

## THE IMPACT OF ILLEGAL OIL TRADING ON NIGERIA'S MARITIME INDUSTRY

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### Abstract

*This study investigated the implication of illegal oil trading on the Nigerian maritime industry covering the period between 1995 and 2012. Data were mainly derived from the records of the Nigeria National Petroleum Corporation (NNPC), the Nigeria Maritime Administration and Safety Agency (NIMASA) and the Central Bank of Nigeria. The data sets were analyzed with descriptive and inferential statistics. The hypothesis was tested with a linear regression model with ordinary least square properties. Thus, a multiple regression approach was adopted, with the cargo throughput (CARPUT) as the dependent variable. The study revealed that a significant relationship exists between illegal oil trading and the Nigerian maritime industry. Other findings are that the volume of oil theft as an explanatory variable, in most cases met the a priori expectation with its negative coefficient, together with the one-year lagged variables of the dependent variables, was statistically significant in terms of contributions to the dependent variable. The study concluded that illegal oil trading has negative effects on the Nigerian maritime industry. The paper recommended that law enforcement authorities should brace up to the challenge and that adequate and effective sanctions be instituted against offenders to serve as a deterrent.*

**Keywords:** Illegal oil trading, lagged variables, sanctions, offenders, a priori expectation, maritime industry

### Introduction

Illegal oil trading involves the theft of crude oil or its derivative products (petrol, diesel or kerosene) through a variety of mechanisms. Oil theft is as old as the oil exploration and exploitation activities in the Niger Delta region of Nigeria became alarming since 1970s, becoming the major source of violence and criminality in the region (Goddey, 2014). Today, it is carried out in large scale and in various ways, with various actors applying different methods to achieve their objectives. Braide (2001) describes the process of illegal oil bunkering in Nigeria. It entails loading of crude oil and or petroleum products into barges in the labyrinthine creeks of the Niger Delta, directly from oil fuel production well heads or from NNPC jetties or private jetties dotting the coastline of Nigeria or by deliberately puncturing crude oil or petroleum products pipelines.

From the coastal states of the Niger Delta, large products are typically trans-shipped into larger ocean faring marine vessels, mid-stream or offshore. In the hinterland of Nigeria, large inventories of refined petroleum products are loaded directly into tanker trucks from the points of deliberate rupture of petroleum products pipelines that traverse the length and breadth of Nigeria.

Asuni (2009) classifies illegal oil trading into three types: a minor and small-scale pilfering of condensate and petroleum product destined for the local market; direct hacking into pipelines or tapping with a hose from wellhead through practical removal of the ‘Christmas tree’; and excess lifting of crude oil beyond the licensed amount, using forged bills of lading. While the first is of little significance in that it is conducted by local people who hide under the cover of violence in the Niger Delta region, the second category brings more technical sophistication into the business with the stolen product placed in small barges and taken straight into the sea where it is loaded into mother ships in return for money and weapons used to fuel violence, while the last category speaks solely about a spoil system facilitated by official corruption in that it involves the use of forged bills of lading, “issued by a carrier to a shipper, listing and acknowledging receipt of goods for transport and specifying terms of delivery” (Asuni, 2009).

The last narrative, while mostly correct, is oversimplified. Lines between legal and illegal supplies of Nigerian oil can blur. The government’s system for selling oil attracts many shadowy middlemen, creating a confusing, high-risk marketplace. Nigeria’s oil industry is also one of the world’s least transparent in terms of hydrocarbon flows, sales and associated revenues. Industry watchers and policy-makers often think they know more about oil theft than they actually do. The specifics of who steals oil are elusive, even in Nigeria. A typical large-scale theft network has facilitators, operations and security people, local and foreign transport, buyers and sellers and a range of opportunists. Top Nigerian officials cut their teeth in the oil theft business during military rule (Lewis, 1996). Over time, evidence surfaced that corrupt members of the security forces were actively involved. The country’s return to democracy in 1999 then gave some civilian officials and political ‘godfathers’ more access to stolen oil (Katsouris & Sayne, 2013).

There is a sense in which trans-border criminal activities around illegal oil bunkering seeks an understanding and this is located in the contextual significance of the political economy of oil. A global view of this significance is succinctly painted by Feyide (1986), cited by Garuba (2010): that oil is a raw material as well as a convenient and effective source of energy and that all over the world the lives of people are affected and the destinies of nations are probably determined by the results of oil industry operations.

Oil keeps the factories of the industrialized countries working and provides the revenues which enable oil exporters to execute national economic development plans. Those developing countries that have no oil are faced with a grim struggle for survival: if they lose they are relegated to the “fourth world” (Feyide, 1986). This global picture of the significance of oil enunciated by Feyide (1986), apart from clearly explaining the premise for the linkage between the mineral resource and the Nigerian State, it also accounts for the significant status the latter occupies in the country’s political economy.

