

Tax revenue and transportation infrastructure expectation gap: evidence from Sub-Saharan African countries

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ABSTRACT

One of the key factors that play a pivotal role in a sub-Sahara African region's economic growth is the presence of a reliable and efficient road network system. Governments' spending on infrastructure in this region remains poses inefficient management of scarce resources and to the detriment of the taxpayers considering the amount budgeted based on the actual needs and the actual investment because the growth in the economies does not physically depict infrastructural development and hence creates a gap in the expectations of the stakeholders. The study employed ex-post facto research design. The population of the study was 48 Sub-Saharan African countries based on the 2020 United Nations categorization. Five countries were purposively chosen for the study owing to data availability covering a sample period of 2007-2020. Data were sourced from the Tax Authority annual reports of the selected countries, World Development Indicators, International Monetary Fund (IMF), World Statistics Bulletin, Global Infrastructural Hub and Central Banks annual reports. Transportation infrastructure expectation gap was estimated using system general method of moments. Descriptive and inferential (Multiple Regression) statistics were used to analyze the data. The study found that tax revenue jointly had significant effect on transportation infrastructural expectation gap ($Adj.R_2 = 0.33$, $W(4, 263) = 12.26$, $p < .05$) in Sub-Sahara Africa. The study concluded that tax revenue influenced infrastructural expectation gap in Sub-Saharan African countries. It was recommended that government of sub-Saharan African countries should prioritize stakeholders' interest when making strategic decisions to reduce the transportation infrastructural expectation gap in these countries.

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1. INTRODUCTION

In every nation of the world, there exist a social contract between the government and the citizenry that clearly defines the role of the government to the citizens, and the role of the citizens to the state. One of the major functions of the government especially in developing countries is the provision of infrastructural facilities among others and thus citizens have expectations from the government regarding the provision of basic infrastructures. The citizens have some legitimate expectations from the government where they have performed their own contractual obligation to the country through the payment of taxes and incidentally these expectations are genuine and natural. The government is required to put the stakeholders' interest in right perspective when making strategic decisions in a nation. The task of meeting the expectations of the stakeholders in respect of these enormous responsibilities is one of the major problems facing the government (Ayeni & Afolabi, 2020). Metcalfe and Valeri (2019) defined the term infrastructure gap as the difference between the infrastructure investment needed and the resources made available to address that need. Understanding the infrastructure gap can be approached in two dimensions which include a notional, quantifiable investment gap and a subjective, needs-based service gap. Despite the clear socioeconomic benefits associated with building infrastructure, investment rates have declined in much of the world since the global financial crisis (Chukwuebuka & Jisike, 2020). Furthermore, the size of the gap triples when we compare current investment needs against what is invested and what would be required to meet the future of undersupplied regions such as Africa. The need for the government to provide infrastructure such as good transportation system at various level, cannot be overemphasized because it stimulates economic growth by facilitating investment and trade, driving enterprise opportunities, engendering employment and providing the less privileged with access to basic amenities to earn a living has been truncated owing to lack of infrastructures. There is an infrastructure expectation gap when some basic amenities are not made available to the stakeholders and/or the availability of such did not capture all the

relevant and underlying economic realities on ground, hence it does not justify the tax revenue being generated and not comprehensive enough in meeting stakeholders' expectations of the utilization of the tax revenue being generated in that economy (Alawi, Wadi & Kukreja, 2018).

One of the key factors that play a pivotal role in a Sub-Sahara African region's economic growth is the presence of a reliable and efficient road network system, this is mainly due to the fact that a well-developed road network and transportation system provides adequate access to the different African regions, which, in turn, is a critical condition for the efficient operation of the manufacturing, retail, labor and housing markets who constantly return their taxes (Caskey, Kanevsky, Kozloski, & Sainath, 2015). Transportation infrastructure is a key element in the growth and development of the economy. It is a wealth-building industry that enhances the capacity of a nation to use its natural resources, export food and other finished products, integrate the manufacturing and agriculture sectors, and supply education, medical and other infrastructure facilities (Zhang & Graham, 2020). Chukwuebuka and Jisike (2020) submitted that Sub-Saharan Africa has been identified as one of the least developing economies of the world despite the tax revenue being generated. They further asserted that low level of industrial sector productivity is largely due to poor electricity and transport infrastructure amongst others. Ayeni and Afolabi (2020) positioned that the availability of infrastructure facilities and services to a large extent has been poor. Investments in infrastructures such as transportation, energy, water, communication technologies have not improved the living conditions of the populace nor promoted economic growth in Sub-Saharan African countries. But, (Asaolu, Olabisi, Akinbode, & Alebiosu, 2018; Nedozi, Obasanmi & Ighata, 2014) demonstrated that despite the role played by tax in improving infrastructure expectation gaps, evidence has shown decay in socio-economic infrastructure and they are on the verge of collapse (Eomike & Isiadimso, 2019). Across the sub-Sahara Africa, huge amount of tax has been received by various governments but its usage in improving the level of infrastructural development in the country has not been felt (Abomaye, William, Jack & Friday, 2018). These current economic situations amounted to infrastructural

expectation gap of the stakeholders in sub-Saharan African countries. Given the avalanche of evidences from prior studies on infrastructure the study seeks to determine the effect of tax revenue on transportation infrastructure expectation gap in selected Sub-Saharan African countries.

