

EFFECTS OF SURVEILLANCE ON OIL PIPELINE VANDALISM IN THE DOWNSTREAM SECTOR, NIGERIA.

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ABSTRACT.

This study assessed the effects of surveillance operation on oil (petroleum products) pipeline vandalism in the downstream sector of Nigeria. The study was a survey design and adopted stratified and simple random sampling techniques. One hypothesis and a research question guided the study. The target population was 1468 involving 1258 major and independent oil marketers (Category A), 110 policy makers (Nigerian National Petroleum Corporation, NNPC and Petroleum Products Pricing Regulatory Agency, PPPRA: Category B) and 100 senior staff of Pipeline and Products Marketing Company, PPMC (Category C). The sample size was 314. The sample size for each category of the respondents was determined. Primary and secondary sources of data were accessed. In-depth interviews were held. The structuring of the questionnaire was based on the five point Likert scale format. Opinions of marketing experts were used in the questionnaire validation. The scores derived from the pilot study were processed with Cronbach Alpha technique. A reliability coefficient of the research instrument, 0.971 was estimated. Using one way ANOVA technique and Minitab software package, the hypothesis was tested at 0.05 level of significance and 9 degrees of freedom. The study revealed that the extent of surveillance operation at 28.84 percent had non-significant positive effects on the oil (petroleum products) pipeline vandalism in the downstream sector of Nigeria. Recommendations were made.

KEYWORDS: Petroleum products, Downstream, Vandalism, Surveillance, Depots & Refinery.

1.0 BACKGROUND OF THE STUDY

Nigeria ranks the eleventh largest producer of oil in the world and the largest in Africa. The petroleum sector contributes about 90% of the nation's foreign exchange earnings and 25% of the Gross Domestic Products. Large proportion of the Nation's oil is produced onshore and transported by extensive systems of pipelines across the Niger Delta region, which is the hub of oil exploration and production in Nigeria. According to Yo-Essien(2012), the enormous oil installations deployed in the Niger Delta region, 600 oil fields of which 360 fields are onshore while 240 are offshore with over 3000 kilometers of pipelines crisscrossing the region and linking some 275 flow stations to various export terminals, explain their vulnerability to vandalism. It has been observed that thousands of barrels of oil spill into the environment through oil pipeline vandalism. Oil spill into the environment has negative consequences, ranging from air pollution, vegetation loss to soil degradation. The Federal Government as the environmental conscience of the citizenry has put in place a number of measures including pipeline surveillance for the protection of oil and gas pipelines and stem the ugly tide of environmental pollution and degradation arising from vandalism. Pipeline surveillance refers to strategic monitoring of the activities on the pipeline's right of way and the adjoining strips of land whose rights are both shared by pipeline operators and landowners. The right of way of the oil pipeline ranges from about 25 to 125 feet and any unauthorized vehicles, people or animals entering the pipeline's right of way are considered security threats. The purpose of surveillance is to limit third-party intrusions, environmental activists and unwanted vehicles entering restricted areas around pipelines with the aim of checking potential threats to the integrity of the oil pipeline. The vandalism of petroleum products pipeline leading to oil spills has continued to be a challenge, with most incidents along major pipelines and manifolds. Besides economic reasons, oil pipeline vandalism has political undertone. It has been described as a form of terrorism against the oil industry and seemed to have defiled all contingency arrangements of the oil industry operators. In a bid to control oil spill into the environment with its consequences, the Nigerian Government enlisted the ex-militant leaders in the war against pipeline vandalism, in addition to other surveillance procedures by the oil industry operators. Multi-billion Naira Surveillance contracts were awarded to the companies belonging to the ex-militant leaders and operational areas assigned to them for effective surveillance of the oil and gas pipelines. In spite of the elaborate joint surveillance arrangements, battalion of ex-militants and stiffer penalties imposed on vandals, streams of oil spills resulting from pipeline vandalism persisted. In view of these contending factors, it became imperative to investigate the extent to which the surveillance operation has affected the oil pipeline vandalism in the downstream sector of Nigeria.

