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Sand Mining Activities in Adamawa State, Nigeria: It's Impact on Tax Revenue Drive in the State's Sand Mining Sector

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Abstract

This study investigates the impact of **sand mining activities (explanatory variable)** on Adamawa State's **tax revenue drive (dependent variable)** in the sand mining sector. The explanatory variables are measured by tax revenue payment by operators (TRP), tax revenue loss (tax revenue not collected by government) (TRL),number of sand mining sites (SIT) and number of operators in the industry (OPR).The dependent variable is measured by tax revenue due to the state government (TRD).The research adopts the survey research design. Primary data are collected using structured questionnaires, observations at mining sites, and interviews. 849 respondents were randomly selected out of a population of 906 operators in the industry. The data are analysed using descriptive analyses and inferential analyses (Correlation and Regression). Hypotheses are tested using the inferential statistics. Findings show that sand mining business operations go on in all the local government areas of Adamawa State. Also, while about N122,353,497 tax revenue is due to the state government annually from this sector of the economy, about N 97,728,120 (79.87%) of it is collected by the government and about N 24,625,377 (20.13%) of same is lost as uncollected tax revenue. The tests of hypotheses reveal that TRD is significantly and positively affected by TRP and TRL, but the positive effects on it by SIT and OPR are not significant. The study recommends that the government should develop appropriate strategies towards enhancing tax payment by operators, while minimizing tax evasion. It also recommends that the government should develop this sector with infrastructural facilities that would increase the number of sand mining sites, create sand storage sites to ensure continued business operation all-year round and encourage more new entrants as operators in this sector with a view to enhancing tax revenue.

Keywords: Sand Mining, Tax Revenue, Drive, Mining Sector, Adamawa State,

Introduction

The world over, the government of any people is expected to play vital economic roles in their affairs. These roles cover virtually every sphere of people's lives such as politics, social life, and, international relations. Economists identified six major functions of governments in market economies – provision of the legal and social framework, maintenance of competition, provision of public goods and services, redistribution of income, ensuring right externalities, and stabilization of the economy (Council for Economic Education, New York, 2020). In summary, government expenditure needs can be divided but not limited to the following five areas: a. Provision of public utilities and social amenities b. Maintenance of law and order c. Administration of justice d. Conduct of diplomatic relations, and e. Defense of the country.

Today, to meet the yearnings of the citizens, no modern government is a single, simple entity. A modern government now consists of many ministries, parastatals, institutions, departments, agencies, and

activities. A modern democratic government includes many separate actors – the executive arm, the legislature, the judiciary, administrators, and an avalanche of employees. Due to the complex nature of modern government, there is one thing that is common to all governments: their "expenditures have grown enormously during the past century" (Higgs Robert, 2018). Consequently, every government needs a continuously growing huge sum of money to perform all the functions it owes members of society. But, where will the government get this needed money? It is through the imposition of various taxes on the citizens, fees, fines, royalties, and profit-oriented projects. Put together, these sources of money to fund governments' businesses are called internally generated revenue (IGR).

Ekpo (2004) highlighted that IGR serves as the nerve center of the social contract between a government and the people it represents. The importance of IGR can be seen in its four (4) main uses: (i) It makes the government more responsible and more responsive as well to the varying needs of the citizens; (ii) It helps keep society on the move because as the government gets more revenue and commissions more projects, more money is injected into the economy, and more employment and business opportunities are created; (iii) It serves as a tool for overall economic development; (iv) It serves as an investment strategy and a useful fiscal weapon to steer the affairs of the economy; (v) IGR serves as a tool for social engineering.

Problem Statement

Since her independence till date, Nigeria has depended and still depends heavily on the oil sector, which has an enormous influence on the country's economy, although it represents a relatively small proportion of the gross domestic product - about 9% in 2020 (Deutsche Welle, 2021). Given the recent incessant unpredictability of crude oil prices in the global market and diminishing oil sales, both resulting in less money coming into the coffers of the country, the over-dependence on oil makes Nigeria's economy quite volatile. Unfortunately, Nigeria has state governments, (Adamawa State inclusive), that largely depend on the allocations from the federation account. Hence, most of these states are struggling to meet their obligations such as the provision of public goods and services, provision of affordable and qualitative education and healthcare services, payment of salaries, etc.

BudgIT (2021) provides empirical data on the Nigerian states' economic development parameters, revealing the following among other very important things:

i. Adamawa State is not yet among the three states (Lagos, Rivers, and Anambra) that can meet their operating expenses obligations with a combination of their IGR and Value Added Tax (VAT);
ii. Adamawa State is one of the states that is yet to attain affordable and effective public service delivery status;
iii. Adamawa is in 32nd position out of 36 states on the 2021 Fiscal Performance Ranking table;
iv. On the States' Performance Index A-table, Adamawa ranked 27th – meaning that the State and other states at the bottom of the table will need to work harder on growing their IGR if their operating expenses will be sustained;
v. There exists an argument among certain academics in the State on the possibility of the State increasing its IGR through registration of a strong presence in the sand mining industry within its jurisdiction.

