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ARTIFICIAL INTELLIGENCE (AI) AND TAX ADMINISTRATION IN NIGERIA

Jayeola, Ebenezer Adesina, ACA, ACIB

Jayeola.adesina@federalpolyilaro.edu.ng

[+2348035607220](tel:+2348035607220); [09072174481](tel:09072174481)

Department of Taxation Federal, Polytechnic, Ilaro, Ogun State, Nigeria

Ogundeji, F.T, HND, B.Sc

Femi.ogundeji@federalpolyilaro.edu.ng

[2348064641695](tel:2348064641695)

Department of Taxation, Federal Polytechnic, Ilaro, Ogun State, Nigeria

ABSTRACT

Artificial Intelligence through the adoption of Electronic Tax system has greatly impacted positively on the revenue administration by the government and its agencies that are saddled with the responsibilities of tax management; whose interest is to meet the pressing civic responsibilities the government is charged with. The use of technology has the potential to transform the process we file our taxes, making the process faster, easier and more accurate, leaving no room for revenue leakages. Tax Administrators are increasingly adopting technology to transform their operations from time to time. The use of advanced techniques in artificial intelligence, machine learning and machine to machine links are opening up new service options for tax administrations and electronic assessment of Income tax that allows for more 'compliance-by-design' style approaches. In relation to this study, the expo factor research design method of collecting data will be used. The usefulness of expo facto research method is that it is a realistic approach used in solving social science statistical problems by collecting data from past events and analyzing such processed data to predict future event (Agbadudu, 2002). The study recommended the application of Artificial Intelligence (AI) as this will help the existing tax administration agencies in expanding their areas of operation and also for Policymakers should prioritize and invest in robust technological infrastructure to sustain and enhance the positive impact of electronic taxation components.

Key words: Artificial Intelligence, Taxation, Technology, Tax Administration, Tax System

Introduction

Background to the study

In a study on Taxation and Revenue Generation in Nigeria (Adegbite & Fasina, 2019), opined that a persistent drop in tax revenue inflow is a result of government negligence, tax evasion, falsifications of records and gross inefficiency which have negatively impacted on the volume of revenue realized

from tax sources over the years. Intelligent Automation (IA) including Artificial Intelligence (AI), it is believed, would revolutionize how governments derive value and insights from data to achieve key goals and objectives. Artificial Intelligence is technology that helps computers gather information and figure out solutions in ways that imitate human thinking. Artificial Intelligence generally covers a spectrum of algorithms, machine learning models, generative AI, neural networks, robotics, design principles, and industry trends. The development of neurocomputer has made the computer to imitate humans endowed thinking faculties and to be able to see things as though a human is in action. Government revenue collection agencies are increasingly using technology to transform their operations. The use of advanced techniques in artificial intelligence, machine learning and machine to machine links are opening up new service options for tax administrations that allow more ‘compliance-by-design’ style approaches. The trend is increasing for tax administrators to unlock the power of digital transformation. The Finance Act 2020 and Sections 25 of the FIRS Establishment Act empowers the FIRS to deploy technology to automate the tax administration process, including assessment, collection and information gathering.

Okoye & Ezejiofor (2014) pointedly arrived at the conclusion that digital assessment of tax liability and administration of such should be carried out electronically. The researchers are of the opinion that tax filing system and corresponding assessment settlement and remittance of tax can be done through the taxpayers’ bank account directly into government revenue wallet digitally without any human intervention. Digital tax administration was introduced in Nigeria some few years ago, precisely about 10 (ten) years as a platform for ease of doing business and to alert all stakeholders on their civic responsibilities without any external input as a leeway into efficient and effective tax administration process, following the recommendation of International Monetary Funds (IMF) and other countries best practice between 2004 and 2006 (Newman & Ekhator, 2019). Appreciating the concept of artificial intelligence through the adoption of digital tax administration, many government agencies embraced the idea of electronically managing tax administration and assessment process throughout Nigeria beginning in 2017 through the use of *Taxpromax*; a unified and integrated government platform for filling assessment from the remote location of taxpayers and making approved payment hit the desired government account with online- real time generation of tax receipt to the benefit of the taxpayers and issuance of other documentary evidence like the Tax Clearance Certificate (TCC). Awai and Oboh (2020), Ofurum et al (2018) opined that electronic tax administration system has greatly impacted positively in efficiently and effectively forestalling and or reducing to the bearest minimum the challenges experienced over time in the use of manual tax assessment processes and payment system. It is agreed that the objective of AI through the use of electronic assessment system is aimed at improving the revenue growth and to protect the integrity of data records.