1.1 Statement of the Problem.

The petroleum products are distributed through the pipeline and bridging systems. The pipeline system conveys the petroleum products from the refineries to the depots. The pipelines may be surface or underground. Pipeline system in Nigeria did not cover the whole nation. It stopped at various terminal depots. The bridging system conveys petroleum products from the depots to filling stations, outlets, jetty and other retail points. This system is mainly operated by tankers, trucks, train and vessels. Major and independent marketers operate within this system to convey products to various parts of the country where pipeline did not cover. The bridging system leads to increased transportation/delivery costs and deterioration of the high way infrastructure (road) through wear and tear. The pipeline system, in spite of its problems is still the most effective and efficient means of distribution of petroleum products in Nigeria. According to Nwachukwu (2003), the severe scarcity of petroleum products has been attributed to pipeline vandalization by thieves, multiple damages of pipelines and leakages, among others. Ehikwe (2002) noted that accidents are minimal under pipeline system but inevitable especially where pipes are old and require

replacement, interference by persons of questionable intentions, bursts resulting from exertion of high pressure, leakages, damages by rust of pipes, landslides and erosion that could expose the laid and buried pipes. Agba (1991) identified pipeline related problems as being responsible for fuel scarcity situation in Nigeria. Fuel scarcity has remained a thorn in the flesh of Nigerians, coupled with its adverse effects, resulting from industrial and domestic accidents to waste of man hour. The spate of vandalism of petroleum products pipeline and its grave consequences on the entire economy of the country deserve serious attention. Mr Dakuku Peterside, (Former Chairman, House of Representatives Committee on Petroleum, Downstream) had noted that persistent pipeline vandalism was impacting on not just downstream but the upstream and mid-stream operations of the Nigerian oil and gas sector. He remarked that pipeline vandalism does a lot of harm, not just only to our people but the entire economy of the country. During the Channels Television discussion on Tuesday, 19th May 2015, Mr Diran Fawibe (energy expert) revealed that Nigeria lost over eight billion Naira (N8bn) on pipeline vandalism between January and March 2015. Most environmental challenges confronting the country today are related to pipeline vandalism and products handling. Oil spills into the environment causing air pollution, vegetation loss, reduction in the use of aquatic resources and soil degradation. Oil spill through pipeline vandalism is a form of terrorism against the oil industry operators, Nigerian Government and sustainable livelihood of citizens. Consequently, the Nigerian Government and Oil Industry Operators adopted the strategies of joint surveillance of pipeline rights-of-way and strips of land surrounding the pipeline, involving ex-militant leaders under the Oil & Gas Pipeline & Waterways (Multi-billion Naira) Surveillance Contract, to stage war against oil pipeline vandalism. In spite of these determined efforts including the huge investments and strategies for effective surveillance of petroleum products pipeline across the country, oil spill incidences resulting from pipeline vandalism continues unabated. In view of these, this study therefore attempts to assess the extent of the effects of surveillance operation on oil (petroleum products) pipeline vandalism in the downstream sector of Nigeria.

1.2 Objective of the Study

The broad objective of the study was the assessment of the effects of surveillance operation on oil (petroleum products) pipeline vandalism in the downstream sector of Nigeria. The specific objective was to determine the extent of the effects of surveillance operation on oil pipeline vandalism in the downstream sector.

1.3 Research Question.

To what extent has surveillance operation affected oil pipeline vandalism in the downstream sector of Nigeria?

1.4 Delimitation of the Study.

The study was limited to the senior staff of the Petroleum Resources Ministry, Nigerian National Petroleum Corporation (NNPC), Petroleum Products Pricing Regulatory Agency (PPPRA), Major and Independent Marketers, Pipeline and Products Marketing Company (PPMC) within the Salary Grade Level 9-17. The focus of the study was the downstream sector of the oil industry.

1.5 Hypothesis Formulation

The study hypothesis was formulated and tested at 0.05 significance level and 9 degrees of freedom. H_0 : Surveillance has no significant effects on oil pipeline vandalism in the downstream sector of Nigeria. H_1 : Surveillance has significant effects on oil pipeline vandalism in the downstream sector of Nigeria.