Meanwhile, the Nigeria Extractive Industries Transparency Initiative's Report on Revenue Generated by the Federal Ministry of Mines and Steel Development 2012 – 2016, placed Adamawa in the 31st position among the 36 States of the Federation (the Federal Capital Territory inclusive). Within the 5years under review, the State was able to generate only **N13, 112,010** from the mining sector in comparison to Ogun State which generated **N1, 913,325,917** in the same period. The state does not generate up to N1B monthly and does not generate up to 19% of what it spends monthly (P.M. News July 2021). Thus, the State is in dire and urgent need of increased IGR. Yet it has the sand mining sector which could enhance its IGR initiative.

Research Objectives

The main objective of this study is to investigate the impact of sand mining activities on the Adamawa State's revenue drive in the sand mining sector. This objective is divided into the following:

i. To examine the impact of tax revenue payment on government's tax revenue drive in the sand mining sector in Adamawa State
ii. To determine the effect of tax revenue loss on government's tax revenue drive in the sand mining sector in Adamawa State
iii. To investigate the impact of the number of sand mining sites on government's tax revenue drive in the sand mining sector in Adamawa State
iv. To examine the effect of the number of operators in the sand mining activities on government's tax revenue drive in the sand mining sector in Adamawa State

Research Questions

This study answers the following research questions:

i. To what extent is the impact of tax revenue payment on government's tax revenue drive in the sand mining sector in Adamawa State
ii. To what extent is the effect of tax revenue loss on government's tax revenue drive in the sand mining sector in Adamawa State
iii. To what extent is the impact of the number of sand mining sites on government's tax revenue drive in the sand mining sector in Adamawa State
iv. To what extent is the effect of the number of operators in the sand mining activities on government's tax revenue drive in the sand mining sector in Adamawa State

Research Hypotheses

The study tests the following hypotheses as stated in their null forms:

i. There is no significant impact of tax revenue payment on government's tax revenue drive in the sand mining sector in Adamawa State
ii. There is no significant effect of tax revenue loss on government's tax revenue drive in the sand mining sector in Adamawa State
iii. There is no significant impact of the number of sand mining sites on government's tax revenue drive in the sand mining sector in Adamawa State
iv. There is no significant effect of the number of operators in the sand mining activities on government's tax revenue drive in the sand mining sector in Adamawa State

Justification of the study

Adamawa State, which is one of the six states that make up the North-East geo-political zone in Nigeria, is blessed with numerous sand mining sites primarily because of the River Benue that passes through the State. The State is made up of twenty-one local government areas (LGAs):

1. Demsa (DEM) 2. Fufore (FUF) 3. Ganye (GAN)4. Girei (GIR)5. Gombi (GOM) 6. Guyuk (GUY) 7. Hong (HON) 8. Jada (JAD)9. Lamurde (LAM) 10. Madagali (MAD) 11. Maiha (MAI) 12. Mayo-Belwa (M/B) 13. Michika (MIC) 14. Mubi North (M/N)15. Mubi South (M/S) 16. Numan (NUM)17. Shelleng (SHE) 18.Song19. Toungo (TOU) 20. Yola North (Y/N)21. Yola South (Y/S)

Adamawa State has so much to generate from its sand mining sector, and so has no excuse for not developing beyond its present state due to revenue insufficiency. To increase its IGR, it should go into partnerships with sand mining licensees as we have in the oil and gas sector (Ehi, 2020). It can therefore enhance its IGR status by taking economic control of the sand mining sites all over the state and maximize the IGR potentials of this sector.

Significance of the Study

The findings from this empirical study will reveal specific facts and figures on how much on the average, the State can generate as revenue from its sand mining sector. And with an increased IGR, the State can begin to compete favorably with states like Lagos, Akwa Ibom, Kano, etc in terms of socio-economic development. Other states of the Federation can also benefit immensely from the findings and recommendations of this study. Meanwhile, the entire study will serve as a contribution to the body of literature, providing empirical literature for future related research topics.

Operational terms

The operational terms for this study include *sand*, which is the natural resource that is grains-like, and found in three texture of sharp sand, soft sand and laterite; *site owners* who are the individuals who claim ownership of a particular portion of the land where sand can be mined; *tipper* drivers, who are the individuals who drive trucks that have rear platforms that can be raised at their front ends, thereby enabling them to discharge the contents (sand) earlier loaded into them. They transport sand from sites to an agreed destination at a fee; and *miners* who are those persons whose work is to mine sand i.e. at sites, heap up the sand and get paid for doing so. Others are *loaders*, the are those persons hired to load mined sand into awaiting tippers/trucks at sand sites, and get paid for doing so; *government officials* (a.k.a. revenue collectors), these are the staff of government assigned to visit the sand mining sites and collect the revenue due to the government from the operators found there. These operators are the *site owners*, the tipper drivers, the miners and the loaders; middlemen who buy mined sand from the tipper drivers and resell, but mostly they add value by molding blocks, interlocks, e.t.c. from bought sand; and tax revenue, which is a mandatory payment a government levies on businesses to generate income therefrom to finance the provision of public goods and government activities.

Literature Review

Conceptual Review

Sand is a natural resource. After air and water, it is the most-used natural resource (Divyansh, 2021). In terms of importance, it contributes directly much more to man's life than oil. In all societies where there is a large deposit, the need for this important resource has resulted in the proliferation of sand mining

activities and businesses, and the main driver of this proliferation is rapid urbanization since more and more people are moving from rural areas into urban areas. Sand mining therefore, can be said to be the process of extracting sand from the ground for different uses, such as in the construction of houses, roads, bridges, dams, agriculture, etc.

