

OIL PIPELINE VANDALISM AND RESIDENTIAL PROPERTY RENTAL VALUE: EMPIRICAL EVIDENCE FROM NIGERIA

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ABSTRACT

Purpose: The incidence of oil pipeline vandalism in Nigeria is on the increase and often a threat to the host communities. Environmental degradation, hazard to human livelihoods and health amongst others are consequential effects of oil pipeline vandalism which oftentimes generate stigma to the surrounding properties and dis-amenity to property values. The purpose of this study is to examine the effect of oil pipeline vandalism on residential rental values.

Design/methodology/approach: To achieve this, questionnaires was distributed to 400 tenants drawn from four purposively selected residential estates in the case study areas. Data gathered was analysed using both descriptive (relative importance index) and inferential statistics (linear regression model) to identify factors that motivates tenant's choice of settling down in the study area and the factors that determines residential property rental value in the area.

Findings: The findings show 'loss incurred to vandalism in monetary terms' alongside six other explanatory variables as statistically significant to residential rental value in the study area.

Originality/value – The outcome of the paper will assist property owners, occupiers, Real Estate Surveyors and Valuers, developers, and other stakeholders in the real estate sector on how oil pipeline vandalism could impact investments and returns. This indicates that the linear regression model offers an explanatory power to understand the essential factors impacting residential property rental value and real estate development.

Keywords: Oil pipeline; rental value; residential property; vandalism; Arepo; Nigeria

1. INTRODUCTION

Before now, the incidence of oil pipeline vandalism was largely restricted to riverine communities. Its prevalence in Nigeria in recent time especially, in communities where oil pipelines crisscrossed is escalating. Between 2002 and 2011, a total of 16,083 pipeline breaks were recorded out of which 398 pipeline breaks were due to ruptures while activities of vandals accounted for 97.5 percent of the total number of cases (Ogbeni, 2012). Vandalization of oil pipelines in Nigeria has assumed huge dimensions such that the amount of oil spilled into the environment has gone unnoticed. It only becomes public when

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it results in explosion and deaths that cannot be curtailed immediately by vandals. Vandalism is a serious and significant problem in Nigeria; the grave consequence is enormous on the economic, environmental, and humanitarian losses in communities traversed by oil pipelines.

So many lives and properties have been lost due to the act of vandalism and scooping fuel which have led to fire outbreak in the Niger Delta areas and some Western States of Nigeria. According to Saheed and Egwaikhede (2012), oil pipeline vandalism has triggered human casualties, loss of livelihood sources, population displacement, destruction of family assets and environmental degradation. For instance, Adekunbi and Nzeribe (2013) confirmed that there have been several cases of oil spillage in Arepo, where Nigeria National Petroleum Corporation System 2B oil pipeline is incessantly damaged by vandals, with its attendant devastation of the environment, loss of several lives and properties worth millions of dollar. Simons, Winson-Geideman, and Mikelbank (2001) points out the impact of oil pipeline spill on surrounding property values as of great concern to property owners in the affected area. Residential areas which are few meters away from oil pipeline right of way remains vulnerable to vandals' attacks. However, a cogent question to be asked at this juncture is why has there been increase in development of private estates in spite of the continual activity of the oil pipeline vandals, in Arepo, Nigeria with its attendant consequences. Property owners, developers, Estate Surveyors and Valuers and others in real estate sector appear not to be bothered.

Notwithstanding the prevalence of the menace in Nigeria, its effect on property value is yet to receive adequate prominence in existing literatures. Several of the existing studies lack empirical analysis. Whereas, Hansen, Benson and Hagen (2006) affirmed property value to be negatively and significantly affected by proximity to petroleum pipeline. Simons and Saginor (2006) also avowed that the degree of the impact of pipeline vandalism on property value is usually a function of the recentness of the incident, the repetition of occurrence, direct property damage and, if not directly affected, the property's proximity to the incident. Even if the property is not directly damaged, the stigma and perception that the next incident could affect them is significant.