2.0 REVIEW OF RELATED LITERATURE.

Activities in the oil and gas industry are normally classified into upstream, mid-stream and downstream. The upstream covers all activities related to the exploration, discovery and extraction of oil and gas and their treatment, transportation and delivery to designated export terminals or otherwise to processing plants. The activities under upstream include oil exploration, oil prospecting, drilling and production. The main stream sector comprises all activities related to the storage of crude petroleum, delivery of crude petroleum to refineries and to jetties for export. The downstream sector comprises all activities from delivery to processing plants (Soyode, 2001). The activities include refining of crude oil into white petroleum products and subsequent conversion to petrochemical products. The full petroleum products from the refineries include liquefied petroleum gas (cooking gas), premium motor spirit (petrol), dual purpose kerosene (aviation fuel and household kero), automotive gas oil (diesel), low and high pour fuel oil, waxes (three grades), base oils, asphalt and sulphur. The downstream operations also involve the importation of white and other finished products, storage of white products in depots, transportation and distribution through pipelines or bridging by long distance trucks, marketing, pump delivery to consumers and users in cars and cans, tail-retailing in gallons, bottles, and quarts. It has been observed that the petroleum pipeline system is cost-saving and has high efficiency potential in moving petroleum products from the nation's refineries to depots, despite some hitches. The hitches include pipeline vandalism, pipeline damages/ leakages resulting from material defects, pipe corrosion to ground erosion due to ageing facilities. Oil spills resulting from pipeline vandalism has continued to be a challenge in Nigeria. Oil pipeline vandalism most times is caused by acts of sabotage. Sabotage refers to inimical acts that disrupt the production and distribution of petroleum products. Hoodlums target and attack oil pipelines to siphon fuel. The attendant spark from the impact leads to the incessant pipeline fire and explosions. Johnson (2004) noted that pipeline explosion has killed hundreds of looters and bystanders. The pipeline explosion in Ilado, Lagos on May, 2006 led to the death of over 200 people (Balogun, et al, 2006). Beside the loss of lives and property through pipeline fire, the site residues usually pollute the fresh water sources which serve the rural communities. The involvement of idle youths of oil communities in pipeline vandalism has become rampant in recent times. The rising tide of violence, hostage taking in the Niger Delta region has significant consequences on oil pipeline surveillance. The pecuniary demands by the host communities often result to restrictions on the pipeline rights-of -way and adversely affect surveillance. The frequent pipeline cuts that continue to spill for weeks and months has the capacity of undermining Government's efforts at meeting its obligations in spill management. The Nigerian National Petroleum Corporation (NNPC) in conjunction with other agencies were charged with the responsibility to maintain surveillance and strengthen the national capacity and regional action to prevent, control, combat and mitigate pipeline vandalism. According to Yo-Essien (2012), it is regrettable that despite efforts and strategies put in place to maintain surveillance of oil pipeline by the Nigerian Government and Oil Industry Operators, oil spill incidences due to pipeline vandalism occur unabated. The effects of surveillance operation on oil pipeline vandalism constitutes the focus of this study.

3.0 METHODOLOGY

The research design was survey. The population of study was 1468, comprising 1258 major and independent oil marketers (Category A), 110 policy makers (Nigerian National Petroleum Corporation, NNPC/ Petroleum Products Price Regulatory Agency, PPPRA: Category B) and 100 senior staff of Pipeline and Products Marketing Company, PPMC (Category C). The sample size of 314 was determined using the formula of Yamane (1967, cited in Eboh, 2009:94). The Bowley's proportional allocation formula was applied to estimate the sample size for each category of respondents, resulting in sizes 269, 24 and 21 for categories A, B and C respectively. Primary and secondary sources were accessed for data. The questionnaire was designed in line with the five point Likert Scale format, viz, strong agree (5points), agree (4points), undecided (3points), disagree (2points) and strongly disagree(1point). Marketing experts were consulted for inputs in questionnaire validation. Pilot study was carried out. The reliability coefficient of the research instrument was estimated to be 0.971 using Cronbach's Alpha technique. The hypothesis of the study was formulated and tested at 0.05 level of significance and 9 degrees of freedom. Using one-way ANOVA and Minitab software package, the extent of the effects of surveillance operation on oil (petroleum products) pipeline vandalism in the downstream sector of Nigeria was determined.