Statement of Problem

Despite the potential benefits of Artificial Intelligence (AI) through electronic tax system, such as improved tax collection and increased tax administration, the system is still faced with some inherent challenges. These challenges include and not limited to technical and operational difficulties, lack of awareness and education among taxpayers, and limited resources for implementation and data protection and recovery. The problem statement, therefore, is to investigate the extent to which electronic tax systems, such as e-VAT, e-CGT, and e-CIT, are contributing to income generation in Nigeria, and to identify the challenges facing the effective implementation of these platforms.

Objectives of the study

The overall objectives of the research are to identify the impact of Artificial intelligence (AI) through the adoption of electronic filing system of tax assessment. To be specific, the study is carried out to:

- i. Examine the effect of Artificial intelligence (AI) on electronic value added tax on total tax revenue.
- ii. Investigate the impacts of Artificial intelligence (AI) electronic company income tax on total tax revenue.
- iii. Analyze the impacts of Artificial intelligence (AI) of electronic capital gain tax on total tax revenue.

Research Questions

- i. To what extent does Artificial intelligence (AI) have effect on VAT on total tax revenue?
- ii. How has Artificial intelligence (AI) impacted on total tax revenue?
- iii. To what extent has Artificial intelligence (AI) impacted on the administration of capital gain tax and total tax revenue in Nigeria?

2.0 Literature Review

Conceptual Framework

Concept of Electronic Taxation

In their own view, Ezeabasili, V. N., & Agu, N. J. (2020). defined electronic taxation as "the use of electronic means for the assessment, collection, and reporting of taxes, which simplifies the tax administration process, reduces compliance costs, and increases transparency." According to Olokundun, Iyiola, and Ibidunni (2021) electronic tax system can be define as "the adoption of electronic means to simplify and improve the tax system and increase tax revenue." Also, Ajibade, Babajide, and Fagbemi (2017) defined electronic taxation as "the application of ICT tools to streamline tax administration and payment processes, with a view to reducing the incidence of tax evasion and enhancing revenue generation."

Ojo and Adeleke (2020) emphasize that electronic tax system can contribute to the digital transformation of the Nigerian economy, as it promotes the use of digital technologies and skills. Olokundun, et al, (2021) argue that electronic tax system can enhance accountability and governance, as it allows for better monitoring and tracking of tax revenues and expenditures.

Theoretical Framework

Compliance theory

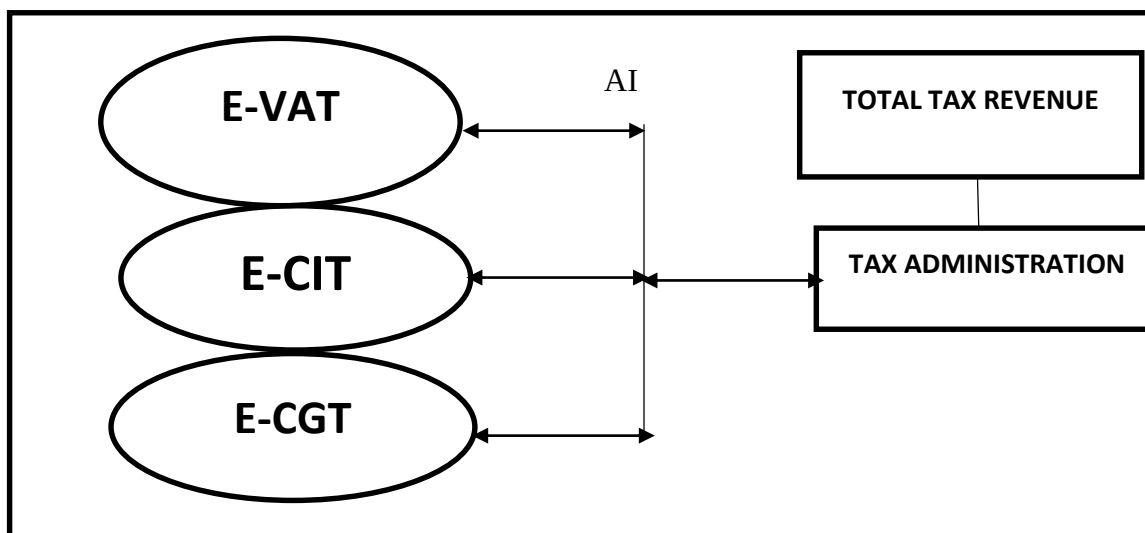
According to this theory, taxpayers are more likely to comply with tax laws if they perceive the tax system to be fair and just, and if they believe that defaulters will be detected by the system and appropriate sanctions meted against such taxpayer (Allingham & Sandmo, 2009). This can deter taxpayers from evading taxes and increase compliance rates (Frey & Torgler, 2007). The use of electronic tax systems can also improve compliance rates by making it easier for taxpayers to pay their taxes and for tax authorities to detect non-compliance (Alm & Torgler, 2006).