The motivation for this study stems from the incessant oil pipeline vandalization in Arepo, Nigeria, the trauma residents are usually subjected to and the stigma attached to the surrounding properties as the aftermath effect. The primary purpose of this study is therefore to establish the relationship between oil pipeline vandalism and residential property rental values in Arepo, Nigeria. The result is to offer best information possible to property owners, Real Estate Surveyors and Valuers, developers, and others in the built environment on how oil pipeline vandalism could impact investments and incomes.

2. LITERATURE REVIEW

2.1 Incidence of Oil Pipeline Vandalism in Nigeria

The incessant vandalism of oil pipelines in the developing countries as in Nigeria, in recent times has been on the spiral increase (Onuoha, 2008). Nigeria has a total network of 5001 kilometres of oil pipeline which traverse the entire national territory (Okoli and Orinya, 2013). However, in 2014, a total of 3,732 breaks were reported by the Nigerian National Petroleum Corporation (NNPC) out of which 3,700 was as a result of vandalism (NNPC, 2014). Oil pipeline vandalism which is also known as oil bunkering in Nigeria has been described by Okoli and Orinya (2013) as the act of drilling into the pipelines with the

intent to steal products. It is a deliberate breaking of oil pipelines with the intention of sabotaging government efforts or stealing petroleum products.

There have been various pipeline explosions in Arepo, Ogun State, South West, Nigeria, due to system 2B oil pipeline vandalism. System 2B is an important pipeline that transports 11 million litres of petrol daily from the Atlas Cove Jetty across the Southwest, spanning some 512 kilometres (Okorodudu-Fubara, 2013). Eight occurrences have been recorded between 2008 and 2015. The incidence of pipeline vandalism and its attendant' explosions, apart from posing immediate threats to lives and properties, have a long-lasting damage to the environment, and health in the host communities (Okoye & Okunrobo, 2014).

2.2 Oil Pipeline Vandalism versus Residential Property Values

The effects of airport noise (Biggs, 1990; Uyeno, Hamilton & Biggs, 1993), high-voltage electric transmission lines (Kung, & Seagle, 1992), golf course (Do & Grudnitski, 1995), greenways (Nicholls & Crompton, 2005), environmental hazards (Hansen, Benson & Hagan, 2006), and natural gas pipelines (Fruits, 2008; Barry, Jack, Spero & Stephanie, 2011) on residential property values has been measured by several studies. Studies as to whether oil pipelines vandalism actually affects residential property values in Nigeria, particularly rental values are limited.

A handful studies in US and Canada were mainly on the impact of oil spill and the presence of oil pipeline on property values. Barton (1996) for instance, found that properties in a Texas subdivision affected by a pipeline leak in 1994 lost 10.2% of their net value a year after the incident. Simons, Winson-Geideman, and Mikelbank (2001) found 11% decline in property values within 10 miles across Maryland neighbourhood in year 2000 due to a suburban spill. Hansen, Benson and Hagen (2006), investigated the impact of pipeline explosion on single-family home prices and found that average home located within 50 feet of the pipeline was worth 4.6% less than other property a year after the explosion, irrespective of whether it was located near the pipeline explosion or a distance away. The study further maintained that the dis-amenity however decreased over time. Also, a study conducted by Conversations for Responsible Economic Development (CRED) (2013) in British Columbia revealed that privately-owned properties can lose from 10-40 percent in value, and even properties near spills that are not directly affected can lose value by association.

3. METHODOLOGY

The study adopted survey research design. A household survey of 400 tenants drawn from four purposively selected residential estates in the case study area in Arepo, Ogun State, South-West, Nigeria was conducted through questionnaires. Since the research required rents of properties around the oil pipeline and properties not in close proximity, the targeted audience were tenants in the selected estates. Two of the residential estates namely Journalist Phase I and Beach land are in close proximity to the Nigeria National Petroleum Corporation (NNPC) system 2B oil pipeline, while the other two estates namely Shalom and Havana are off the oil pipeline traverse. The selection of the 400 tenants in the residential estates was made using the convenience sampling techniques. The study used both descriptive and inferential statistical tools in analysing the data collected from the respondents.