2. LITERATURE REVIEW

2.1 Transportation Infrastructure Expectation Gap

The infrastructure expectation gap can be approached in two dimensions which include a notional, quantifiable investment gap and a subjective, needs-based service gap. The infrastructure investment expectation gap relies on a dataset produced by the G20's Global Infrastructure Hub and sets an aspirational metric, which is benchmarked against a country's peers (GHI and Oxford Economics 2018). Therefore transportation infrastructure gap can be defined as the difference between the budgeted amount on the required infrastructure needs on road, rail and port transportation in a country and the actual amount invested measurable in monetary term in a given period. This measures the stakeholder's expectation gap as a result of the difference in the value of budgeted transportation infrastructural need of a country per time and the actual amount invested on road, rail and port transportation for that same period. The difference in the value of the budgeted amount of the infrastructural needs and the actual amount invested will lead to a gap in the stakeholder's expectation for that period (Hammayo, Shittu & Abdullahi, 2020). Transportation infrastructure consist of road, rail and port transportation, given the benefits and economic gains derived from having these infrastructures in top shape in any given economy; it is in no doubt that stakeholders in such economy will look forward to achieving and maximizing the best of these infrastructures as they are being budgeted for each year to aid the development of any nation. Stakeholder's infrastructural gap will arise when there is a difference in the value budgeted for transportation infrastructural needs of a country per time and the actual amount invested on road, rail and port transportation infrastructure for that same period.

2.2 Tax Revenue

Tax revenue has been seen as major source of government revenue all over the world (Oladipupo, & Ibadin, 2015). Tax revenue is the revenues collected from taxes on income and profits, social security contributions, levies on goods and services, payroll taxes, taxes on the ownership and transfer of property, and other taxes (Okwara & Christian, 2019). The present study considered Companies income tax and personal income tax as measure of direct tax while value added tax and custom and excise duties as indirect taxes. Ayeni, Ibrahim and Adeyemi (2017) identified companies' tax as a charge on the taxable profits of limited companies and some organizations including clubs, societies, associations, co-operatives, charities and other unincorporated bodies. Olayode and Omodero (2021) refers to personal income taxes a direct tax on an individual's, sole owner's, communities and families' income, executors or trustees of undivided property, or any settlement. Value-added tax is a consumption tax whereby the consumers bear the tax burden. Here, tax burden is passed from the manufacturer to wholesaler to retailer and finally to the consumer who ultimately bears the burden. Invariably one can only avoid tax by not buying and consuming the vat able goods or services (Ogwuru & Agbaraewoh, 2017; Akhor, Sadiq & Ekundayo, 2016). Customs duties are taxes which must be paid to government when goods are brought in (imported) from or exported to other countries (Inga, 2018).

2.3 Theoretical Framework

2.3.1 Social Contract Theory

This study was hinged on the social contract. The theory denote an implicit agreement within a State regarding the rights and responsibilities of the State, i.e., the government and its citizens. The social contract theory agrees that individuals, by nature free and equal, agree to renounce part of their natural liberty by entering into civil society and constituting a political authority to which they subject themselves for the sake of the advantages provided by civil society. It mainly worked in accordance with the principle that governments delivered social and economic benefits to citizens including free health and education, commodity subsidies, and public sector jobs for graduates while citizens accepted limited government accountability and restricted political participation. In addition, it is expected that government of a country should provide the necessary infrastructure for the effective functioning of economic activities in the state. However, it always seen that there are infrastructural gaps in

transportation which invariably affect the effective functioning of the state. This implies that government at one point or the other failed in providing the required infrastructure to meet up with the expectations of stakeholders.