The march of progress would be retarded and life itself could become unbearable if the world was deprived of oil. That is why oil has become a concern of governments, a vital ingredient of their policies and a crucial factor in their political and diplomatic strategies. Inspired by sensational disclosures and revelations of alleged machinations in the corridors and inner chambers of oil empires, oil has been given the image of a big business ruled by naked politics and dominated by ruthless men who are insensitive to nothing except their profit (Feyide, 1986). The objectives of this study were to determine the influence of maritime illegal oil trading on the maritime industry and to raise prediction models on the relationship between the maritime illegal oil trading and the maritime industry in Nigeria.

## **Hypothesis**

H<sub>01</sub>: There is no significant relationship between the maritime illegal oil trading and the level of cargo throughput in the Nigerian maritime industry.

## **Methodology**

### **Sources of Data**

Secondary data employed in the analysis of this paper were mainly sourced from the publications of the Nigerian National Petroleum Corporation (NNPC), the Nigerian Maritime Administration and Safety Agency (NIMASA) and the Central Bank of Nigeria.

### **Methods of Data Analysis**

The data set were analyzed using two approaches: descriptive statistics and inferential statistics. Inferential statistics were employed to analyse the hypothesis while the objectives of the study were analyzed through descriptive statistics.

### **Test of Hypothesis**

The hypothesis was tested with a linear regression model with ordinary least square properties. Thus, a multiple regression approach was adopted. For the hypothesis, the cargo throughput (CARPUT) was made the dependent variable.

### **Test Statistics**

The time series data for the period, 1995-2012, were fitted into the linear function. This was to enable us predict the level of the dependent variable (CARPUT) that can be achieved given known levels of the illegal oil trading explanatory variables. The test statistics, therefore, include the Coefficient of Correlation (R), Coefficient of Determination (R<sup>2</sup>), the analysis of variance (ANOVA/F-ratio) and the t-distribution (t-Test). While the ANOVA/F-test establishes the significance of the model as a whole, the coefficient of correlation seeks to test the magnitude of the relationship between the dependent variable and the components of maritime illegal oil trading as explanatory variables. The t-Test seeks to test the level of significance of the maritime illegal oil trading explanatory variables to the dependent variable.

### **Test of the Model Significance:**

The first test carried out under the hypothesis testing was a test of the model significance. This seeks to test for the significance of the model as a whole. There are two ways to achieve this; the analysis of variance or the coefficient of determination, R<sup>2</sup>.

### **The Analysis of Variance Approach**

This statistical tool aims at splitting the variations of a variable, for example, in the hypothesis, the cargo throughput, (CARPUT) dependent variable with its component parts, variations in the dependent variable (CARPUT), that are accounted for by the explanatory

variables (maritime illegal oil trading variables), independent variables, that is, the different sources of growth in the cargo throughput (CARPUT) as produced by the maritime illegal oil trading components; are called the EXPLAINED VARIATIONS. Other sources not thus explained are due to random or chance factors. These are estimates of the population disturbance variable ‘u’ and are represented by ‘e’, otherwise referred to as the RESIDUALS or error term (Iyoha & Ekanem, 2002). For the hypothesis, the regression equation is designated thus;

$$CARPUT_t = \beta_0 + \beta_1 VAS_t + \beta_2 VOS_t + u_t \dots \dots \dots 1$$

**The Coefficient of Determination, R<sup>2</sup> Approach**

Another way to test for the model significance is through the coefficient of determination (R<sup>2</sup>). The R<sup>2</sup> is calculated from the regression and it gives the proportion of the total variation in the dependent variable, actual cargo throughput factor that is explained by the independent variables, here the various maritime illegal oil trading components. R<sup>2</sup>, from the sample is a statistical estimate of the population, e<sup>2</sup>, (row squared). The value of R<sup>2</sup> ranges between 0 and 1;

In setting up the test the following hypothesis is tested;

HO<sub>1</sub>: ρ<sup>2</sup> = 0     i.e., the independent variables, the growth in the maritime illegal oil trading components, or sources of growth in the cargo throughput factor, in a given year have no significant relationship with the actual growth of the cargo throughput factor for that year.

HA<sub>1</sub>: ρ<sup>2</sup> > 0     (One-tailed test of significance) i.e., at least, there is a significant relationship between one of the independent variables and the actual growth of the cargo throughput factor.

