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Taxation and Human Capital Development in Nigeria: A Dynamic Analysis using the Error Correction Model

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Abstract: This study empirically examined the impact taxation on the Human Development Index (HDI) in Nigeria, for the period 1990 - 2024. The error correction model was used to evaluate both short-run and long-run impact of the independent variables on the dependent variable. The results showed that Company Income Tax (CIT) and Petroleum Profit Tax (PPT) had a negative and significant impact on HDI in the short run, while Value Added Tax (VAT) demonstrated a positive and significant relationship. Customs and Excise Duties (CED) were found to negatively affect HDI, though insignificantly in the short run. In the long run, CIT continued to have a negative but insignificant impact, while PPT and CED maintained a negative and significant effect. VAT remained the only tax component with a consistently positive and significant influence on human development. Despite a confirmed long-run relationship between tax revenue and HDI, the study highlights that increasing tax revenue in Nigeria has not translated into significant human development gains, likely due to poor fiscal discipline, tax evasion, weak policy implementation, and lack of transparency. The findings recommended the need for tax policy reform, improved revenue utilization, and stricter enforcement to enhance the developmental impact of tax revenue in Nigeria.

Keywords: Taxation, Human Capital Development, Error Correction Model.

1.1 Background to the Study

Taxation plays a fundamental role in any economy, especially in the context of a developing nation like Nigeria, where government revenue primarily relies on tax collection. Taxes are essential to fund public goods and services, which in turn can impact the country's human capital development. Human capital development, which refers to the process of improving the economic value of individuals through education, health, skills development, and productivity, is vital for economic growth and development. In Nigeria, taxation and human capital development are intricately linked, as the efficient collection and allocation of tax revenue can either propel or hinder progress in education, healthcare, and other vital sectors of human development.

This study seeks to explore the relationship between taxation and human capital development in Nigeria, examining how effective taxation policies can be a catalyst for the improvement of human capital in the country. In particular, it focuses on understanding the role of tax revenues in financing key areas such as education, healthcare, skills development, and poverty alleviation programs. Despite the potential of taxation to contribute to human capital development, the efficiency of tax collection, the equitable distribution of tax revenue, and the effective utilization of tax proceeds are often subjects of debate in Nigeria.

Taxation plays a crucial role in government revenue generation and can significantly support human capital development in Nigeria through strategic investments in education, healthcare, and infrastructure. According to Ojo (2017), taxation is a powerful tool for economic

development, enabling governments to mobilize resources for essential services. However, Nigeria's tax system suffers from low compliance, a narrow base, and inefficient collection methods (Ajakaiye, 2018). The overreliance on oil revenue (Ogunleye, 2016) has made government funding vulnerable to global oil price fluctuations, jeopardizing consistent support for human capital programs. One of the most direct pathways through which taxation fosters human capital development is education, but Nigeria's educational system remains underfunded and constrained by infrastructural and quality issues (Ogunyemi, 2017). Despite UNESCO's (2020) recommendation that 15–20% of total government spending go to education, Nigeria falls short, resulting in high out-of-school rates and skill mismatches. A robust tax regime, effectively allocated, can help close these gaps and enhance national development outcomes (Ademola & Osabuohien, 2019).

Healthcare is another vital sector in human capital development. A well-funded healthcare system can significantly boost productivity and economic growth by ensuring a healthy workforce. Yet, Nigeria's healthcare sector is plagued by poor infrastructure, limited access, and inadequate funding (Ogunyemi, 2018). Although efforts like the National Health Insurance Scheme have been introduced, their impact is minimal due to mismanagement and limited resources (Uzochukwu et al., 2019). With Nigeria spending less than 5% of its GDP on healthcare—well below the global average (World Health Organization [WHO], 2020)—a reformed tax system could provide the financial backing needed for improved health outcomes. However, the effectiveness of taxation in this regard is undermined by tax evasion, poor governance, and a largely untaxed informal sector (Ojo, 2017; Nigerian Bureau of Statistics [NBS], 2020). Additionally, corruption and misallocation of collected revenues (Ajakaiye, 2018) erode the developmental potential of taxation, making reforms in tax administration and transparency critical for sustainable human capital growth

1.2 Statement of the Problem

Taxation is a fundamental mechanism for financing public services that are critical to human capital development, such as education, healthcare, and infrastructure. In Nigeria, however, the effectiveness of taxation in supporting these sectors is undermined by a narrow and oil-dependent tax base, low compliance, and widespread evasion—especially in the informal sector (Ogunleye, 2016; Ajakaiye, 2018). These limitations have led to chronic underinvestment in education and healthcare, with Nigeria spending significantly less than global benchmarks, resulting in poor service quality and a workforce ill-prepared for economic challenges (UNESCO, 2020; WHO, 2020; Ogunyemi, 2017). Compounding this issue are governance failures and corruption, which distort revenue allocation and diminish the developmental impact of taxes (Ajakaiye, 2018). Although tax reforms aimed at broadening the base and improving compliance have been initiated, they remain largely ineffective due to entrenched structural problems (Ogunleye, 2016). This study, therefore, addresses the inefficiency of Nigeria's tax system in financing human capital development and aims to identify both the barriers to and opportunities for reform to better support education, healthcare, and long-term national development.