3. METHODOLOGY

The study *ex-post facto* research design using the panel data set. The population for this study consisted of forty-eight (48) Sub-Saharan African (SSA) countries as listed on World Bank classification of Sub-Saharan African countries for the period 2007-2020. The choice of the periods was informed by availability of data for the study, the country's gross domestic product accounts for more than 50 per cent of the sub-Saharan African countries and the issue of infrastructural decay around this period across Sub-Sahara Africa countries. The sample size of the study is made up of five (5) Sub-Saharan African countries which include Nigeria, Kenya, Rwanda, Ghana and South-Africa as contained in the World Bank classification of Sub-Saharan African countries into four economic categories of oil exporting countries, middle income class, fragile countries and non-fragile low-income countries by way of purposive sampling technique. Data for the research instrument was sourced from published secondary sources such as Tax Authority annual reports of the selected countries, World Development Indicators, Global Infrastructural Hub, International Monetary Fund (IMF) World Statistics Books, Central Bank annual reports of the selected countries and African Development Bank Statistical Book within the period of 2007 to 2020. The infrastructure investment gap relies on a dataset produced by the G20's Global Infrastructure Hub and sets an aspirational metric, which is benchmarked against a country's peers (GHI and Oxford Economics 2018). The study analysed the data collected with descriptive and inferential statistics. STATA Statistical package software was employed. The study made use of System General Method of Moment panel regression to analyze the data collected. The stated hypothesis in this research was tested with the use of Wald chi-square test. The Wald chi-square test is appropriate because it tests for significant difference between the means of more than two comparing variables used. The estimation method applied in this study is the System Generalized Method of Moments. The rationale for using this approach was based on the nature of the study which requires taking care of individual cross sectional units' specific heterogeneity, and autocorrelation problem as a result of the inclusion previous values of the dependent variables as one of the regressors which the static panel of Pooled OLS, Random effect model and the fixed effect model are not able to handle and as such will require a dynamic panel.

3.1 Description and Measurement of Variables

This study adopted the explanatory variables of Companies Income Tax (CIT), Value Added Tax (VAT), Custom an Excise Duty (CED) and Personal Income Tax (PIT) which are properly operationalized in this study on the premise of the work of Koutsoyainnis (1977) which says economic theory does not indicate the functional form of any relationship. This means that economic theory does not state whether a relationship will be expressed in linear form, quadratic form or in a cubic form. On the strength of the above, the study specifies the relationship between tax revenue and transportation infrastructure expectation gap. The variables of the study were sufficiently adapted in the works of (Abomaye-Nimenibo, William, Michael, Mini & Friday, 2018; Ayeni & Afolabi, 2020; Metcalfe & Valeri, 2019; Ejemai, Akintoye & Adegbe, 2020).

Table 1
Measurement and Justification of Variables

Symbols	Variables	Measurement of Variables	Justification
Dependent Variable TIEG	Transportation Infrastructural Expectation Gap	The difference between the budgeted amount on infrastructure needs on road, rail and port transportation and the actual amount invested on road, rail and port transportation infrastructure per period.	Hammayo, Shittu and Abdullahi (2020) Metcalfe and Valeri (2019), Ayodele, Alao, Ogunjuyigbe, & Munda, (2019).
Independent variables CIT	Companies' Income Tax	Tax chargeable on the total profit of any corporate entity registered in Nigeria at the rate of 30%.	Ejemai, Akintoye and Adegbe (2020)

VAT	Value Added Tax	Tax paid by consumers on all goods and services at 7.5%.	Eneje (2018) Ayeni, Ibrahim and Adeyemi (2017).
CED	Custom and Excise Duty	Customs duties are taxes that must be paid to government when goods are brought in (imported) from or exported to other countries	Abomaye-Nimenibo, William, Michael, and Mini Friday (2018)
PIT	Personal Income Tax	Personal Income Tax (PIT) is a direct tax levied on personal income including wages and salaries of individuals.	Amin, Chen and Huang (2018)

Source: Researcher's Compilation, (2022)

3.2 Model Specification

This section presents the model for testing the research hypotheses formulated. This study adapted the model by (Abomaye-Nimenibo, William, Michael, Mini & Friday, 2018; Amos, Uniamikogbo & Aigienohuwa, 2017; Amin, Chen & Huang, 2018; Ayeni & Afolabi, 2020; Metcalfe and Valeri (2019), Ejemai, Akintoye & Adegbe, 2020) which considered two groups of variables. Namely, the dependent and independent variables, the independent variable is tax revenue which was subdivided into direct tax which was measured using companies Income Tax (CIT) and Personal Income Tax (PIT) while indirect tax was measured using Value Added Tax (VAT) and Custom and Excise Duty (CED). The dependent variable was proxy by Transportation Infrastructural Expectation Gap (TIEG).

The model is stated hereunder

From the hypothesis stated above, the functional relationships of the variables are as follows:

$$Y = f(X)$$

Where:

Y = Dependent Variable

X = Independent Variable

Where:

Y = Transportation Infrastructure Expectation Gap (IEG)

X = Tax Revenue (TR)

x_1 = Companies' income tax (CIT)

x_2 = Personal income tax (PIT)

x_3 = Value added tax (VAT)

x_4 = Custom and excise duty (CED)

Y_{t-1} = The lag of Transportation Infrastructure Expectation Gap (TIEG_{t-1})

MODEL

$$TIEG_{it} = \alpha_0 + \beta_1 TIEG_{it-1} + \beta_2 CIT_{it} + \beta_3 PIT_{it} + \beta_4 VAT_{it} + \beta_5 CED_{it} + \epsilon_{it}$$

4. DATA ANALYSIS, RESULTS AND DISCUSSION OF FINDINGS

This section discussed the panel data regression results used to examine the effect of tax revenue on infrastructure expectation gap in Sub-Saharan Africa countries.