**3.2.3.3 Decision Rule**

If F-ratio calculated is greater than the F-ratio tabulated or theoretical F, at alpha (α) – level of significance, and (K-1), (N-K), degrees of freedom, then we Reject H<sub>0</sub> and Accept H<sub>A</sub>, and thus state that there is some truth in the estimated model (i.e. the regression model is significant since the independent variables significantly account for the variation in the dependent variable (CARPUT<sub>t</sub>))

$$\text{Here, F calculated} = \frac{R^2 \cdot K - 1}{\frac{1 - R^2}{N - K}} \dots \dots \dots 2$$

**Test of Significance of the Explanatory Variables, T-Test**

Having established the significance of the estimated model as a whole next is to test the specific strengths of the various independent variables in bringing about this result. This carried out through the test on the estimated parameters of the independent variables or independent variables.

The test-statistics or student t-test is calculated as follows;

$$t - \text{Test} = \frac{\beta_k}{Se(\beta_k)} \text{ for } K = 1 - 6 \dots \dots \dots 3$$

Where;

β<sub>k</sub> = estimate of the population parameters for the independent variables (i.e. maritime illegal oil trading components)

Se(β<sub>k</sub>) = Standard error of the estimate

**Decision Rule**

If absolute value or  $\frac{\beta_k}{Se(\beta_k)} > t_{n-k}$  at  $\frac{\alpha}{2}$  level of significance, we Reject H0 and Accept HA: and conclude that the variable belongs significantly to the model.

**Specification of Model**

The dependent variable represented by the symbol CARPUT<sub>t</sub> is regressed on the various components of maritime illegal oil trading components figures for the corresponding period. These components of maritime illegal oil trading are hereby represented as follows:

VAS<sub>t</sub> = Total value of stolen oil in year t;

VOS<sub>t</sub> = Total volume of stolen oil in year t;

CARPUT = Level of cargo throughput in year t;

The dependent variable (CARPUT) is however as specified in equation (1) above.

**Data Presentation and Analysis**

**Table 1: Annual Volume and Value of Oil Stolen and Cargo Throughput**

S/N	YEAR	VOS(in barrels)	VAS(in Billion ₦)	CARPUT(in Metric Tons)
1	1995	229565000	91.76	13.27
2	1996	230031800	111.74	15.48
3	1997	257947000	107.56	16.61
4	1998	249207600	76.26	19.33
5	1999	257791600	105.13	22.23
6	2000	242350000	357.68	28.93
7	2001	337322415	821.7	35.94
8	2002	390463495	1079.1	36.99
9	2003	237250000	786.6	39.77
10	2004	193450000	812.8	40.82
11	2005	156950000	1161.6	44.95
12	2006	255500000	2240.6	49.17
13	2007	255500000	2304	57.47
14	2008	292000000	4056	64.37
15	2009	694925910	6655.5	65.78
16	2010	283078530	3525	76.74
17	2011	386091290	6975	83.46
18	2012	179514150	3239.5	77.09

Source: NNPC, NIMASSA and CBN, various years

**Hypothesis Testing**

**The Impact of Maritime Illegal Oil Trading on Cargo Throughput Factor**

Here, one lead equation is to be estimated and the hypothesis states as follows:

H0<sub>1</sub>: There is no significant relationship between the level of maritime illegal oil trading and cargo throughput factor in the marine domain in Nigeria.

The sub-hypotheses from H0<sub>1</sub> are as follows;

H0<sub>1a</sub>: The value of maritime illegal oil trading has no significant effect on the level of cargo throughput factor in the marine domain in Nigeria.

- H0<sub>1b</sub>: The volume of maritime illegal oil trading has no significant effect on the level of cargo throughput factor in the marine domain in Nigeria.  
 H0<sub>1c</sub>: The one-year lagged variable of cargo has no significant effect on the cargo throughput in the marine domain in Nigeria.

**Table 4: Global Statistics Results for Impact of Illegal Oil Trading on Cargo Throughput**

Test-Statistic	Model1 Least Square with LAG
R-square	0.974
Adjusted R-square	0.968
S.E of Regression	3.930594
Sum of squared residual	200.8444
Log likelihood	-45.11115
Durbin-Watson stat	1.633473
Mean dependent Variable	45.59588
S.D. dependent Variable	22.071
Akaike info criterion	5.778
Schwarz criterion	5.974
Hannan-Quinn criterion	5.797
F-statistic	163.8350
Prob (F-statistic)	0.00000

NB: \*\*\* = significant at 1%; \*\* = significant at 5%; \* = Not significant.  
 F-ratio tabulated DF (3, 14); 1% = 5.56, 5% = 3.34, t-ratio DF (14); 1% = 2.98, 5% = 2.14.

Source: E-views 6.0 Statistical Package

**Test of Model Significance – ANOVA.**

In order to confirm the specification status of our model, we employed the ANOVA.