2.0 LITERATURE REVIEW

2.1 Conceptual Literature

2.1.1 Human Development Index (HDI) and Its Components

The **Human Development Index (HDI)** is a composite index used to measure and rank countries based on human development, which is a broader concept than simply economic growth. It was introduced by the **United Nations Development Programme (UNDP)** in 1990 as a tool to emphasize that development should be measured not only by economic factors such as GDP, but also by the quality of life and human well-being. The HDI focuses on three core dimensions: **health, education,** and **standard of living**. These components collectively aim to

capture the essential factors that contribute to human flourishing and socio-economic development.

a) Health: Life Expectancy at Birth

The **health dimension** of HDI is measured using **life expectancy at birth**. Life expectancy is often used as an indicator of the general health of a population and its access to basic healthcare, nutrition, and other social services. A higher life expectancy typically indicates better healthcare systems, higher standards of living, and healthier living conditions. The health aspect of human development is crucial because it represents the capacity of individuals to live long and healthy lives, which is fundamental for development. In fact, **Amartya Sen** (1999) emphasized the importance of health as a critical capability that enables individuals to function effectively in society and contribute to economic development. Therefore, life expectancy is a direct measure of the success of a nation in providing healthcare and living conditions that allow citizens to live longer, healthier lives.

b) Education: Mean Years of Schooling and Expected Years of Schooling

The **education component** of HDI includes two indicators: **mean years of schooling** for adults aged 25 and older, and **expected years of schooling** for children of school-entry age. These measures assess the educational attainment of the population and the potential for future generations to receive an education. Education plays a critical role in human development as it enhances people's knowledge, skills, and capabilities, thereby improving their quality of life and contributing to economic and social growth. A more educated population tends to have better job prospects, higher incomes, and greater participation in social and political activities (Becker, 1993). The **mean years of schooling** measures the past educational experience of the adult population, while the **expected years of schooling** reflect the future opportunities for children to receive education.

Education is also seen as a **human capability**—a means by which individuals can increase their freedom to live the lives they value (Sen, 1999). It is often linked to improvements in health, income, and social cohesion. As such, education is essential for fostering human development and reducing inequality within countries. **World Bank (2018)** highlights that education is a long-term driver of development, improving not only the quality of life but also economic productivity and social stability.

c) Standard of Living: Gross National Income (GNI) per Capita

The **standard of living** dimension of HDI is measured by **Gross National Income (GNI) per capita** adjusted for purchasing power parity (PPP). GNI per capita reflects the average income of citizens and is an important indicator of economic well-being and living standards. However, it is not a comprehensive measure of development on its own because it does not capture inequalities in income distribution, environmental sustainability, or other non-economic aspects of human well-being. Nevertheless, it is an essential component of HDI as it provides a basic measure of the wealth available to individuals in a given country (Todaro & Smith, 2015).

Economic development, as reflected in higher GNI per capita, is closely tied to improvements in health and education, as greater wealth allows for better healthcare, better access to education, and overall higher standards of living. However, the relationship between economic wealth and human development is complex, as **income inequality** and **poverty** can diminish the benefits of increased national wealth (Piketty, 2014). Consequently, while GNI per capita is an important factor in HDI, it must be understood in conjunction with health and education outcomes to provide a more holistic view of human development.

2.1.2 Taxation and Economic Development

Taxation plays a pivotal role in the economic development of countries, particularly in developing economies where the need for public revenue to finance infrastructure, education, healthcare, and other developmental projects is critical. The relationship between taxation and

economic development is multifaceted, involving not only revenue generation but also the design and efficiency of tax systems, tax compliance, and the ability of the tax system to support sustainable economic growth and social equity.

Taxation is one of the primary means by which governments generate the revenue necessary to fund public goods and services that support economic development. Taxes finance investments in infrastructure (such as roads, electricity, and telecommunications), education, healthcare, and social protection programs, all of which contribute to a country's overall development. **Bird and Zolt (2005)** argue that an efficient and equitable tax system is essential for the development of both the public and private sectors, as it enables governments to finance long-term investments in human and physical capital.

In the context of developing countries, tax revenue provides governments with the financial means to address poverty, reduce inequality, and achieve sustainable development. However, the capacity of a nation to effectively raise revenue through taxes is influenced by its tax base, economic structure, and administrative capacity (Tanzi, 2002). For example, countries with a large informal economy or significant levels of tax evasion may struggle to generate sufficient tax revenue, which can hinder development efforts (Oats, 2001).

The **tax-to-GDP ratio** is often used as an indicator of a country's tax effort and capacity. A higher ratio typically indicates a more developed, diversified economy with the ability to generate tax revenue from various sectors. In contrast, lower tax-to-GDP ratios in many developing countries often reflect weak tax administration, limited economic diversification, and high levels of informality in the economy (IMF, 2011).