4.0 DATA PRESENTATION AND ANALYSES

The data obtained from the study were presented as shown below.

Table 4.1. Distribution of Questionnaires.

Category of Respondents	Number distributed	Number not returned	Number returned	Number rejected	Number Accepted	Percentage Accepted
A: Oil Marketers	1258	98	1160	28	1132	86
B: Policy Makers	110	8	102	4	98	7
C:Senior Staff (PPMC)	100	9	91	3	88	7
TOTAL	1468	115	1353	35	1318	100

Source: Field Survey, 2014.

Table 4.1 showed that a total of 1468 copies of questionnaires was distributed, 1353 were returned ,representing 92.0 percent while 115 were not returned (8.0percent).Of the 1353 returned questionnaires,35 were rejected (2.5percent) due to discrepancies while 1318, representing (97.5percent) were utilized for the study.

Table 4.2 Age Distribution of Respondents

Age (years)	Oil Marketers	Policy Makers(NNPC & PPPRA)	Senior Staff (PPMC)	Total	Percentage
Under 20	-	-	-	-	-
21-30	125	8	3	136	9.26
31-40	282	12	24	318	21.66
41-50	595	52	40	687	46.80
Above 50	256	38	33	327	22.28
Total	1258	110	100	1468	100.00

Source: Field Survey, 2014.

From Table 4.2, about 69.08 percent of the respondents were within the age bracket of 41 years upwards, 21.66 percent between 31 and 40 years, 9.26percent within the range of 21 to 30 years and none below 20 years.

Table 4.3. Analysis of Responses for Effectiveness of Petroleum Products Pipeline Surveillance across the Country

Item	Number of respondents. Agree.	Scores of respondents. Agree. A	Number of respondents. Disagree.	Score of respondents. Disagree. D	Total Number of respondents
1	866	3464	452	1356	1318
2	429	1716	889	1772	1318
3	882	3528	436	1308	1318
4	493	1972	825	1650	1318
5	439	1756	879	1758	1318
Total	3109	12436	3481	7844	6590

Source: Field Survey, 2014.

Table 4.3 showed that the number of responses, 3481, representing 53.0 percent, indicated that the surveillance of the petroleum products pipeline across the country was ineffective while 3109 responses, reflecting 47.0 percent, held contrary opinion.

4.2 Test of hypothesis

H_0 : The surveillance of oil pipeline has no significant effects on pipeline vandalism in the downstream sector of Nigeria. H_1 : The surveillance of oil pipeline has significant effects on pipeline vandalism in the downstream sector of Nigeria.

Welcome to Minitab, press F1 for help.

One-way ANOVA: Scores A, Scores D.

Source	DF	SS	MS	F	P
Factor	1	2108646	2108646	4.65	0.063
Error	8	3629218	453652		
Total	9	5737864			

S = 673.5 R-Sq = 36.75% R-Sq (adj) = 28.84%

The hypothesis test showed that F-critical (5.318) was greater than F-computed (4.65) at 0.05 level of significance and 9 degrees of freedom. The null hypothesis, H_0 was not rejected. The p-value provided a confirmation of the decision. The p-value, 0.063 was greater than the significance level of 0.05 (i.e, $p>0.05$). The null hypothesis was therefore upheld. The co-efficient of determination, R^2 (adj) was 28.84 percent. This result showed that the extent of the effects of surveillance operation on oil (petroleum products) pipeline vandalism was 28.84 percent. Therefore, surveillance has no significant effects on oil pipeline vandalism in the downstream sector of Nigeria.