Across Africa, Asia, Latin America, etc. urban communities are growing at a high speed and on a scale bigger than at any time in human history (Divyansh, 2021). While some countries (e.g. Australia, Indonesia, Malaysia, Thailand and Cambodia) export sand, others (e.g. Singapore and Dubai) import it (Jan De Nul Group Report, 2013).

Sand mining is a highly lucrative business which some governments of the world that have it in abundant supply are taking advantage of in their pursuit of increased revenue generation. The United States of America is ranked the largest producer of industrial sand and gravel in the world. In 2021, it produced an average of 720million metric tons of sand and gravel at about $9.90 per metric ton (Statista, 2022). This is approximately $7,128b in monetary value! In Dubai, the famous palm Jumeirah, an artificial set of islands utilized 186.5 million M^3 of sand and 10 million M^3 of rocks worth US$ 12 billion. The issues of revenue generation are indeed volatile and constitute a source of both economic and political tensions in the world.

Theoretical Review

The theoretical framework used for this study is the fiscal federalism theory. This helped in forming the basis for discussion and in providing answers to the research questions raised. Technically, discussions about internally generated revenue of sub-national or state governments are located within the framework of the theory and practice of fiscal federalism. Meanwhile, this theory itself has its foundation in the theory of public goods (highlighted earlier) which establishes the framework and explains the role of the state in the economy (Ariyo, 1997; Musgrave, 1987).

The theoretical framework in question is a Keynesian one which requires a government to play an active role in economic affairs. For a country that allows for a multi-level government setting, this role of the state in maximizing social welfare then provides the basic ingredients for the theory of fiscal federalism. This then puts on each tier of government the responsibility to seek to maximize the social welfare of the citizens within its jurisdiction. Economically speaking, this multi-dimensional responsibility becomes very important where public goods exist, the consumption of which is not national in character, but localized. Consequently, the local outputs targeted at local demands by respective local jurisdictions will provide higher social welfare than central provision by the national government. It is this principle that was formalized into the "Decentralization Theorem", and which later constitutes the main foundation for what is referred to as the first-generation theory of fiscal decentralization (Hankler, Martinez-Vazquez and Rodriguez, 2019)

Given today's global economic downturns, and its attendant dwindling grants from the central government and the assignment of social welfare maximization through public goods to the lower sub-national governments, the sub-national governments must raise funds internally to complement such grants (allocation) to carry out their functions effectively.For states that are endowed with natural resources e.g., sand, it is generally agreed that all that such states need to do to increase IGR is to be directly involved

in tapping into such resources, and where private individuals are allowed to be involved, there is need to formulate regulatory policies that will both control the activities and simultaneously levy appropriate tax on such individuals, thereby generating additional revenue. Earth's natural resources include energy resources, non-metallic resources, metallic resources, water, air, animals, and natural vegetation (South Carolina Geological Survey, 2005). For this study, we shall narrow down to sand which is a type of soil. There is a need to untangle the complexity of differentiating sand from soil. The soil on the one hand has pores which permit it to hold water and nutrients, while sand on the other hand, is grainy and loose without the presence of pores for neither holding water nor nutrients (Diksha, 2015).

Sand mining is an activity that is as old as anyone can remember. In various civilizations, man and institutions have always deployed sand in different ways e.g., in the building of houses, construction of bridges, and roads, making of glass or in other things that can be made out of it. Naturally sand-endowed countries are involved in the exportation of sand to countries that demand it thereby contributing positively to the exporting countries' gross domestic product (GDP) and overall economic growth rate (Ojukwu, Umemezia, Agbadudu, and Azotani, 2022).

Empirical Review

Hans and Bernd (2014) examined the effects of revenues on macroeconomic variables. It was found that about half of the analyzed economies in Latin America were faced with an apparent trade-off between growth and volatility of revenues, implying that revenue fluctuations are indeterminable and that this impacts negatively on the sustainability of the economy. The factors responsible for the low yield of IGR in the Local Governments (LGAs) of Ogun State, Nigeria were examined by Olusola (2011). The study found that the IGR potentials of the third tier of government in the State were not enhanced. Kiabel and Nwokah (2009) conducted research that examined the role of external tax consultants in the management of IGR of States in Nigeria, and the results imply that there are numerous internal revenue sources which are left idle and untapped. They also found that infrastructural development is also affected by the level of IGR accruals in any state. The results of the study of Adenugba and Ogechi (2013) revealed that an increase in IGR led to greater infrastructural development in Lagos State.

Similarly, the contribution of IGR to the development of the Nigerian States was investigated by Oseni (2013). It was found out that the IGR of States accounted for less than 14% of their total revenue, with Lagos State having the largest IGR-to-total revenue ratio of more than 36%. Igyo, Simon, and Iorlumun (2016) investigated the contribution of Personal Income Tax on IGR and found that Personal Income Tax (PIT) contributed in a very small measure to the IGR of the sampled State. In line with the latter's study, an examination of ways of enhancing the IGR of States in Nigeria was conducted by Okeke, Chidi and Eme (2017) and it was found that the IGR potentials of the States have not been fully utilized. The results imply that most of the States in the country have low revenue-raising capacity. Adeoti, Olawale and Abdulraheem (2014) analyzed the sources of IGR in Oyo State Local Governments of Nigeria.