4.1 Descriptive Statistics

4.1.1 Tax Revenue and Transportation Infrastructural Expectation Gap

The study consists of quarterly data for the period 2007-2020 for five (5) Sub-Saharan Africa countries. The descriptive statistics presented in table 2 are the mean, maximum, minimum and standard deviations, and the numbers of observations for each of the dependent and independent variables. The dependent variable is Transportation Infrastructural Expectation Gap (TIEG), The independent variables are Company Income Tax (CIT), Personal Income Tax (PIT), Value Added Tax (VAT) and Custom and Excise Duties (CED).

Table 2. Descriptive Statistics of Tax Revenue and Transportation Infrastructural Expectation Gap

Variables	Mean	Maximum	Minimum	Std. Dev.	Obs.
TIEG	121.253	856.111	-111.451	256.992	280
CIT	1215.663	5209.986	10.647	1609.017	280
PIT	1800.534	9314.367	19.314	3043.390	268
VAT	64.434	434.527	1.408	127.644	280
CED	1381.060	11337.030	11.618	2301.662	280

Source: Researcher's computation (2021)

Notes: Table 2 shows the mean, maximum, minimum and standard deviation of the variables. The dependent variable is Transportation Infrastructural Expectation Gap (TIEG). The independent variables are Company Income Tax (CIT), Personal Income Tax (PIT), Value Added Tax (VAT) and Custom and Excise Duties (CED). All the values were calculated from the 280 country-year observations for five sub-Saharan African countries. The estimation process was facilitated using EViews 10.

Interpretation: From Table 2, Transportation infrastructural expectation gap has the mean value of 121.253. The mean value suggests that on the average the transportation infrastructural expectation gap of the selected sub-Saharan African countries is 121.253 million dollars. The standard deviation of 256.992 connotes that there is a dispersion of the transportation infrastructural expectation gap from the mean to around 256.992 per cent. Thus, the standard deviation value is far from the mean, suggesting that the transportation infrastructural expectation gap is highly susceptible to change over time. The minimum value of -111.451 and maximum value of 856.111 indicate that the selected sub-Saharan African countries have different levels of transportation infrastructural expectation gap. This further implies that while some sampled sub-Saharan African countries are experiencing negative transportation infrastructural expectation gap at around 111.451 million dollars, others experience positive transportation infrastructural expectation gap at around 856.111 million dollars.

CIT: Company income tax has the mean value of 1215.663. The mean value suggests that on the average the company income tax of the selected sub-Saharan African countries is 1215.663 million dollars. The standard deviation of 1609.017 connotes that there is a dispersion of the company income tax from the mean to around 1609.017 per cent. Thus, the standard deviation value is far from the mean, suggesting that the company income tax is highly susceptible to change over time. The minimum value of 10.647 and maximum value of 5209.986 indicate that the selected sub-Saharan African countries have different levels of company income tax. This further implies that while some sampled sub-Saharan African countries are experiencing low company income tax at around 10.647 million dollars, others experience high company income tax at about 5209.986 million dollars.

PIT: Personal income tax has the mean value of 1800.534. The mean value suggests that on the average the personal income tax of the selected sub-Saharan African countries is 1800.534 million dollars. The standard deviation of 3043.390 connotes that there is a dispersion of the personal income tax from the mean to around 3043.390 per cent. Thus, the standard deviation value is far from the mean, suggesting that the personal income tax is highly susceptible to change over time. The minimum value of 19.314 and maximum value of 9314.367 indicate that the selected sub-Saharan African countries have different levels of personal income tax. This further implies that while some sampled sub-Saharan African countries are experiencing low personal income tax at around 19.314 million dollars, others experience high personal income tax at about 9314.367 million dollars.

VAT: Value added tax has the mean value of 64.434. The mean value suggests that on the average the value added tax of the selected sub-Saharan African countries is 64.434 million dollars. The standard deviation of 127.644 connotes that there is a dispersion of the value added tax from the mean to around 127.644 per cent. Thus, the standard deviation value is far from the mean, suggesting that the value added tax is highly susceptible to change over time. The minimum value of 1.408 and maximum value of 434.527 indicate that the selected sub-Saharan African countries have different levels of value added tax. This further implies that while some sampled sub-Saharan African countries are experiencing low value added tax at about 1.408 million dollars, others experience high value added tax at around 434.527 million dollars.