In many developing countries, including Nigeria, taxation is one of the main sources of public revenue. However, there is often a significant reliance on non-tax revenue sources, such as oil exports. This reliance on a volatile commodity has made Nigeria's economy highly vulnerable to fluctuations in global oil prices, often leading to underfunding of essential services and sectors, including those that contribute to human capital development (Ogunleye, 2016). As a result, the tax system in Nigeria needs to be reformed and expanded to create a more diversified and sustainable revenue base that can better support the development of human capital.

2.3 Empirical Literature

Oloyede & Adeyemi, (2025), carried out a study titled, The Effect of Taxation on Human Capital Development in Nigeria: An Empirical Investigation. The **Objective** was to assess the relationship between tax revenue and human capital development, focusing on education and healthcare. Their study spanned from 2000–2023. The following variables of interest were used for the study: Tax revenue, education expenditure, healthcare expenditure, literacy rates, life expectancy. **Method of Analysis** was Autoregressive Distributed Lag (ARDL) Model. The study found that tax revenue has a positive impact on both education and healthcare outcomes, with a notable improvement in literacy rates and life expectancy as government spending in these sectors increased. However, challenges in efficient tax collection and corruption were cited as significant barriers. From the findings, the study recommended strengthening the tax administration system and improving transparency in government spending to ensure that tax revenues are efficiently allocated to human capital development. However, the limitation of the study was its reliance on national-level data, which might not capture local variations in human capital outcomes. A more regional approach could have provided deeper insights into the disparities across different states.

Olatunji, (2024), titled his work Taxation, Governance, and Human Capital Development: A Case Study of Nigeria. The broad objective was to investigate the role of governance in the effectiveness of taxation on human capital development. The **time scope** from 2000–2023 for **Variables such as;** Tax revenue, governance indicators (corruption, transparency), education expenditure, healthcare expenditure, human capital indicators (life expectancy, literacy rates) were used. **Method of Analysis** was Generalized Method of Moments (GMM)**.** The study found

that governance quality was a critical factor in determining the effectiveness of tax revenue in promoting human capital development. Countries with better governance systems saw more significant improvements in education and healthcare outcomes from tax revenues. **Recommendations** includes improving institutional capacity, reducing corruption, and strengthening governance to ensure that tax revenues are effectively used for human capital development. However, the study focuses predominantly on governance and does not adequately address other socio-economic factors that could influence the use of tax revenue in human capital development.

Oyegun & Ugochukwu (2023), carried out to investigate the impact of taxation on economic growth in Nigeria. Four hypotheses were stated and tested. The study used mostly secondary data from the Central Bank of Nigeria Bulletin (CBN) and reports from Federal Inland Revenue for the period of 29 years (1994 – 2022). The study used Regression Analysis by applying an Error Correction Model (ECM) and Granger Causality Approach based on the outcome of the unit root test and to discover both long and short run effect. The study revealed that Custom and Excise Duty has a negative and insignificant impact on Nigeria Gross Domestic Product in the short run. Petroleum Profit Tax (PPT) has a negative impact on the Nigeria Gross Domestic Product in the short run. However, Value Added Tax (VAT) and Company Income Tax both have positive and significant impact on Nigeria Gross Domestic Product in the short run. The study recommended that Efforts should be intensified by the government towards increased collection of tax revenue this is due to the low contribution of tax revenue to GDP over the period of study. This can be done through blocking all loopholes in our tax laws as well as bringing more prospective tax payers into the tax net (especially the informal sector). Also there should be stringent penalty imposed on any individual or corporate body who indulge in any form of tax malpractices, if the positive correlation between taxation and economic growth should be maintained.

Adebayo, & Olayanju. (2023), in Tax Revenue and Healthcare Development in Nigeria: Implications for Human Capital Growth. The authors evaluate the influence of tax revenue on healthcare spending and its impact on human capital development in Nigeria. Their study scoped from 2005–2021. Tax revenue, healthcare spending, healthcare outcomes (life expectancy, infant mortality rate), human capital index were among variables used for the study. Fixed Effects Model (FEM) was used to analyze the collected time series data. The study revealed that tax revenue had a significant impact on healthcare outcomes such as life expectancy and infant mortality rates. However, it pointed out that while tax revenue increased over time, the growth in healthcare infrastructure and services was not commensurate with the increase in revenue, primarily due to mismanagement and corruption. **Recommendations** such as improving healthcare governance, ensuring that tax revenue is effectively allocated to infrastructure and personnel development in the healthcare sector. A limitation of the study was its reliance on aggregate healthcare data, which may obscure regional differences in healthcare delivery and human capital outcomes.