The results showed that tax was used effectively as one of the main sources of IGR in the region. Similar to the findings above was an appraisal of the revenue generation in

Numan South-Western local government (LG) of Adamawa State in Nigeria by Jamala, Asongo, Mahai and Tarfena(2013). The results revealed that human factors have a significant positive impact on revenue generation. On the contrary, Ajayi (2015) investigated the management of IGR in Ife South LGA of Osun State in Nigeria and the findings indicated that adverse human factors as well as statutory allocation dependency syndrome militate against efficient IGR collection in the study area. If the growth rate of IGR outpaces that of expenditure, it is a reflection of strong fiscal sustainability. Nto (2016) in his findings found out that there is no link between taxable individuals and their respective bank accounts. This accounted for significant leakage in the revenue accruals of States in Nigeria.

In case all the strategies employed towards improving own revenue at lower levels of government have not yielded the desired level of revenue, a comparative analysis between outsourcing revenue base and Board of Internal Revenue collections in Niger State, Nigeria was conducted by Zubairu, Aliyu and Mohammed (2016). The findings revealed that the use of private firms in revenue collection leads to a significant positive effect on revenue generation. Omodero, Ekwe and Ihendinihu (2018) investigated the impact of IGR on the economic development of Nigeria. The findings of the study revealed that the IGR of the sub national governments in Nigeria has minimal impact on the growth of the economy. Sequel to the above, calls and efforts to enhance the potential of IGR of Nigerian State governments have been on in recent years.

The Research Gap

There has been insufficient empirical study in the sand mining industry in Adamawa State, especially in relation to examining the effect of the operations in this industry on the government's tax revenue drive in this industry. Therefore, this study tends to fill this empirical research gap. Majority of the existing studies tend to focus on the impact of mining sand and other natural deposits on the environment, while others focused on how governments can regulate the industry to prevent negative environmental impacts.

Methodology

Research Design

A survey research design is adopted in this study. Primary data were collected from respondents through structured questionnaires, observations and interviews at mining sites. Respondents are randomly selected from among the estimated 906 operators in the industry. Using Taro Yamane's formula [$n = N/ (1+ Ne^2)$], the sample size is calculated to be approximately 278. However, the sample size used in this study is 849, which significantly exceeds the calculated sample size.

Method of Data Analysis

Descriptive statistics (means) are used to describe the data. Normality test was conducted on the regression residual using the Jarque-Bera test. Simple percentages of the responses to the dichotomous questions were also computed. Cost prices and Selling prices of trucks of sand are computed as well as the profit generated by operators in this business.

Furthermore, correlation analysis was conducted using the Pearson-Product Moment correlation coefficient (r) to determine the extent of correlation between the variables.

$$r = \frac{\sum (x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum (x_i - \bar{x})^2 \sum (y_i - \bar{y})^2}}$$

Where:

r = Correlation coefficient
x_i = Values of the x-variable in the sample
$\bar{x}$ = Mean of the values of x variable in the sample
y_i = Values of the y-variable in the sample
$\bar{y}$ = Mean of the values of x variable in the sample

Source:https://www.quora.com/what-is-the-person-correlation-coefficient

Also, regression analysis was conducted to determine the extent of impact of the explanatory variables on the dependent variable. In the regression analysis the following functions were used:

$$y = a_o + a_1x_1 + a_2x_2 + a_3x_3 + \ldots + a_kx_k + U$$

Where:

y = Dependent Variable
x = Explanatory variable
a_o = Constant
$a_{1\ldots}a_k$ = Coefficients of the various explanatory variables
U = Error term (Disturbance term)
Such that:

TRD = f(TRP, TRL, SIT, OPR)

Taking logs on both sides, the model is transformed as follows:

LTRD = f(LTRP, LTRL, LSIT, LOPR)

Where:

LTRD = Log of tax revenue due to the government
LTRP = Log of tax revenue paid to the government from the sand mining business.
LTRL = Log of tax revenue not collected (lost) by government
LSIT = Log of Number of sand mining sites in Adamawa state
LOPR = Log of Number of operators in the sand mining business.

Data Presentation and Analysis

Data Presentation

Data for this study is presented in tables below:

Table 4.1: **Average Number of Operators in the LGAs of Adamawa State**

SN	LGAs	SITE OWNERS	TIPPER DRIVERS	MINERS	LOADERS	TOTAL
1	DEM	0	10	0	30	40
2	FUF	10	4	0	12	26
3	GAN	3	7	0	30	40
4	GIR	10	2	0	8	20
5	GOM	12	10	20	35	77
6	GUY	2	5	0	10	17
7	HON	12	25	20	30	87
8	JAD	6	8	0	18	32
9	LAM	3	5	0	15	23
10	MAD	5	5	20	25	55
11	M/B	3	12	0	20	35
12	MIC	5	15	20	25	65
13	M/N	5	17	10	25	57
14	M/S	10	20	35	70	135
15	NUM	0	13	0	52	65
16	SHE	5	5	0	15	25
17	TOU	2	14	0	36	52
18	Y/N	6	2	0	12	20
19	Y/S	7	7	0	21	35
	TOTAL	**106**	**186**	**125**	**489**	**906**