The descriptive statistics employed twelve (12) key variables as observed directly from the field to have prompted tenants' choice of settling in Arepo community. They were presented to the respondents to solicit their views. On each of the 12 variables, they were asked to specify the extent to which each variable impact their settlement in the study area based on a five-point scale (1-highly insignificant, 2-Insignificant, 3-Neutral, 4-Significant and 5-highly significant). Empirically, the Relative Importance Index (RII) was employed. Relative Importance Index is a type of relative importance analyses. RII was used for the analysis because it best fits the purpose of this study. RII supports in finding the contribution of a variable to the prediction of a criterion variable both by itself and in combination with other predictor variables. Relative Importance Index (RII) can be calculated using Equation 1.

$$Relative\ Importance\ Index\ (RII) = \frac{\sum W}{A * N} \dots \dots \dots (1)$$

Where, W = weighting given to each statement by the respondents and ranges from 1 to 5; A = Higher response integer (5); and N = total number of respondents.

In addition, the inferential statistical tool used is the linear regression model. The model was employed to regress rental values (dependent variable) upon the series of characteristics (independent variables) that are determinants of residential property rents in the study area.

The regression model is expressed in the form:

$$RTVL = \beta_0 + \beta x_1 + e \dots \dots \dots (2)$$

Where:

RTVL= Rental value of a property

β_0 = Constant term

βx_1 = the coefficient vector for the independent variables

e is the error term

Since the focus of this study is to investigate the effect of oil pipeline vandalism on land value, the model specification has 7 independent variables in the analysis. 'Rent per annum' is the dependent variable. The model specification for the analysis is presented in Equation 3.

$$Y = f(X_1, X_2, X_3, X_4, X_5, X_6, X_7) \dots \dots \dots (3)$$

Where:

Y = Rent Per Annum (Net)

X_1 = Number of living room

X_2 = Type of property

X_3 = Amount of money lost to vandalism

X_4 = Nearness to place of work

X_5 = Nearness to the market

X_6 = Nearness to place of worship

X_7 = Water supply

E= Error Term

3.1 Operationalization of Variables

Y is the observed rental value of the properties (Net)

NLRM = Number of living room (Actual number)

TPTY = Type of property measured as dummy (tenement buildings = 1, one room self-contain apartment = 2, one-bedroom flat = 3, two-bedroom flat = 4, three-bedroom flat = 5, four-bedroom apartment = 6, two-bedroom duplex = 7, three-bedroom duplex = 8, four-bedroom duplex = 9 and five-bedroom duplex = 10)

LVMT = Amount of money lost to vandalism (Measured in naira (₦))

NPWK = Nearness to place of work (Kilometre (Km) (approx.))

NMKT = Nearness to the market (Kilometre (Km), (approx.))

NPWP = Nearness to place of worship (Kilometre (Km), (approx.))

WASS = Water supply measured as dummy (1=borehole, 0=hand dug well)

4. PRESENTATION AND DISCUSSION OF RESULTS

A total of four hundred questionnaires were administered to the randomly selected tenants of the residential estates. The four hundred questionnaires were retrieved and found suitable for analysis. The analysis was structured to analyse the factors that motivates tenants' choice of settling down in the study area. The result is however detailed in table 1.