Eze, & Okafor. (2022), wrote on the Effect of Taxation on Human Capital Development in Nigeria: A Study on Education and Healthcare Financing. The **Objective was t**o examine the effect of tax revenues on financing education and healthcare, and its impact on human capital development in Nigeria. From 2010–2021, using Tax revenue, education and healthcare expenditure, literacy rates, life expectancy, government spending on human capital sectors as variables of interest and running a Fixed Effects Model (FEM) method of data analysis, the study showed that tax revenue played a vital role in financing both education and healthcare, contributing to improvements in literacy rates and life expectancy. However, inefficiencies in resource allocation and inadequate policy implementation limited the impact of tax revenues on human capital development. In their recommendations, the study suggested that Nigeria should adopt more effective tax administration policies and enhance government capacity to manage funds allocated to human capital development sectors. Limitedly, the study did not consider the

role of external debt or international organizations' aid in financing education and healthcare, which may also influence the outcomes of tax-financed spending.

Akinyemi & Ajiboye. (2019), assess the role of tax revenue in financing education and its impact on human capital development in Nigeria. Using Vector Autoregressive (VAR) Model. Annual data from 2000 – 2018 were collected on variables such as Tax revenue, education expenditure, literacy rates, school enrollment, government education expenditure. The study found that tax revenue significantly influences education financing in Nigeria, leading to improvements in literacy rates and school enrollment. However, the study noted inefficiencies in tax collection and allocation of funds. It does recommended improving tax administration to ensure more efficient collection and allocation of resources to education, particularly in rural areas. As laudable as the finding were, it did not fully account for the role of private sector investment in education and how that may supplement or counterbalance public funding from tax revenues.

Adebayo & Eze. (2018), to investigate how taxation is used to finance education and its contribution to human capital development in Nigeria. From a t**ime scope** of 1999–2017, **Variables used** includes; Tax revenue, education expenditure, literacy rates, school enrollment rates, government spending on education. **Method of Analysis** was an Error Correction Model (ECM). The study found a strong positive relationship between tax revenue and education financing, which led to improvements in literacy rates and enrollment. However, the study noted that despite the availability of tax revenue, educational outcomes were often constrained by inefficiencies in government policy and management. In line, the study recommended enhancing the governance of educational financing, improving tax compliance, and ensuring more targeted funding for education in rural areas. Sadly, it did not fully address the issue of the quality of education, focusing primarily on funding and enrollment.

Daramola & Olufemi. (2017), the Objective to assess the role of taxation in financing education and healthcare, and its subsequent impact on human capital development. The authors used Granger Causality Test on variables data such as; Tax revenue, education and health expenditure, literacy rates, life expectancy, government social expenditure for the period from 2000 – 2015. The study found that tax revenue is a significant determinant of government spending on education and healthcare, leading to improvements in human capital. However, it also pointed out that the impact of tax revenue on human capital was limited by inefficiencies in public service delivery. It was thereby recommended improving public service delivery, reducing corruption, and ensuring a more equitable distribution of tax revenue across regions. Meanwhile, the study's use of Granger causality does not fully capture the complex relationships between tax revenue and human capital development over time.

3.0 METHODOLOGY

3.1 The Research Design

The longitudinal and ex-post facto research method was adopted in this study because the study involved the collection of past data for 26 years starting from 1994 to 2024. The period was representative and long enough to capture the responsiveness of the chosen independent variables on HDI in the country. The proxies for tax revenue, economic growth and development were observed and recorded annually over the period of time. This research design approach makes it easier to collect the data from the various sources in examining the impact of tax revenue on economic growth and development of Nigeria.

3.2 Sources of Data Collection

Secondary data were employed in the study which consisted of Human Development Index, Company Income Tax, Petroleum Profit Tax, Value Added Tax, and Custom and Excise

Duties revenue in Nigeria ranging from 1994 to 2024. The data was obtained from the Central Bank of Nigeria (CBN) Statistical Bulletin and Annual Report, Federal Inland Revenue Service

(FIRS) Quarterly Reports, National Bureau of Statistics (NBS), World Bank country specific report and United Nations Human Development Report.

3.3.1 Model Specification

Based on the functional relationship between the theory of optimal commodity taxation and economic growth, a link was drawn from the two variables. The model for the study states that Economic Development proxy by Human Development Index (HDI) depends on tax revenue. The model is in line with the work of Ofoegbu et al (2016) in the empirical analysis of the effect of tax revenue on economic development of Nigeria. The models state that a linear relationship existed between tax revenue, economic growth and development in Nigeria. This model was modified in this study. Thus, the functional relationship and the resultant models are as specified below:

HDI = f (Tax Revenue) ……... (3.1)

HDI = f (CIT, PPT, VAT, CED) …… (3.2)

From the above functional relationship, the stochastic model is specified thus:

$HDI = \beta_0 + \beta_1 CIT_t + \beta_2 PPT_t + \beta_3 VAT_t + \beta_4 CED + \mu_t$ ……(3.3)

Where HDI = Human Development Index

CIT = Company income Tax Revenue

PPT = Petroleum Profit Tax Revenue

VAT = Value Added Tax Revenue

CED = Custom and Excise Duties Revenue

β_0 = Constant parameter

$\beta_1, \beta_2, \beta_3, \beta_4,$ = Coefficients of the explanatory variables

μ_t = Stochastic disturbance term

t =Time subscript

The Apriori expectation is that the coefficients of, CIT, PPT, VAT and CED are positively related to HDI, i.e., $\beta_1, \beta_2, \beta_3, \beta_4, > 0$ in equation 3.3 above respectively.