A literal visit to all these LGAs (except for Maiha and Song) confirmed on-going sand mining activities. This is shown in table 4.2

Table 4.2: Sand Mining Sites in Adamawa State

SN	LGA	NAMES OF MINING SITES	No of Sites Found	TYPES OF SAND
1	DEM	Old Demsa road, Borrong, Demsa town, Mararaba-Dakanta, Maliki, Dowaya, Bidoma, Kpasan, Dilli, Banghe, Bomara, Morro 1, Morro 2, Mbula-kuli, Kpamneagi, Kula-sala, Buso, Lawaru, etc	19	Sharp, Soft and Laterite
2	FUF	WuroAli,Damare	2	Sharp and Laterite
3	GAN	Gindin kuka, Babarat, Water Board, Gada Sanduka, Burtuly	5	Sharp and Laterite
4	GIR	Badreh area, Bangale Forest Reserve	2	Sharp and Laterite
5	GOM	Tastan Gada, Walawu, Muchala, Garin Faki, Sabongari, Jammango, Guduyan, Kogin Boda, GG Gombi, Koko	10	Sharp, Soft and Laterite
6	GUY	Forest, Janga, Tsamiya, Mada, Rawe, Tapki, Kogin Shelleng, Korin Buba	8	Sharp, Soft and Laterite
7	HON	Ngalbi, Mutuku, Gangiu, Mbillinyi, Sangeri, Kwanan Kuka, Maki, Kura, Dawa, Miehil, Dilmava, Kwagang, Mittil, Dilbuni, Udin, Silkami Road	16	Sharp and Soft
8	JAD	Mamukan, Kojoli, Jada Central, Mayo Kalaye, Dashen, Ganwaja, Bulo Central	7	Sharp and Laterite
9	LAM	Lamurde, Rigange, Tinno, Tasu, Bayan Gari, Gangoran, Gang, Suwa, Burkutu	9	Sharp and Soft
10	MAD	Madagali, Kwajivi, Tsila, Shuwa, BakinDutse, Duhu	6	Sharp and Soft
11	M/B	Mayo Sanganare, Wuro Mana River, NdikongNassarawo River, Mayo Belwa Main River, Binkola Mayo Belwa River, Ndikong Central Mining, Sakuwa Line, Banban Kogi, Mayo Tipper, Bayan Tashan	10	Sharp and Laterite
12	MIC	Wotu, Muza, Dogon Gayi, Tundun Wada, Kawa, Kuda, Cumbadi, Central, Yadibonko OBF, Opposite Gen Hospital, Muse, Moda, Shuwa, Kubur Shuwa Shuwa	14	Sharp, Soft and Laterite
13	M/N	Vimtim Breach, Digel River, Bypass Digel Road, Sebbore River	4	Sharp and Soft
14	M/S	Nassarawo, Lamurdi, Vattita, Girpta, Gashiga, Gaya, Vimtim Gada	7	Sharp and Laterite
15	NUM	Johnholt, Hayin Gada and Dong	3	Sharp, Soft and Laterite
16	SHE	Ladiga, Blau, Ngudugudu, Baban Kogi, Kwabibim	5	Sharp, Soft and Laterite
17	TOU	River Side, Dadam, Darmayon, Mayon Gada, Gada Daduduka	5	Sharp and Laterite
18	Y/N	Baking Kogi, Gindin Gada, Tashan Sani, Yolde Pati, Down Shagari	5	Sharp and Laterite
19	Y/S	Ngurore, Girei, Hayin Gada, Mbamba, Malkohe, Fombina area, etc	6	Sharp, Soft and Laterite
		Total	143	

Table 4.1 and 4.2 show that there are sand mining sites in all the LGAs of Adamawa State. The types of sand include sharp sand, soft sand and laterite.

Table 4.3: A **Calculation of Average Cost Price Per Truck of Sand, per trip, per day (Sharp/Soft/Laterite)**

	Sharp Sand (N)	Soft Sand(N)	Laterite(N)
Single	18,900	18,100	21,800
Double	30,000	21,250	33,300
Tangle	41,000	30,300	43,000
Total	89,900	69,650	98,100
Average	29,966	23,216	32,700

Overall Average	85,882/3 =N28,627

Source: Researchers' Computations

Table 4.3B Calculation of Average Selling Price per Truck of Sand, per trip, per day (Sharp/Soft/Laterite)

	Sharp Sand (N)	Soft Sand(N)	Laterite(N)
Single	26,500	19,000	27,600
Double	39,900	25,800	39,500
Tangle	54,500	33,300	54,200
Total	120,900	78,100	121,300
Average	40,300	26,033	40,433
Overall Average	106,766/3 =N35,588		

Source: Researchers Computations

Calculation of Average Profit per Truck of Sand, per trip, per day (Sharp/Soft/Laterite) = Selling Price – Cost Price =N35,588-N28,627=**N6,961**

Data Analyses

For the purpose of this study, the following assumptions are made to guide data analyses:

i. An industry approach is adopted in this study, in that, the sand mining industry is taken as a whole, in terms of the profit realized in the sector, and the taxes paid to the government, irrespective of who (i.e. which category of player in the industry) made the profit or paid the tax.

ii. All the players in the sand mining industry/sector of the state's economy are seen as one single entity and acting as such.

iii. The word 'sand' is used to include sharp sand, soft sand and laterite.