CED: Custom and excise duties have the mean value of 1381.060. The mean value suggests that on the average the custom and excise duties of the selected sub-Saharan African countries is 1381.060 million dollars. The standard deviation of 2301.662 connotes that there is a dispersion of the custom and excise duties from the mean to around 2301.662 per cent. Thus, the standard deviation value is far from the mean, suggesting that the custom and excise duties is highly susceptible to change over time. The minimum value of 11.618 and maximum value of 11337.030 indicate that the

selected sub-Saharan African countries have different levels of custom and excise duties.

tax, and custom and excise duties will lead to increase in the stakeholders' infrastructural expectation gap.

Table 3. Correlation Matrix of Tax Revenue and Infrastructural Expectation Gap

Variables	IEG	TIEG	EIEG	WIEG	TEIEG	CIT	PIT	VAT	CED	GP	CRP	VIF
IEG	1											N/A
TIEG	0.984	1										N/A
CIT	0.176	0.241	0.241	-0.173	-0.125	1						1.04
PIT	0.186	0.267	0.252	-0.109	-0.181	0.937	1					2.27
VAT	0.325	0.287	0.338	-0.209	0.376	0.006	-0.245	1				1.79
CED	0.209	0.195	0.232	-0.191	0.203	0.162	-0.089	0.936	1			1.37

Source: Researcher's computation (2021)

This further implies that while some sampled sub-Saharan African countries are experiencing low custom and excise

duties at about 11.618 million dollars, others experience high custom and excise duties at around 11337.030 million dollars.

4.1.2 Descriptive Statistics using Graphs

4.1.2.1 Graphical Description of Tax Revenue

Figure 4.2 depicts the average tax revenue for the selected sub-Saharan African countries for the period 2007Q1 – 2020Q4. The patterns of the custom and excise duties are not stable, it fell in the second quarter of 2001 to the third quarter of 2008 and later rose thereafter, up until the second quarter of 2014 that it fell sharply and this has been falling thereafter. The company income tax also is not stable, there are evidence of revenue oscillation from the corporate institutions as well it reached its peak in the third quarter of 2013 and later fell thereafter. The value added tax most of the period was on the increase and fell sharply in the third quarter of 2013 and thereafter has been constant overtime. Lastly, the personal income tax is also not constant, for most of the period covered there is up and down of the PIT. On the overall, this is a wake-up call to governments of this countries to intensify their revenue drive so as raise revenue that can drive growth in their economies.

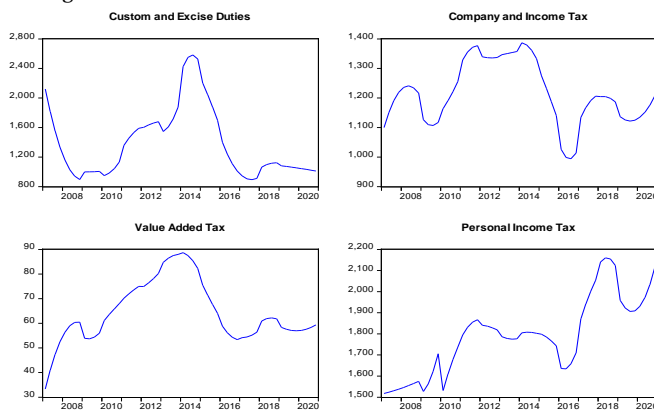


Figure 1. Graph of Tax Revenue 2007Q1 – 2020Q4

Source: Researcher's Fieldwork Result Analysis (2021)

4.2 Inferential Statistics

Table 4.2 presents the correlation coefficient of the dependent variable Transportation Infrastructural Expectation Gap (TIEG), on the independent variables are Company Income Tax (CIT), Personal Income Tax (PIT), Value Added Tax (VAT), Custom and Excise Duties (CED).

Interpretation: Starting with the test for multicollinearity, the variance inflation factor for each of the explanatory variables is less than 10, the VIF are 1.04, 2.27, 1.79, 1.37, 3.61 and 4.14 for company income tax, personal income tax, value added tax, custom and excise duties, government policy on taxation, and corruption perception index, respectively. This implies that the explanatory variables included in all the specified and estimated models are not correlated with one another. From the results, company income tax, personal income tax, value added tax, and custom and excise duties have positive association with the stakeholders' infrastructural expectation gap of the selected sub-Saharan African countries with correlation values of 0.176, 0.186, 0.325 and 0.209, respectively. This implies that increases in company income tax, personal income tax, value added