3.4 Method of Data Analysis

The method of data analysis in the study was the Multiple Ordinary Least Square (OLS) session Analysis. This method is a good estimating technique for time series data because it has characteristics of Best Linear Unbiased Estimator (BLUE) that possesses the properties of unbiasedness, efficiency and consistency. This technique established a stronger causal relationship between the chosen variables in achieving the research objectives. The data obtained were electronically analyzed with the aid of Econometric View (E-View) 10.

Operationalization of variables

S/N	Variables	Proxy	Definition	Sources	Apriori Sign
1	Development	HDI	It is a composite index of education, life expectancy and standard of living use in measuring development.	Haller, (2012); and Ofoegbu et al (2016).	Nil
2	Company Income Tax Revenue	CIT	Revenue realized from The imposition of CIT on companies.	Adegbie&Fakile (2011); and Ogwuche et al (2019).	Positive

3	Petroleum Profit Tax Revenue	PPT	Revenue realized from The imposition of PPT on oil companies.	Anyaduba&Aronmwan (2015); and Saheed et al, (2014).	Positive
4	Value Added Tax Revenue	VAT	Tax revenue realized from the imposition of VAT on goods and services.	Okoror& Onatuyeh (2018); and Yusuf et al (2018)	Positive
5	Custom and Excise Duties Revenue	CED	Revenue realized from the collection of CED on imports and exports.	Ibadin&Oladipupo (2015); and Asaolu et al., (2018).	Positive

Sources: Researcher's Compilation from Various Sources (2025)

4.0 DATA PRESENTATION AND ANALYSIS

4.1 Data Presentation - Descriptive Statistics

The result of the descriptive statistics is shown on the table below:

Table 4.1: Descriptive Statistics

	HDI	CIT	PPT	VAT	CED
Mean	0.4794	451.543	1335.12	441.248	282.674
Median	0.474	244.9	1183.5	221.6	232.8
Maximum	0.534	1421.79	3201.31	1409.21	705.5
Minimum	0.393	12.275	42.803	7.2608	18.295
Std. Dev	0.0347	464.810	1026.35	448.183	204.635
Skewness	-0.1191	0.6832	0.339	0.7714	0.5257
Kurtosis	2.8478	1.9914	1.8464	2.1833	2.0797
Jarque-Bera	0.0832	3.0047	1.8652	3.1745	2.0338
Probability	0.9592	0.2226	0.3935	0.2045	0.3617
Sum	11.984	11288.5	33378.1	11031.2	7066.85
Sum Sq. Dev.	0.029	5185181	25281620	4820833	1005015

Source: Researcher's Compilation (2025)

The descriptive statistic of the variables used in the analysis presented in Table 4.1 above explains the range, minimum, maximum, mean values, spread and normality of the variables.

The descriptive statistics result of the Jarque-Bera test revealed that all the variables- human development index, company income tax, petroleum profit tax, value added tax and customs and excise duties were all normally distributed

4.2 Data Analysis - Diagnostics Tests

This section deals with the serial correlation and heteroscedasticity test result among the human development index, company income tax, petroleum profit tax, value added tax, and custom and excise duty.

Table 4.2: Breusch-Godfrey Serial Correlation LM Test for HDI Model

F-statistic	2.360669	Prob. F (2, 17)	0.1245
Obs*R-squared	5.433987	Prob. Chi-Square (2)	0.0661

Source: Results Extract from Eview 10 SV

Table 4.3: Breusch-Pagan-Godfrey Heteroskedasticity Test for HDI Model

F-statistic	1.247868	Prob. F(5,1 9)	0.326
Obs*R-squared	6.180172	Prob. Chi-Square(5)	0.2891
Scaled explained SS	4.006704	Prob. Chi-Square(5)	0.5485

Source: Results Extract from Eview 10 SV

The result from the Breusch-Godfrey serial correlation test in Table 4.2 revealed that we cannot reject the null hypothesis because the p-value of 12.45 percent is greater than the 5% significance level. Thus, we accept the null hypothesis that there is no serial correlation among the residuals in the human development index model. Similarly, the Breusch-Pagan- Godfrey Heteroskedasticity test as shown in Table 4.3 indicated that we cannot reject the null hypothesis because the p-value of 32.63 percent is greater than the 5 percent significance level. Thus, we accept the null hypothesis that the residuals were homoskedastics in the human development model.