(a) Profit in the industry for a Month:

Formula: Profit per Truck, per trip, per day x Total No. of Trucks x No. of trips per truck, per day x 30 days (a month) i.e N6, 961 x 186 trucks x 6 trips x 30 days = **N233, 054,280**

(b) Profit in the industry for a year (Note that the business operates actively in 7 months in a year)

This is computed as: Profit for a month x 7 months= N233, 054,280 x 7 = **N 1,631,379,960**

(c) **Annual Tax Revenue due to Government**

[According to the Federal Inland Revenue Service (FIRS), Sales Tax rate is 7.5%.]. Therefore, 7.5% of annual profit from the industry (N 1,631,379,960) gives the sum of **N 122,353,497**

(d) Annual Tax Revenue actually paid to Government

Formula: Average tax paid per truck, per trip x Average No. of trips x No. Trucks x 30 days x 7 months i.e N417 x 6 trips x 186 trucks x 30 days x 7 months = **N97, 728,120**

Summarizing the above computations:

i. Annual tax revenue due to government: **N 122,353,497 (100.00%)**
ii. Annual tax actually paid to government: **N 97,728,120 (79.87%)**
iii. Annual tax revenue loss by government **N 24,625,377 (20.13%)**

Descriptive Analyses

Appendix A2 and A3 show the descriptive analyses. The Jarque- Bera test results in both each of the variables and also the regression residual show that the data are normally distributed because the probability values are all greater than 0.05. Also appendix A2 shows the means, maximum and minimum values, medians, standard deviations, skewness and kurtosis values which are within reasonable limits.

Correlation Analysis

Table 4.4 Extract of Correlation Analysis Results

Dependent Variable	LTRD	Finding
Explanatory Variables	Correlation Values	
LTRP	0.107	Weak, Positive Correlation
LTRL	0.874	Strong, Positive Correlation
LSIT	0.135	Weak, Positive Correlation
LOPR	0.134	Weak, Positive Correlation

Source: Eviews Software (Version 10)

Multiple Regression Analysis

Table 4.5 Extract from Multiple Regression Analysis Results

Dependent Variable		LTRD	
Explanatory Variables	Coefficients	P-Values	Decision
LTRP	0.22	0.0017	Significant Effect
LTRL	0.77	0.0000	Significant Effect
SIT	0.13	0.2079	No Significant Effect
OPR	0.05	0.7065	No Significant Effect
Coefficient of Determination(R^2)=0.92			
Adjusted R^{-2} = 0.90 ;Probability (f-statistics)=0.00; Durbin Watson Statistics =2.28			
Durbin Watson Statistics = 2.28			

Source: Eviews Software (Version 10)

Discussion of Results

The average of the internally generated revenue (IGR) for a ten-year period (2012-2021) obtained from the National Bureau of Statistics (2022) is approximately 6.8(N'B). Table 4.6 and 4.7 provide additional details:

Table 4.6: Various percentages of Adamawa State IGR Remitted/Unremitted

S/N	Item	Amount N'B	% of IGR
1	Annual Average total IGR of Adamawa State	6.75	100
2	Annual Average profit generated by operators in sand mining industry	1.63	24
3	Annual Average tax revenue due to government from this sector	0.122	1.78
4	Annual Average tax revenue actually paid to Government from this sector	0.098	1.45
5	Annual Average tax revenue loss (not collected by government) from this sector	0.025	0.37

Source: Researchers' Computations

Table 4.7: Various percentages of tax revenue due (TRD) from the Sand Mining Sector to Adamawa State Govt.

S/N	Item	Amount N	% Of TRD
1	Annual tax revenue due to government	122,353,497	100
2	Annual tax revenue actually paid to government	97,728,120	79.87
3	Annual tax revenue loss(uncollected) by government	24,625,377	20.13

Source: Researchers' Computations

The above percentages show that while some tax revenue has been generated by government from the sand mining industry of the state (79.87%), about 20.13% is yet to be collected by it. Furthermore, Table 4.5 shows that the model is of good fit as the probability of f-statistic (0.00) is less than 0.05. Also, the Durbin Watson statistic of 2.28 is approximately 2 and hence do not indicate any significant challenge with serial autocorrelation in the regression residual. The coefficient of determination is very high, indicating that 92 percent of the variations in the dependent variable are accounted for by changes in the explanatory variables jointly.