5.0 DISCUSSION OF RESULTS

The findings revealed that the extent of surveillance operation at 28.84 percent had non-significant positive effects on pipeline vandalism in the downstream sector of Nigeria. This implied that the effects of surveillance on oil pipeline vandalism was not statistically significant. Onwuka,(1999) buttressed this result when he stated that oil bearing communities constitute a chain restriction to pipeline surveillance as they frequently block the pipeline right of way to demand compensations from oil companies and Nigerian National Petroleum Corporation. One major problem of the Niger Delta area is that the oil pipelines passed through their land and creek leaving them with little or no means of survival. Over the years the oil producing communities were not giving the sense of belonging in the affairs of resource management. Unemployment and environmental degradation compounded the situation. The memorandum of understanding (M.O.U) between oil companies and host communities was poorly implemented (Yo-Essien, 2015). Agitation in the communities intensified, the youths took to streets and later became militants and hostage takers. Again, the sharing of the surveillance jobs among the former warlords and their cohorts under the Oil & Gas Pipeline & Waterways (Multi-billion Naira) Surveillance Contract generated serious tension as many ex-militants complained bitterly of being schemed out. It was alleged that the ex-militants entered the oil fields to continually sabotage the facilities which government committed to the watch of their peers. This situation has made it difficult for the government to win this war against oil thieves and pipeline vandalism. The extent of wanton vandalism has even affected electricity generation in Nigeria due to shortage of gas supply to power stations occasioned by the vandalism of pipelines (Global Reporters, 2015). Petroleum products smugglers and bunkerers also form a strong resistance to free route surveillance on the oil pipelines. Agba (1991), opined that some “bottle necks” (pipeline related problems) which cannot allow for free surveillance include logistic and inadequate security arrangement.

5.1 Implications of the findings

The Nigerian Government and Industry Operators would be properly guided in finding far reaching solutions to oil pipeline vandalism in the country beside the current practice.

5.2. Conclusion

It is disheartening that the former militants, well mobilized for the task of surveillance, cannot keep vandals off the nation's oil and gas pipelines (Global Reporters, 2015). This confirmed the ineffectiveness of surveillance on pipeline vandalism in the downstream sector of Nigeria. The Nigerian Government and Industry Operators should explore ways and means other than what is available currently in order to abate this 'monster'-pipeline vandalism (Yo-Essien, 2015). The implication is that the huge investment on pipeline surveillance operation has failed and the urgency of another strategy cannot be neglected. Developing a problem prevention mentality to unscramble the intuition of rushing into detection /inspection mode to solve problems is important for both the Nigerian Government and the Oil Industry operators (Dike, 2014). The decades of neglect of the oil bearing communities should be genuinely addressed. The host communities desire strong sense of belonging in the resources management. The highly-needed funds being spent on Surveillance contracts should be directed to taking care of the environment and welfare of the people. The provision of the basic needs of the communities is indispensable, especially standard schools, well equipped and affordable hospitals, good roads, electricity, and portable water, among others. The unemployed youths should be trained and equipped in the skill acquisition centres. With this treatment, the people wittingly would identify with the projects of the Oil Industry operators and become motivated to fight or report incidence of unauthorized movements in the pipeline's right of way or neighborhoods. These measures would be more beneficial to the entire nation than the current practice of detection/inspection through pipeline surveillance.

5.3 Recommendations.

Since the host communities allegedly constitute the key players in the acts of sabotage of the petroleum products pipeline system, the panacea for the prevention of the pipeline vandalism lies with them. All hands must be on deck to embrace preventive measures. It is rather illogical to spend billions of Naira to fight a war that is preventable in the first instance.

- The Nigerian Government and Oil Industry operators should institutionalize the culture of corporate social responsibility, sensitive to the needs and aspirations of the oil bearing communities.
- The memorandum of understanding (M.O.U) between the oil industry operators and their host communities should be well managed, implemented and geared toward relationship building.
- The host communities should be involved in the surveillance operation. The pipelines passed through villages, front/backyards, farmlands, sea (fishing ponds) owned by members of the communities. When the host communities are involved in the surveillance of the oil pipelines, vandalism would be minimized because no community is happy to be associated with evil acts.
- There should be full deregulation of the petroleum downstream sector of Nigeria. Opening up of the downstream sector for more private entrepreneurs would proffer solutions to pipeline vandalism, fuel diversion/smuggling and fuel scarcity.
- Special oil pipes with fire and acid resistance features should be used. Such pipes would be difficult for oil thieves to vandalize.
- Modern sensing technological devices should be installed by the Oil Industry operators to monitor continuously the integrity of the oil and gas pipelines against leak and threats of vandalism.

5.4. Suggestion for further studies

Further studies should be extended to assess the effectiveness of the recommended preventive measures on oil pipeline vandalism in future.

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