Table 4.4: Ramsey RESET Test for HD I Model

	Value	Df	Probability
t-statistic	0.612734	18	0.547700
F-statistic	0.375444	(1,18)	0.5477
Likelihood ratio	0.516086	1	0.4725

Source: Results Extract from Eview 10 SV

The result from the Ramsey RESET test for model misspecification in Table 4.4 displayed above revealed that we cannot reject the null hypothesis because the F-statistic of 0.3754 with p-value of 0.5477 is greater than the 5% significance level. Thus, we accept the null hypothesis that the model is correctly specified in a linear form.

The diagnosis tests of heteroscedasticity and serial correlation using Breausch-Pagan Godfrey and Breausch- Godfrey tests revealed that all the residual in the the human development index model is homoskedastics and with the absence of serial correlation at the 5 percent level of significance respectively. Likewise, the Ramsey RESET test for model misspecification confirmed that the models was not mis-specified.

4.2.1 Unit Root Test

The results of the unit root test using Augmented Dickey Fuller (ADF) test was reported below on Table 4.5:

Note: The Null hypothesis was that there is a unit root in the variables. The "D" denoted first difference of the variable. The different values of the lag length was as a result of automatic lag selection based on Schwarz Information Criterion (SIC). The maximum lag length automatically selected for the sample size was 5. This was to enable same lag length for all the chosen variables in order to allow for sound judgment and decision making.

From the unit root test results conducted, the variables at level as displayed in Table 4.5 above revealed that the ADF test statistic (-2.035846) of the real gross domestic product (RGDP) was less than the critical value (-2.9981) in absolute terms. Hence, we failed to reject the null hypothesis of a unit root at the 5 percent significance level. Thus, real gross domestic product was found to be non-stationary at level. Similarly, the other variables were likewise found to be non-stationary at first differencing because their ADF test statistics were less than the critical value at the 5 percent significance level. Hence, the AD unit root test confirmed that all the variables were not stationary at their levels. Thus, the variables were tested for stationarity in their first differences.

Table 4.5: Augmented Dickey-Fuller Unit Root Test at First Difference

(Augmented Dickey-Fuller Regressions include an intercept but not a linear trend)

Variable	Lag Length	ADF Statistic	5% Critical Value	Remarks
D(HDI)	4	-4.045046	-3.029970	Stationary
D(CIT)	1	-3.507185	-3.004861	Stationary
D(PPT)	0	-5.707569	-2.998064	Stationary
D(VAT)	1	-4.051839	-3.004861	Stationary
D(CED)	1	-4.949337	-3.004861	Stationary

Source: Results Extract from Eview 10 SV

The ADF unit root test results in Table 4.5 above revealed that all the variables were stationary after first differencing at the 5 percent significance level because all the individual ADF test statistics were all greater than their respective critical values in their absolute terms. Hence, we failed to accept the null hypotheses of a unit root at the 5 percent significance level. Thus, we conclude that all the variables were stationary after second differencing at the 5% significance level. The results of the Augmented Dickey-Fuller unit root tests indicated that all the variables were stationary at first differences, that is, they were integrated of order one. It means that all variables in the models became stationary after first difference.

4.2.2 Co-integration Test

Having established the time series properties of the data, the study proceeded to conduct the Johansen Multivariate Co-integration test for HDI model. The results of the HID test for co-integration based on the trace and maximum Eigen value statistics were reported in Tables 4.6 and 4.7 below:

4.2.3 Human Development Index and Tax Revenue

This section dealt with the presentation and analysis of co-integration test results among human development index and value added tax, company income tax, petroleum profit tax, education tax and customs and excise duty.

Table 4.6: Unrestricted Co-integration. Rank Test (Trace) for HDI Model

Hypothesized No. of COE(s)	Eigen value	Trace Statistic	0.05 Value	Critical Prob. **
None *	0.990504	194.1512	95.75366	0.0000
At most 1 *	0.807097	87.04390	69.81889	0.0012
At most 2 *	0.726352	49.19589	47.85613	0.0372
At most 3	0.410102	19.38993	29.79707	0.4651
At most 4	0.244338	7.250391	15.49471.	0.5487
At most 5	0.034466	0.806696	3.841466	0.3691

Source: Results Extract from Eview 10 SV

Trace test indicates 3 co-integrating eqn(s) at the 0.05 level

- denotes rejection of the hypothesis at the 0.05 level

*MacKinnon-Haug-Michelis (1999) p-values

Table 4.7: Unrestricted Co-integration Rank Test (Maximum Eigenvalue) for HDI Model

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Value	Critical Prob.**
None *	0.990504	107.1073	40.07757.	0.000
At most 1 *	0.807097	37.84801	33.87687	0.0159
At most 2 *	0.726352	29.80596	27.58434	0.0255
At most 3	0.410102	12.13954	21.13162	0.5339
At most 4	0.244338	6.44370	14.26460	0.5569
At most 5	0.034466	0.806696	3.841466	0.3691

Source: Results Extract from Eview 10 SV

Max-eigenvalue test indicates 3 co-integrating eqn(s) at the 0.05 level

- denotes rejection of the hypothesis at the 0.05 level
- *MacKinnon-Haug-Michelis (1999) p-values

The co-integration test based on the Trace test statistics in Table 4.6 above indicated that there were three co-integrating equations at the 5 percent significance level. Similarly, the maximum Eigenvalue test statistics in Table 4.7 above also revealed 3 co-integrating equations at the 5

percent level of significance. The result of the human development index model based on the Trace and Maximum Eigenvalue test statistics therefore revealed that a long-run relationship existed among human development index and the tax revenue variables in the model as reported in Table 4.6 and 4.7 above.