The log-log model shows that for every one percent increase or decrease in each explanatory variable, the dependent variable (tax drive in this sector), increases or decreases by the following percentages: 0.22 (in the case of LTP), 0.77 (in the case of LTRL), 0.13 (in the case of LSIT), and 0.05 (in the case of OPR). The impact of tax revenue payment (LTRP) and tax revenue loss/uncollected tax (LTRL) on tax revenue due to government tax revenue drive(LTRD) is significant as their respective probability values of 0.0017 and 0.0000 are less than 0.005(the level of significance, α). These kind of significant effects demonstrate the fact that tax payment or tax evasion, by tax payers, significantly affect the internally generated revenues of states/countries. This is corroborated by a number of empirical research studies. Ojukwu, Umemezia, Agbadudu and Azotani (2022) show in their study that sand export (to increase IGR) increases the gross domestic product (GDP) of countries. Adenugba and Ogechi (2013) in their study reveal that increase in internally generated revenue tends to increase infrastructural development. Furthermore, Adeoti, Olawale, and Abdulraheem (2014) indicated in their study of Oyo state , Nigeria, that tax is one of the major sources of IGR in that state. Also, Zubairu, Aliyu and Mohammed (2016) have

shown in their study that when revenue collection was outsourced to a private firm, revenue generation improved significantly.

On the other hand, the study of Hans and Bernd (2014) reveal that fluctuations in revenue negatively affect economic stability. Despite the importance of tax revenue collection in boosting IGR, which in turn enhances economic stability, studies have revealed that not much has been done by many states in Nigeria to maximize their IGR potentials. Olusola(2011) has shown in his study that many local government areas in Nigeria have failed to maximise their IGR potentials. This finding was corroborated by Kiabel and Nwokah (2009) and Okeke, Chidi and Eme (2017). In the same vein, Oseni (2013) revealed in his study that the IGR of many states in Nigeria is less than 14 percent their respective total revenues. As a result of this negative trend, Omodero, Ekwe and Ihendinihu (2018) showed in their study that the IGR of sub national governments have exerted little effects on Nigeria's economic growth. According to Ajayi (2015), his study showed that some of the reasons for poor performance in IGR collection in Ife South Local Government Area (LGA) of Osun State include adverse human factors and statutory allocation dependency.

Furthermore table 4.5 also shows that the number of mining sites (LSIT) and operators in the industry (LOPR) positively affect government's revenue drive in this sector. This is expected because the operators are the ones paying tax to government from income that they have earned from the sand they have mined and sold from the mining sites. However, their positive effects were found not to be significant. This means that there is need to improve on the tax collection modalities and also encourage more participation by increasing the number of operators in the industry. Again, the government can assist to open up more mining sites and also increase the duration of operations from the seasonal 7 months (largely dry season) to 12 months by storing sand in "sand storage sites" in the dry season, so that during the rainy season when the river sides have become inaccessible for sand mining, there would still be enough sand to trade with from the storage sites.

Summary of findings

The following are the findings from this study:

i. Annual tax revenue due to government from this industry is N 122,353,497, while annual tax actually paid to government is N97,728,120 (79.87% of annual tax due).Thus, annual tax revenue loss(tax revenue not collected) by government is N 24,625,377 (20.13% of annual tax due).

ii. There is a weak, positive correlation between the tax revenue due (LTRD) in the sand mining sector and tax revenue paid by operators in the sector (LTRP), the number of mining sites (LSIT), and the number of operators (LOPR); but this positive relationship is strong with the tax revenue loss(uncollected) (LTRL).

iii. The tax revenue due to government (LTRD) is significantly and positively affected by the tax revenue paid by operators (LTRP) and the tax revenue loss (tax revenue not collected by government) (LTRL), but the positive effect on it by the number of mining sites (LSIT) and number of operators in the industry (LOPR) is not significant.

Conclusion

The tax revenue due to government (LTRD) is significantly and positively affected by the tax revenue paid by operators (LTRP) and the tax revenue loss (tax revenue not collected by government) (LTRL), but the positive effect on it by the number of mining sites (LSIT) and number of operators in the industry (LOPR) is not significant.

Recommendations

The study, recommends the following:

i. Since tax revenue paid (TRP) significantly and positively affect government's tax revenue drive in this sector (TRD), efforts should be made by government towards facilitating tax payment by operators in this sector. This may include training/retraining of revenue collectors and the deployment of only qualified personnel for tax collection. Similarly, corrupt, and compromising tax collectors who would not remit to the government the tax collected by them should be disciplined in accordance with the law.

ii. Tax revenue loss (uncollected tax revenue) (TRL) also significantly and positively affected TRD.As a result, it is necessary for government to set up appropriate strategies to minimize TRL. This may be done by setting up modalities to minimize tax evasion and fraudulent connivance between tax collectors and tax payers to pay less tax.

iii. The number of sand mining sites (SIT) and the number of operators in the industry (OPR) both exerted positive impact on TRD. This positive impact is however not significant. This means that there is a potential of positive impact if the government assists in increasing the mining sites and also encourages more operators to venture into this sector. These strategies tend to increase the potential tax revenue from this sector.

iv. The government should be seen to have a more significant presence in this sector, through the construction of more access roads to the various sand mining sites across the State, and maintaining same; and also the provision of other social amenities such pipe borne water or boreholes, parking spaces for the tipper drivers, resting sheds for workers at the sites, etc. These measures would attract more operators to this sector thereby increasing the potential towards increased tax revenue from this sector.

v. During the rainy season access to the mining sites along the rivers becomes difficult and reduces sand mining activities. The government should designate some undeveloped lands in each local government as "sand storage sites" for operators to heap enough sand during the dry season and use same during the rainy season when the rivers sides would have become inaccessible. This will ensure all year-round business, more profit for the operators, and more tax revenue for the government.