Notes: Table 3 shows the correlation coefficient of the variables. The dependent variable is Transportation Infrastructural Expectation Gap (TIEG), The independent variables are Company Income Tax (CIT), Personal Income Tax (PIT), Value Added Tax (VAT) and Custom and Excise Duties (CED). The variance inflation factor (VIF) which is a test for multicollinearity is on the last column of the table. All the values were calculated from the 280 country-year observations for fifty-five sub-Saharan African countries. The estimation process was facilitated using EVIEWS 10. Company income tax, personal income tax, value added tax, custom and excise duties, and government policy on taxation have positive association with the stakeholders' transportation infrastructural expectation gap of the selected sub-Saharan African countries with correlation values of 0.241, 0.267, 0.287, 0.195, and 0.023, respectively. This implies that increases in company income tax, personal income tax, value added tax, custom and excise duties, and government policy on taxation will lead to increase in the stakeholders' transportation infrastructural expectation gap. In addition, company income tax, personal income tax, value added tax, custom and excise duties have significant relationship with the stakeholders' transportation infrastructural expectation gap of the selected sub-Saharan African countries. This implies that while company income tax, personal income tax, value added tax, custom and excise duties, are significant factors influencing changes in the stakeholders' transportation infrastructural expectation gap of the selected sub-Saharan African countries.

4.3 Hypotheses Testing

Research Objective: examine the effect of tax revenue on transportation infrastructural expectation gap in selected sub-Saharan African countries.

Research Question: How does tax revenue affect transportation infrastructural expectation gap in selected countries of sub-Saharan Africa?

Research Hypothesis: Tax revenue has no significant effect on transportation infrastructural expectation gap in selected countries of sub-Saharan Africa.

Table 4. Tax Revenue and Transportation Infrastructural Expectation Gap in Sub-Saharan Africa

Variable	Coefficient	Corrected Standard Error	Z-test	Prob.
Constant	-15.914	12.580	-1.265	0.206
L.TIEG	0.613***	0.150	4.095	0.000
CIT	0.791***	0.249	3.182	0.000
PIT	5.462	3.715	1.470	0.141
VAT	0.680***	0.217	3.138	0.000
CED	0.423**	0.183	2.316	0.021
Observations	263			
Adjusted R ²	0.327			
Number of group	5			
Wald chi-square	12.26 (0.031)			
AR1 test	-2.60 (0.009)			
AR2 test	1.23 (0.220)			
Hansen test	4.36 (0.225)			
Sargan test	5.01 (0.171)			

Dependent Variable: TIEG

Source: Researcher's computation (2021)

Notes: Table 4 reports System General Method of Moment (SGMM) regression results of the effects of tax revenue on transportation infrastructural expectation gap of Sub-Saharan Africa countries. The dependent variable is Transportation Infrastructural Expectation Gap (TIEG). The independent variables are Company Income Tax (CIT), Personal Income Tax (PIT), Value Added Tax (VAT) * Significant at 10%, ** Significant at 5%, *** Significant at 1%.

$$TIEG_{it} = \beta_0 + \beta_1 TIEG_{it-1} + \beta_2 CIT_{it} + \beta_3 PIT_{it} + \beta_4 VAT_{it} + \beta_5 CED_{it} + \epsilon_{it}$$

$$\text{TIEG}_{it} = -15.914 + 0.613\text{TIEG}_{it-1} + 0.791\text{CIT}_{it} + 5.462\text{PIT}_{it} + 0.680\text{VAT}_{it} + 0.423\text{CED}_{it}$$

$$\text{Z-test} = \begin{matrix} -1.265 & 4.095 & 3.182 & 1.470 & 3.138 \\ 2.316 \end{matrix}$$

Interpretation: To determine the appropriateness of the parameter estimates for the Model which examined the impact of tax revenue on transportation infrastructural expectation gap of Sub-Saharan Africa countries, the post estimation tests from the system general method of moment were used. Ideally, four types of tests are generally considered and they are as follows; first, the serial correlation of first autoregressive order, with the null hypothesis that there is no serial correlation. Second, the serial correlation test of second autoregressive order; with the null of serial correlation. Third, the *Hansen test* of over-identifying restrictions with the null that the model specified has valid instrumentation. Lastly, the *Sargan test* that the specified variables are proper instruments, with the null that the model specified are proper instruments.

The serial correlation of autoregressive of order 1 with a statistic value of -2.60 with a probability of 0.009 is significant at 1 per cent, this implies that the null of no-serial correlation was rejected and accept the alternative that there is serial correlation. This is in line with the SGMM that the AR1 should be significant and that the successive error terms should be correlated. The AR2 with a statistic of 1.23 with a probability of 0.220 is not significant, thus, the null of serial correlation was rejected and the alternative of no serial correlation was accepted. This is in conformity with the literature that the AR2 should be serial independence.