The Johansen co-integration tests which examined the long-run relationship among the variables revealed that long-run relationships existed among the variables in the model. This means that a long-run relationship existed between HDI and the set of tax revenue variables - CIT, PPT, VAT, and CED. Since long run co-integration relationships were established in the human development index model, the error correction model was estimated using the OLS regression method. Thus, the result of the short-run error correction model for human development index was presented in Table 4.8 below.

Table 4.8: Estimated Coefficients of the HDI Error Correction Model

Dependent Variable: D(LOGHDI)				
Regressor	**Coefficient**	**Standard Error**	**T-Ratio**	**Probability**
DLOG(CIT)	-0.599077	0.330781	-1.811095	0.0878
DLOG(PPT)	-0.224402	0.052243	-4.295381	0.0005
DLOG(VAT)	0.870600	0.411500	2.115675	0.0494
DLOG(CED)	-0.572188	0.350035	-1.63466	0.1205
ECM(-1)	-0.476765	0.254962	-1.869943	0.0788
	0.007196	0.058414	0.123196	0.9034
R-squared DW-Statistic	0.5655		R-Bar-Squared	0.4122
	1.7931		F-Statistic	3.6890 [0.0156]

Source: Results Extract from Eview 10 SV

From Table 4.8 the coefficients of determination of the short-run human development index

(HDI), R-squared (R}) is approximately 0.57 and the adjusted R-squared (R}) bar was 0.41. it showed that about 57 percent of the systematic variations in human development index (HDI) in Nigeria were explained by the regressors in the equation. The adjusted R- bar squared (R^2 bar) indicated that about 41 percent of the changes in human development index (HDI) were attributable to the explanatory variables after adjusting for degree of freedom. The F-statistic of 3.69 with p-value of 0.01 revealed that the overall model was significant as the p-value is less than the 5 percent significance level. Consequently, the hypothesis of a log linear relationship between the human development index and the regressors in the equation could not be rejected at the 5 percent level of significance.

From Table 4.8 above, the estimated coefficient of CIT has an estimated negative coefficient of -0.60, t-statistics of 1.81 with p-value of 0.09. This implies that CIT has a negative impact on HDI at the 10 percent level of significance. The estimated coefficient of PPT is negative with a coefficient of -0.22 and t-statistics of -4.30 with p-value of 0.000. This means that PPT has a significant short-run negative impact on HDI in the country as its p-value of 0.000 is less than 0.05 at the 5 percent significance level. VAT is positive. It has an estimated coefficient of 0.87 and t-statistics of 2.12 with p-value of 0.049. This means that value added tax has a positive significant short-run impact on human development index in Nigeria as its p-value of 0.049 is less than 0.05 at the 5 percent significance level. The estimated coefficient of CED is negative with a coefficient of -0.57 and absolute t-statistics of 1.63 with p-value of 0.12. This means that custom and excise duties have insignificant negative short-run impact on human development index in the country as its p-value of 012 is greater than 0.05 at the 5 percent significance level. The coefficient of the Error Correction Mechanism (ECM) is negative and significant at the 5 percent level. Thus, it acted rightly to correct any deviation of the human development index model from its long-run equilibrium value. The coefficient of the constant also known as the intercept is positive but not significant at the 5 percent level. This means that there will be a form

of human development though it may not be visible even though if tax revenue were not collected.

The Durbin Watson statistic of approximately 1.79 indicated the absence of autocorrelation in the human development index model in the short-run as its value is greater than the coefficient of determination R- squared (R}) with a value of approximately 0.57.

Front the analysis of the data, it was revealed that company income tax has a negative significance short-run relationship with human development index at the 10 percent significance level.; petroleum profit tax has a negative significance short-run relationship with human development index at the 5% significance level; value added tax has a positive significant short-run relationship with human development index in Nigeria; And finally, customs and excise duties have an insignificance negative short-run relationship with human development index in Nigeria. Thus, value added tax has a positive sign with human development index which was in conformity with our appriori expectation. Surprisingly, company income tax, petroleum profit tax and custom and excises duties have a negative sign with human development index.