Table 1: Tenants' ranking of the factors that motivated choice of settling down in the study area

Factors	RII	Rank
Proximity to Lagos metropolis	0.94*	1
Existing built up and prime emerging neighbourhoods	0.92*	2
Closeness to Place of Work	0.90*	3
Proximity and accessibility to different amenities	0.89	4
Closeness to Children's School	0.88	5
Easy access to the Lagos-Ibadan expressway and the Third Mainland bridge	0.88	5
Proximity to Ikeja Central Business District and the Lagos Airport	0.87	7
Proximity to Lagos State Government Secretariat	0.86	8
Quality of neighbouring structures and streets	0.85	9
Security	0.84	10
Regular Power Supply	0.80	11
Cheap Rent	0.79	12

**Most important index scores*

Table 1, shows the general ranking of the factors which informed tenants' choice of settling down in the study area. Interestingly, "Proximity to Lagos metropolis" was the most popular option. This was evident from the relative importance index of 0.94 while "existence of built up and prime emerging neighbourhoods" ranked second with the relative importance index score of 0.91. Cheap rent with the significance index score of 0.79 is the least popular although it remains as one of the factors.

Table 2: Results of the regression analysis

Variable	Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t-Statistic	Sig.
NLRM	-.096	.038	-.038	-2.509	.013
TPTY	.916	.019	.899	47.332	.000
LVMT	-.082	.025	-.092	-3.227	.001
NPWK	-.071	.017	-.076	-4.153	.000
NMKT	.096	.022	.070	4.472	.000
NPWP	-.035	.018	-.029	-1.982	.048
WASS	-.120	.037	-.047	-3.266	.001
Regression Constant	.029	.226			
R ²	.928	Prob.(F statistic)	.000		
Adjusted R ²	.925	Durbin-Watson	1.221		
Standard Error of regression	.345				
Sum Squared Residual	45.861				
Mean dependent variable	45.241				

The *R* value of 0.963 indicates a high degree of correlation. The *R*² value indicates how much of the total variation in the dependent variable (rental value), can be explained by the independent variables (NLRM, TPTY, LVMT, NPWK, NMKT, NPWP and WASS). In this case, 92.8% can be explained, which is very large. The probability (F-statistic) indicates the statistical significance of the regression model that was run. From the table, $p < 0.0005$, which is less than 0.05, and indicates that, overall, the regression model statistically significantly predicts the outcome variable (it is a good fit for the data). The Coefficients provides the necessary information to predict residential rental value from independent variables, as well as determine whether income contributes statistically significantly to the model (as can be seen at the "Sig." column).

The Durbin Watson statistics of 1.221 indicates the model is free from auto-correlation. An F-value of 380.781 was achieved also, making the overall equation significant ($p < 0.05$). Furthermore, the results show that seven (loss incurred to vandalism in monetary terms, number of living rooms, type of property, nearness to place of work, nearness to market, nearness to place of worship and type of water supply) were found to significantly influence rental value of residential property in the study area. By way of emphasis on oil pipeline vandalism, with a t-value of -3.227, reveals that 'Amount of money lost to vandalism' contributes a significant negative influence on rental values of residential property in the study area. This is in consonance with the findings of CRED (2013) that privately-owned properties near oil spills lose value as well as properties that are not directly affected even by association.

Furthermore, the values in the "B" column of the unstandardized coefficients can be used to present the regression equation as:

$$RTVL = 0.029 - 0.096(NLRM) + 0.916(TPTY) - 0.082(LVMT) - 0.071(NPWK) + 0.096(NMKT) - 0.035(NPWP) - 0.120(WASS)$$

5. CONCLUSION AND RECOMMENDATIONS

The study has contributed to knowledge on the series of factors associated with rental values of residential property in communities' susceptible to incessant oil pipeline vandalism in Nigeria. The results demonstrate that there is interdependence between the

rental values and loss incurred to vandalism in monetary terms. For high profitability in investment on real estate and returns on rentals in the study area, number of living rooms, type of property, nearness to place of work, nearness to market, nearness to place of worship and type of water supply remain important. The study has also shown that the problem of vandalism, which started in the Niger Delta region of Nigeria, has become widespread across the communities where oil pipeline traverses. The findings of the paper imply the need for adequate security to safe guard oil pipeline creeks by the government since oil pipeline has become synonymous with disaster in the communities it traverses. This will also reduce the stigma and the complexities of the issues ensuing in the occurrence of pipeline vandalism and the associated repercussions on property values in the communities where oil pipeline criss-crosses.

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