**Decision Rule**

Employing the regression statistic in E-views software, since the F-ratio calculated (163.8350) > F-ratio critical (5.56, 3.34), at both 1% and 5% levels of significance respectively, we reject Ho and conclude that there is a significant relationship between the level of maritime illegal oil trading and cargo throughput in the maritime domain in Nigeria. The estimated regression result is presented thus;

$$\begin{aligned}
 & \text{CARPUT}_t \\
 & = 11.29763 + 0.002396\text{VAS}_t + 1.60e^{-08}\text{VOS}_t \\
 & + 0.813878\text{CAPUT}_{t-1} \dots \dots \dots 4a
 \end{aligned}$$

Having tested the significance of the model, we went a step further to test the significance of the maritime illegal oil trading in contributing to the total variation in the level of cargo throughput factor. This was achieved through the student t – test. Refer to the regression result in Table 4 in which only the one-year-lagged variable of cargo throughput proved to be significant contributors to the level of cargo throughput since the t-ratio calculated (6.988) > t-ratio critical (2.98, 2.14) at both 1% and 5% levels of significance, respectively.

**Table 5: T- Statistic Table-Cargo Throughput**

Variable	X <sub>1</sub> , Value of Oil Theft, ( VAS <sub>t</sub> )	X <sub>2</sub> , Volume of Oil Theft, ( VOS <sub>t-1</sub> )	X <sub>3</sub> , One-year Lagged Variable of Cargo, ( CARGO <sub>t-1</sub> )
Test Statistic			
Coefficient of the Variable	0.002396	-1.60E-08	0.813878
Standard Error	0.001431	1.38E-08	0.116460
T-Statistic Calculated	1.674048 NS	-1.156522 NS	6.988466 ***
T-Statistic Tabulated 1%	2.98	2.98	2.98
T-Statistic Tabulated 5%	2.14	2.14	2.14
Significance	0.12	0.26	0.00

NB: \*\*\* = significant at 1%; \*\* = significant at 5%; \* = Not significant. T-ratio DF (14); 1% = 2.98, 5% = 2.14.

**Source:** E-views 6.0 Statistical Package

**Discussion of Results**

Following the pattern of the hypotheses, the results are discussed to reflect the maritime illicit trading and the maritime industry represented by the cargo throughput factor. Therefore, the results are discussed in line with the lead equation.

**The Maritime Illegal Oil Trading Cargo Throughput**

The model 4 was on the relationship between maritime illegal oil trading and cargo throughput. This result reveals that a significant relationship actually exists between maritime illegal oil trading and cargo throughput. However, only the one-year lagged variable of the cargo throughput proved to exert a significant effect on the cargo throughput, even at 1% level of significance. Also, the model, with an R-squared of 97.4% has shown that the changes in the explanatory variables taken together, have been able explain at least, 97% of the total variations in the dependent variable, cargo throughput, thus, leaving only about 3% to chance occurrence. The estimated regression result is presented thus:

$$CARPUT_t = 11.29763 + 0.002396VAS_t + 1.60E - 08VOS_t + 0.813878CAPUT_{t-1} \dots \dots \dots 4b$$

From model 4b, while the volume of maritime illegal oil trading, with its negative coefficient, met the a priori expectation, the value of maritime illegal trading and the lagged variables of cargo throughput failed to meet the a priori expectation, bearing positive coefficients.

**Summary and Conclusion**

**Summary of Findings**

The findings from this study, arising from its objectives may be summarised as follows:

1. A significant relationship exists between maritime illegal oil trading and the maritime industry, cargo throughput.
2. Both the volume and value of maritime illegal oil trading exert significant effects on the level of cargo throughput, with only the volume of maritime illegal oil trading meeting the a priori expectation with its negative coefficient.

## Conclusion and Recommendations

On the basis of our findings, the study therefore concludes that generally, maritime illegal oil trading has negatively affected the maritime industry and that the volume of illegal oil trading is on the high side and as such has a devastating effect on the maritime sector. On the strength of these findings and conclusion, the following recommendations are made:

1. There is need for the maritime authorities to intensify the fight against illegal oil trading in the country. To this end, there should be adequate and effective sanctions for offenders to serve as a deterrent.
2. In addition, there should be a proper legal framework to persecute culprits involved in illegal oil trading.
3. The laws and penalties arising from its infractions should apply equally to all offenders. The practice of selective treatment for offenders should be stopped since our constitution states that all individuals are equal before the law.

The third recommendation is crucial in view of the generally held opinion that some members of our law enforcement outfits are in the habit of paying lip service to crimes committed by the “high and mighty” in the society while only the “small” are the only individuals that should face the full weight of the law.

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