Conceptual Model

Adegbie, Fagbemi, and Adegbie (2016) conducted a study to examine the impact of electronic tax systems on tax administration in Lagos State, Nigeria. The study found that the use of technology in tax administration has brought many taxpayers to a uniform platform of digital assessment and in turn. Resulted into increase in tax revenue generation in Lagos State and even across the country hence increasing the gross domestic product (GDP).

The authors are also of the opinion that adopting Artificial Intelligence tools in electronic VAT, electronic CGT and electronic CIT, including perceived usefulness, ease of use, and security, will positively impact on revenue collection and administration process.

The conceptual model is diagrammatically represented as shown below.



3.0 Methodology

Research Design

Research design refers to the overall strategy that you choose to integrate the different components of the study in a coherent and logical way thereby ensuring you will effectively address the research problem, it constitutes the blueprint for the collection, measurement, and analysis of data. It refers to the strategy used for answering the stated research question. In relation to this study, the expo factor research design method of collecting data will be used.

Population of the Study

According to Cooper and Schindler (2006), population refers to the total collection of the elements about which the researcher wishes to make inferences. It is used in quite general sense to comprise all element of interest to a researcher. For the purpose of the study, growth in total tax revenue and GDP is the indices of economic growth.

Method and Sources of Data

The Researcher used secondary data collected from Central Bank of Nigeria (CBN) official Bulletin and data sourced from Federal Inland Revenue Service (FIRS) annual report. The data covered the period of 2015-2024.

Method of Data Analysis

There are various analytical procedures adopted in drawing conclusion from available data and differentiating general perspectives of reasoning from various statistical inputs present in the data. Sequel to the foregoing, the ordinary least square regression method will be used and it will be analyzed scientifically using Eview.

Model Specification

The data used in this include: ECIT, EVAT, and ECGT as proxies for Electronic taxation represent independent variable while Total tax revenue proxy for Tax income connotes the dependent variable. The model specification for this study will be carried out using regressive equation model. The model is illustrated below:

$$TTR = f(ECIT, EVAT, ECGT)$$

The model is arithmetically expressed as:

$$TTR = \beta_0 + \beta_1 ECIT + \beta_2 EVAT + \beta_3 ECGT + \mu$$

Where:

TTR= Total tax revenue

ECIT= Electronic company income tax

EVAT= Electronic value added tax

ECGT= Electronic capital gain tax

β_0 = Constant value

β_1 - β_3 = Coefficient of variation.

μ = error term

Apriori Expectation

Electronic taxation is expected to significantly affect total tax revenue ($\beta > 5$).

4.0 Data Analysis, Interpretation And Discussion Of Findings

Data Presentation

Table 1: Descriptive statistics

	TTR	EVAT	ECIT	ECGT
Mean	5399.283	1372.680	1504.396	25.56853
Median	5107.070	1149.010	1307.855	14.69835
Maximum	10179.35	2511.520	2649.190	99.40340
Minimum	3307.460	767.3340	933.5370	3.180300
Std. Dev.	2174.017	625.5165	524.3137	32.80520
Skewness	1.394930	0.843781	1.352047	1.633767
Kurtosis	4.044395	2.321581	3.977088	4.307071
Jarque-Bera	2.958026	1.102706	2.755609	4.128407
Probability	0.227862	0.576170	0.252131	0.126919
Sum	43194.26	10981.44	12035.17	204.5482
Sum Sq. Dev.	33084446	2738896.	1924334.	7533.269
Observations	8	8	8	8

Source: Author's computation from Eview12

Table 1 reports the descriptive statistic of the variables employed, it was shown that Total tax revenue (TTR) has a standard deviation of 2174.017, Electronic value added tax (EVAT) also has a standard deviation of 625.5165. Electronic company income tax (ECIT) has a standard deviation of 524.3137. Lastly, Electronic capital gain tax (ECGT) has a mean of 25.56853 with the standard deviation of 32.80520. The Jarque Bera normality test value of 2.958026, 1.102706, 2.755609 and 4.128407 indicates that Electronic value added tax (EVAT) is normally distributed because the p-value is greater than 0.05 while Total tax revenue, electronic company income tax and electronic capital gain tax are not normally distributed because their p-value is less than 0.05.