The Hansen test statistic of 4.36 with a probability of 0.225 is statistically insignificant because the probability value is greater than the 5 per cent level, thus, the null that the model has valid instrumentation was not rejected, and therefore, the variables are valid instrumentation of the estimated model. The Sargan test statistic of 5.01 with a probability value of 0.171 could also not reject the null that the variables are proper instruments of the estimated model. From the post-estimation tests result reported above it shows that the estimated model is efficiency and thus, inferences can be drawn from the result.

From the results in Table 4.3, there is evidence that the lag of transportation infrastructural expectation gap, company income tax, personal income tax, value added tax, and custom and excise duties have positive relationship with transportation infrastructural expectation gap. In addition, there is evidence that the lag of transportation infrastructural expectation gap, company income tax, value added tax and custom and excise duties have significant relationship with transportation infrastructural expectation gap of the selected sub-Saharan African countries (L.TIEG = 0.613, Z-test= 4.095, $p < 0.05$; CIT = 0.791, Z-test=3.182, $p < 0.05$; VAT = 0.680, Z-test = 3.138, $p < 0.05$, and CED = 0.423, Z-test = 2.316, $p < 0.05$), respectively. This implies that the lag of transportation infrastructural expectation gap, company income tax, value added tax and custom and excise duties were significant factors influencing changes in transportation infrastructural expectation gap in sub-Saharan African countries. Conversely, there is evidence that the personal income tax does not have significant relationship with the transportation infrastructural expectation gap of the selected sub-Saharan African countries (PIT = 5.462, Z-test = 1.470, $p > 0.05$). This implies that personal income tax is not a significant factor influencing changes in transportation infrastructural expectation gap of the selected sub-Saharan African countries. Concerning the magnitudes of the estimated parameters 1 per cent increase in lag of transportation infrastructural expectation gap, company income tax, personal income tax, value added tax, and custom and excise duties will lead to 0.613, 0.791, 5.462, 0.680 and 0.423 per cent increase in transportation infrastructural expectation gap respectively. The Adjusted R² which measures the proportion of the changes in the transportation infrastructural expectation gap in Sub-Saharan African countries as a result of changes in previous value of transportation infrastructural expectation gap, company income tax, personal income tax, value added tax, and custom and excise duties explains 32.7 per cent changes in the transportation infrastructural expectation gap of the selected Sub-Saharan African countries, while the remaining 67.3 per cent were other factors explaining changes in transportation infrastructural expectation gap of the selected in Sub-Saharan African countries but where not captured in the model.

Decision Rule: With Wald Chi Square Statistic of 12.26, the p-value is 0.031 which is less than 0.05 level of significance adopted. The study therefore rejected the null hypothesis which means that

TAX REVENUE has significant effect on transportation infrastructural expectation gap in selected countries of Sub-Saharan Africa.

5- DISCUSSION OF FINDINGS

The study examined the effect of tax revenue on transportation infrastructure expectation gap of five (5) Sub-Saharan African countries for the period 2007-2020. The result of the study revealed that the lag of transportation infrastructural expectation gap, company income tax, personal income tax, value added tax, and custom and excise duties have positive relationship with transportation infrastructural expectation gap. In addition, the Wald Chi Square rejects the null that tax revenue has no significant effect on transportation infrastructural expectation gap in selected countries of sub-Saharan Africa and the alternative hypothesis that tax revenue has significant effect on transportation infrastructural expectation gap in selected countries of sub-Saharan Africa was accepted. This evidence conforms with the result reported by Olugbade and Adegbe (2020) examined personal income tax and infrastructural development in Lagos state, Nigeria with emphasis on housing and road infrastructure to ascertain the reasons for infrastructural expectation gap of stakeholders in the state evidenced in the standard of living of citizens in the state owing to infrastructural deficit. The result of the depict a negative but statistically significant relationship between personal income tax and government expenditure on road infrastructure. The negative relationship recorded by the study aligns with that of the current study where personal income tax is not statistically significant at 5% level of signifies which implies that personal income tax is not a significant factor influencing changes in transportation infrastructural expectation gap of the selected sub-Saharan African countries.

Furthermore, the findings of the study also align with Anyaduba and Aronmwan (2015) that companies' income tax has significant impact on the level of infrastructural development. Inyiyama, Chinedu and Nnenna, (2017) examined the effect of Federal Government of Nigeria's Tax revenue on infrastructural development of Nigeria tax proxy by companies' income tax. The result reveals companies' income tax is positively related to Infrastructural Development in Nigeria. Collier and Venables (2016) also found that companies' income tax is positively significant to urban transportation which also led to increase in economic growth. Adegbite (2015) similarly found that companies' income tax corporate tax is positively significant to transportation infrastructure, in Nigeria. The findings also align with that of Khanani, Adugbila, Martinez and Pfeffer (2020) who established that road infrastructure projects scaled up residential development, both in Kisumu and Accra, as the roads contributed positively to the expectation of stakeholders such as real estate developers in the economy. Furthermore, the study found accessibility to facilities and services improved, and the road infrastructure projects benefitted the major stakeholders in the economy.

