect on Petroleum Profit Tax revenue generation in Nigeria as the coefficient values of Error Reduction In Reporting (0.249), Compliance Rate (0.237), Audit Outcomes (0.235) and Timely Filing (0.252) and their respective Prob values stood at 0.000
thus, null hypothesis is rejected and conclude that AI-driven data analytics and reporting systems have significant effect on Petroleum Profit Tax revenue generation in Nigeria.

H2: The adoption of Artificial Intelligence does not significantly enhance tax compliance in the Nigerian petroleum sector.

Table 11: Regression Result

Variable	Coefficient	Std. Error	t-Statistic	Prob.
adoption of Artificial Intelligence	0.015433	0.008324	15.32114	0.0000
C	0.05889	0.070309	1.234242	0.0254
R-squared	0.762038	Mean dependent var		3.829082
Adjusted R-squared	0.708838	S.D. dependent var		0.585033
F-statistic	84.40144	Durbin-Watson stat		2.007034
Prob(F-statistic)	0.000000			

Table 11 revealed that adoption of AI had positive and significant effect on Tax compliance in Nigeria as the coefficient value stood at (0.01533) and Prob value stood at 0.000 respectively. thus, null hypothesis is rejected and conclude that the adoption of Artificial Intelligence had significantly enhanced tax compliance in the Nigerian petroleum sector.

5. Conclusion and Recommendations

This research looked into the use of Artificial Intelligence (AI) technology in Petroleum Profit Tax (PPT) administration in Nigeria. The findings showed that, while AI use remains limited, technologies such as machine learning, data analytics, robotic process automation (RPA), and predictive analytics are becoming more prevalent in FIRS operations. The findings revealed that AI has positively impacted a variety of tax administration outcomes, including error reduction in reporting, compliance rate, audit outcomes, and timely filing. Notably, the regression research revealed that AI-powered data analytics and reporting systems have a statistically significant influence on Petroleum Profit Tax revenue collection, and that the use of AI enhances tax compliance in Nigeria's petroleum sector.

Despite the positives, impediments to greater AI adoption include a lack of technical skills, opposition to change, and expensive implementation costs. Participants also voiced concerns about simplicity of use and the need for improved support systems to increase AI use.

As a result, the study finds that AI is a revolutionary instrument that, when properly implemented and integrated, may greatly improve tax administration performance, particularly in complicated areas such as petroleum taxes. However, its full potential will only be realized until operational, technological, and strategic obstacles are solved.

Based on the results of this investigation, the following recommendations are proposed:

i. FIRS and other tax agencies should invest in frequent training and upskilling for tax officials, compliance officers, and IT professionals to improve their technical skills and trust in AI tools.
ii. Gradual and Strategic Implementation: To overcome reluctance to change, adopt AI technology gradually, with pilot phases and explicit information about their advantages for tax administration and personnel tasks.
iii. Budgetary Support for AI Infrastructure: Government agencies should allocate funds for AI system development, procurement, and maintenance, considering the long-term cost-benefit of automation in tax processes.
iv. Develop or update legal and ethical frameworks for responsible AI usage in tax administration, including data protection, transparency, and accountability.
v. Implement a continuous monitoring and assessment system to check AI tool efficacy in real time and suggest areas for improvement or realignment.

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