Table 2: Regression Analysis

Dependent Variable: LOG(TTR)
 Method: Ordinary Least Squares
 Date: 27/02/25 Time: 14:37
 Sample: 2015 2022
 Included observations: 8

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(EVAT)	0.326432	0.142683	2.287816	0.0841
LOG(ECIT)	0.709476	0.196427	3.611908	0.0225
LOG(ECGT)	0.009702	0.026809	0.361888	0.7357
C	1.019877	0.777520	1.311706	0.2598
R-squared	0.966843	Mean dependent var		8.535011
Adjusted R-squared	0.941976	S.D. dependent var		0.352974

Source: Author's computation from Eview12

The table above shows the regression analysis of the variables. It can be seen that the coefficient of the constant variable is 1.019877 which implies that the constant variable has a positive relationship. The coefficient of electronic value added tax, electronic company income tax and electronic capital gain tax are 0.326432, 0.709476 and 0.009702. This show that electronic value added tax, electronic company income tax and electronic capital gain tax has a positive relationship with total tax revenue. If the probability value is less than 5% level of significance it means there is a significant and if otherwise it shows there is no significance. The p-value of electronic value added tax, electronic company income tax and electronic capital gain tax are 0.0841, 0.0225 and 0.7357. According to the result, electronic value added tax and electronic capital gain tax has no significant impact on total tax revenue while electronic company income tax has significant impact.

Table 3 LM Test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.100585	Prob. F(2,2)	0.9086
Obs*R-squared	0.731141	Prob. Chi-Square(2)	0.6938

Source: Author's computation from Eview12

The results of post estimation technique was presented in table 5. As stated by the results, there is absence of autocorrelation among the variables since the p-value of 0.9086 which exceeds 0.05 (5% significant value). Similarly, the chi-square probability value of 0.6938 confirmed there is no

heteroskedasticity among the variables. Thus, the study concludes that the model is freed of any heteroskedasticity problem.

Discussion of Findings

The empirical analysis revealed an insignificant positive relationship between e-VAT and total tax revenue. The increase in e-VAT rates and improvements in compliance levels were associated with a notable rise in overall tax revenue. This finding underscores the effectiveness of electronic systems in enhancing the collection of value-added tax, contributing positively to the fiscal health of the Nigerian government. Descriptive analysis revealed upward trends in e-CIT contributions, while regression results confirmed the significance of e-CIT rates and compliance factors in shaping the broader tax revenue landscape. This underscores the importance of electronic company income tax as a vital component of the Nigerian tax revenue system. An increase in tax generated from sales of capital items will lead to a corresponding increase in the total tax revenue in the economy. The result shows the importance of generating tax from capital gain tax in the economy. The finding is against the stated apriori expectation of the study.

5.0 Summary, Conclusion and Recommendations

Summary

The study analyses the impacts of Artificial Intelligence (AI) through the adoption electronic tax system on revenue growth. The study also delves into the impacts of using electronic tax payment system have on the nation's economic growth through the total tax revenue as measured by gross domestic products(GDP) company income tax, value added tax, capital gain tax and total tax revenue. The introductory section consist of background to the study, statement of problem, objective of the study, research question, hypothesis, scope, significance of the study and the rest. The conceptual review was considered where the independent and dependent variables as well as their proxies were discussed extensively. It also consists of the theoretical review which has to do with the use of theoretical phenomenon to juxtapose the author's work on the subject matter.

Conclusion

Conclusively, this work has contributed to the understanding of the role of Artificial Intelligence (AI) though the adoption of electronic tax administration and how this impacted on the economic growth.

The positive impact observed in e-VAT, e-CIT, and e-CGT highlights the potential for electronic systems to drive revenue growth. Policymakers and stakeholders are encouraged to consider the recommendations provided as they work towards optimizing electronic taxation for sustainable economic development.

Recommendation

Based on the findings from the study, the following recommendations are proffered:

- The government provide an enabling environment for the operation of companies in the country, through this, there will be more revenue accruing from company income tax.
- It is also recommended that regular training of personnel should be encouraged periodically on the use and application of state of the art technology.
- Recruitment, selection and engagement of the right staff should be a priority coupled with an attractive and competitive wage reward.
- Policymakers should consider a comprehensive approach to tax reform, aligning tax rates, addressing compliance challenges, and ensuring that the tax system remains adaptable to the evolving economic landscape.
- Policymakers should prioritize and invest in robust technological infrastructure to sustain and enhance the positive impact of electronic taxation components.

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