5.1 Implication of Findings

The findings of this study can be beneficial to different stakeholders including management of firms, government agencies, academic and the general public across sub-Saharan Africa (such as Tax Authorities in sub-Saharan Africa, Central Banks in sub-Saharan Africa, Ministries of Environment and Infrastructure), policymakers (such as investors and financial analysts), and researchers as the study provides empirical evidence on the effect of tax revenue on transportation infrastructure expectation gap in sub-Saharan African countries. The implications are as stated below:

To the management of quoted companies: The findings of this study have demonstrated that tax revenue has significant effect on transportation infrastructure expectation gap. This implies that tax revenue is a medium through which countries in the sub-Saharan Africa can guarantee continuous development of transportation infrastructural facilities in the continent due to improved stakeholders' relation and reputational benefits. An effective tax payment goes beyond fulfilling corporations' obligations by covering the interest of all stakeholders. For adequate provision of infrastructure, management of firms should ensure that tax payment by corporations is duly obliged to and ensure to oversee the strategy of tax payment structure of corporations.

To investors and shareholders: Globally, provision of standard transportation infrastructure has been identified as a good criterion for investment decisions. However, the findings of this study from

Table 4.3 on the effect of tax revenue on transportation infrastructure expectation gap show that personal income tax does not have significant effect on stakeholders' infrastructure expectation gap in sub-Saharan African countries. This implies that to potential and existing investors of sub-Saharan region; other factors should be considered to determine the long-term values of firms other than tax revenue. Thus, beyond tax payment, financial performance of the investees is critical as tax revenue alone cannot guarantee the provision of infrastructural facilities. Therefore, other important investment considerations are required together with the tax revenue.

To policy/regulators: The insignificant nature of some tax revenue measures is not farfetched from the poor institutional framework of tax authorities in the region as indicated with the mean values of company income tax (1215.663 million dollars), personal income tax (1800.534 million dollars), value added tax (64.434 million dollars) and custom and excise duties (1381.060 million dollars). This implies that government agencies, policymakers and tax regulators should develop standards and guidelines in line with global best practices that will promote tax payment entities and ensure proper monitoring of compliance with the requirements. Also, policies are in place to ensure there is no avenue for misappropriation of funds and corrupt practices.

To financial analyst: The result of the descriptive statistics indicates variation in transportation infrastructure expectation gap of sampled sub-Saharan African countries. This is judged with the wide gap between the minimum and maximum values of TIEG (-111.451 and 856.111 million dollars), this implies that the transportation infrastructure expectation gap in sub-Saharan African countries has been fluctuating. It can be due to factors such as the economic recession and loss of confidence of stakeholders. Thus, when making decisions and predictions, financial analysts and investors should not rely solely on the performance of companies but consider the infrastructure available for production.

To accounting practice: Thus, accounting practices should pay adequate attention to keeping transparent and timely records of tax payment activities of companies and individuals in the region.

Additionally, accounting practice should help the government in the utilization of tax revenue by doing the following; first, sets frameworks and uses standard assessment tools to ensure accountability and transparency, and prioritization according to evidence of need.

To the government: The result of this study provides a lot of insight as to the relationship between tax revenue and transportation infrastructural expectation gap in sub-Saharan African countries, thus by implication government should establish expert-led bodies to forecast infrastructure requirements and recommend projects on the basis of need; collect reliable data on the service potential of existing infrastructure and on the performance of past projects; disaggregate expenditure on infrastructure to enable reporting on both maintenance and new project spend; align long-term infrastructure plans with the annual budget process, in order to minimize the use of higher cost private finance and achieve capital budget flexibility; and adopt full accrual accounting and maintain a public sector balance sheet to support decision-making on transportation infrastructure policy.

6. CONCLUSION AND RECOMMENDATIONS

The study examined the effect on tax revenue on transportation infrastructure expectation gap in selected Sub-Saharan African country for a period of 14 years from 2007-2020. Following the findings of this study, it concluded that tax revenue jointly had significant effect on transportation infrastructural expectation gap in Sub-Saharan Africa. Following the results of the analyses, it was recommended that policymakers should develop rules and regulations that aim to improve the quality of tax revenue procurement and require stakeholders to adhere strictly to them. This can improve the quality and effective tax collection towards improving the infrastructure needed in the transportation industry across sub-Saharan African countries. The government should also develop strategy, identifies goals that are achievable giving consideration to the available revenue and constraints with its utilization and potential gain in terms of addressing stakeholders transportation need and hence achieving their expectations. Also, assessing the financial viability and identifying the long-term impact and strategies for risk mitigation should be carried out periodically for each project.

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