Table 4.9: Estimated Coefficients of the Long-Run HDI Model

Dependent Variable: LOGHD				
Regressor	**Coefficient**	**Standard Error**	**T-Ratio**	**Probability**
LOG(VAT)	0.799198	0.459725	1.738428	0.0983
LOG(CIT)	-0.417347	0.300201	-1.390224	0.1805
LOG(PPT)	-0.253768	0.058221	-4.358704	0.0003
LOG(TET)	0.195407	0.142721	1.36915	0.18(59
LOG(CED)	-0.668058	0.343201	-1.946547	0.0665
C	1.844647	0.594810	3.101240	0.0059
R-squared	0.7027		R-Bar-Squared	0.6245
DW-Statistic	1.1205		F-Statistic	8.9835 [0.0002]

Source: Results Extract from Eview 10 SV

From Table 4.9 displayed above, the coefficients of determination of the long-run HDI, R-square (R^2) is approximately 0.70 and the adjusted R-square (R^{-2}) was 0.62. It showed that about 70 percent of the systematic variations in HDI in Nigeria were explained by the regressors in the equation. The adjusted R squared (R^{-2}) indicated that about 62 percent of the changes in HDI were attributable to the explanatory variables after adjusting for degree of freedom. The F-statistic of 8.98 with the p-value of 0.000 revealed that the overall model was significant as the p-value is less than 0.05 at the 5 percent significance level. Consequently, the hypothesis of a long-run log linear relationship between the HDI and the regressors in the equation could not be rejected at the 5 percent level of significance.

From Table 4.9 above, the estimated coefficient of CIT has an estimated negative coefficient of -0.42 and absolute t- statistics of 1.39 with p-value of 0.18. This implies that CIT has an insignificant negative impact on HDI as its p-value is less than 0.05 at the 5 percent level of significance. The estimated coefficient of PPT is negative with a coefficient of -0.25 and absolute t-statistics of 4.36 with the p-value of 0.00. This means that PPT has a significant long-run negative impact on HDI in the country as its p-value of 0.00 is less than 0.05 at the 5 percent significance level. The estimated coefficient of VAT is positive. It has an estimated coefficient of 0.80 and absolute t-statistics value of 1.74 with the p-value of 0.10. This means that VAT has a positive significant long-run impact on HDI in Nigeria at the 10 percent significance level. The estimated coefficient of CED is negative with a coefficient of -0.67 and absolute t-statistics value of 1.95 with p-value of 0.07. This means that CED have significant negative long-run impact on

HDI in the country at the 10 percent significance level. The coefficient of the constant also known as the intercept is positive and significant at the 5 percent level. This means that there will be a form of human development even though if tax revenue were not collected. The Durbin Watson statistic of approximately 1.12 indicated the absence of autocorrelation in the long-run HDI model as its value is greater than the coefficient of determination R- squared (R^2) with a value of approximately 0.70. From the analysis of the data, it was revealed that CIT has a negative insignificance long-run relationship with HDI; PPT and CED has a negative significance long-run relationship with HDI. VAT has a positive significant long-run relationship with HDI in Nigeria; value added tax has a positive sign with human development index which were in conformity with our appriori expectation. Surprisingly, company income tax, petroleum profit tax and custom and excises duties have a negative sign with human development index in the estimated model.

4.4 Discussions of Findings

The study explored the relationship between tax revenue and human development in Nigeria, focusing on key tax components—Company Income Tax (CIT), Petroleum Profit Tax (PPT), Value Added Tax (VAT), and Customs and Excise Duties (CED)—and their effects on the Human Development Index (HDI). Empirical findings revealed that VAT had a positive and significant impact on HDI, suggesting that indirect taxation may play a constructive role in enhancing public welfare. In contrast, CIT and PPT had negative impacts, with PPT being statistically significant, indicating issues such as tax evasion and mismanagement of petroleum tax revenues (Ajakaiye, 2018). CED also had a negative and significant impact on HDI, potentially due to outdated tax laws and poor allocation of revenue (Ogunleye, 2016). The study emphasized that, although tax revenues are increasing, they have not significantly translated into human capital improvements, as reflected in persistently low HDI values (UNESCO, 2020; WHO, 2020). This underscores the disconnect between revenue collection and developmental outcomes in Nigeria.

5.0 Summary of Findings Conclusion and Recommendations

The study investigated the impact of tax revenue on the Human Development Index (HDI) in Nigeria, revealing mixed effects across different tax components. Using an error correction model, the findings showed that while Value Added Tax (VAT) had a positive and significant impact on HDI, other taxes—namely Company Income Tax (CIT), Petroleum Profit Tax (PPT), and Customs and Excise Duties (CED)—exhibited either negative or insignificant effects. Despite the potential of taxation to fund crucial infrastructure and improve living standards, the study concluded that tax revenue in Nigeria has not significantly translated into better human development outcomes, largely due to poor implementation, loopholes in tax laws, and mismanagement of public funds. It recommended reforms such as amending corporate tax incentives to curb evasion, improving transparency in petroleum tax reporting, expanding VAT to the informal sector, and revising outdated excise duty laws. These changes, if effectively implemented, could enhance the contribution of taxation to human capital development and foster long-term economic growth in Nigeria.

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