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APPENDICES

Figure 1. Photograph of Some Sand Mining operators working on site

A 1. Table of Primary Data

PRF(B'N)	TRD(B'N)	TRP(B'N)	TRL(B'N)	SIT	OPR
1.5624	0.11718	0.0025	0.11468	19	40
0.3906	0.029295	0.0015	0.027795	2	26
0.3906	0.029295	0.0035	0.025795	5	40
0.3906	0.029295	0.0008	0.028495	2	20
1.67958	0.125969	0.0038	0.122169	10	77
0.07812	0.005859	0.00012	0.005739	8	17
0.1953	0.014648	0.0126	0.002048	16	87
0.1953	0.014648	0.005	0.009648	7	32
0.1953	0.014648	0.0063	0.008348	9	23
0.31248	0.023436	0.0008	0.022636	6	55
0.1953	0.014648	0.0076	0.007048	10	35
0.1953	0.014648	0.0095	0.005148	14	65
0.1953	0.014648	0.0107	0.003948	4	57
0.1953	0.014648	0.001	0.013648	7	135
0.1953	0.014648	0.0033	0.011348	3	65
0.1953	0.014648	0.0008	0.013848	5	25
0.1953	0.014648	0.0053	0.009348	5	52
0.3906	0.029295	0.0008	0.028495	5	20
0.11718	0.008789	0.0018	0.006989	6	35

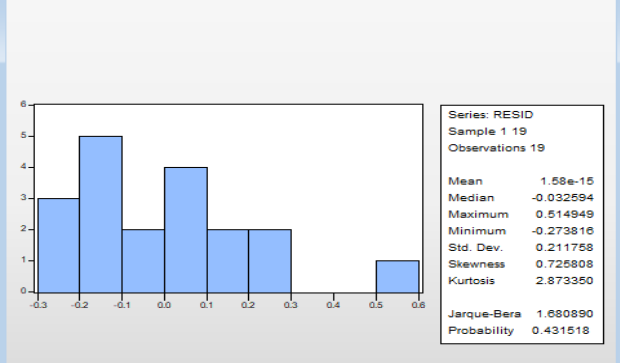
Source: Data from Questionnaire Administration on the field (2024)

A 2. Descriptive Analysis of Primary Data

	LPRF	LTRD	LTRP	LTRL	LSIT	LOPR
Mean	-1.314972	-3.905239	-6.014099	-4.296784	1.843274	3.708249
Median	-1.633218	-4.223486	-5.713833	-4.478758	1.791759	3.688879
Maximum	0.518544	-2.071723	-4.374058	-2.102354	2.944439	4.905275
Minimum	-2.549509	-5.139776	-9.028019	-6.191136	0.693147	2.833213
Std. Dev.	0.755464	0.755464	1.193175	1.050095	0.622115	0.565860
Skewness	1.200341	1.200341	-0.684654	0.530022	-0.167674	0.276225
Kurtosis	4.302834	4.302834	3.123885	2.993087	2.579123	2.274513
Jarque-Bera	5.906347	5.906347	1.496527	0.889627	0.229263	0.658297
Probability	0.052174	0.052174	0.473187	0.640944	0.891695	0.719536
Sum	-24.98447	-74.19955	-114.2679	-81.63890	35.02221	70.45673
Sum Sq. Dev.	10.27307	10.27307	25.62600	19.84858	6.966479	5.763549
Observations	19	19	19	19	19	19

Source: EViews Application Software (Version 10)

A 3. Figure 1 Normality Test of Regression Residual (Jarque-Bera)



Source: EViews Application Software (Version 10)

B.1 Correlation Test (LTRD,LTRP,LTRL,LSIT and LOPR)

Correlation

	LTRD	LTRP	LTRL	LSIT	LOPR
LTRD	1.000000	0.107981	0.874436	0.135378	0.134448
LTRP	0.107981	1.000000	-0.292267	0.317075	0.470635
LTRL	0.874436	-0.292267	1.000000	-0.093020	-0.097565
LSIT	0.135378	0.317075	-0.093020	1.000000	0.319153
LOPR	0.134448	0.470635	-0.097565	0.319153	1.000000

Source: EViews Application Software (Version 10)

B.2. Multiple Regression Analyses

Dependent Variable: LTRD
Method: Least Squares
Date: 03/12/24 Time: 14:09
Sample: 1 19
Included observations: 19

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.072619	0.750817	0.096720	0.9243
LTRP	0.220093	0.057037	3.858801	0.0017
LTRL	0.711652	0.056422	12.61305	0.0000
LSIT	0.129359	0.097967	1.320430	0.2079
LOPR	0.044542	0.115902	0.384304	0.7065

R-squared	0.921431	Mean dependent var	-3.905239
Adjusted R-squared	0.898982	S.D. dependent var	0.755464
S.E. of regression	0.240111	Akaike info criterion	0.205504
Sum squared resid	0.807147	Schwarz criterion	0.454041
Log likelihood	3.047711	Hannan-Quinn criter.	0.247566
F-statistic	41.04673	Durbin-Watson stat	2.282420
Prob(F-statistic)	0.000000		

Source: EViews Application Software (Version 10)