Corruption in Nigeria's Oil and Gas Industry: Measure and Extent

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This study aims to develop a measure and ascertain the extent of corruption in Nigeria's oil and gas industry. The opacity index approach to measuring corruption, as well as a conceptual framework that clarifies the concept of corruption and the context of a corruption analysis in Nigeria's oil and gas industry, is used in developing the measure of corruption. The extent of corruption is measured by looking at the upstream, downstream, and aggregate sectors. The main findings of the study show that there is a persistence and enlargement in the scope of corruption in the oil and gas industry in Nigeria. The study also found that the oil and gas industry is highly vulnerable to large-scale corruption. The study concludes that corruption, in general and in the oil and gas industry, in particular, will thrive where there is opacity and unaccountability. It recommends, among other things, keeping accurate data on the activities of the industry, arrest, and prosecution of those involved in oil stealing, and entrenchment of institutional quality.

Keywords: *Oil and Gas Industry, Corruption, Opacity, Unaccountability, Measures, Nigeria*

Introduction

Oil dominates the Nigerian economy and generates the bulk of government revenue. However, this has not translated into an improved standard of living for the citizens due to corruption and mismanagement (Asobie, 2009). The preceding argument is woven around the 'rentier state' concept, which contends that nation-states like Nigeria, which depend heavily on rent from their natural resources (rather than taxes), tend to be corrupt and poor (Hahdavy, 1970). Asobie (2009) attributes this to three main reasons. First, resource rent is much more easily appropriable than

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revenue from taxation because its source is concentrated (oil is a "point resource"), not dispersed. Secondly, it is easier for political leaders to ignore public demand for accountability in a rentier state because they do not depend on taxes from citizens for the national income. Therefore, they can acquire, retain, and use state power without bothering about legitimacy. Third, rent-seeking has a magnetic effect as it tends to suck all and sundry into its seductive loop, including entrepreneurs who could have invested in manufacturing and agriculture. Consequently, diversification of the economy is difficult to achieve in a rentier state.

The stylized facts of the oil and gas industry and the Nigerian economy in the last two decades suggest persistence and enlargement in the scope of corruption in the oil and gas industry (allAfrica.com, 2013). In addition, all the probe panels and recent reports indicate that the oil and gas industry is highly vulnerable to large-scale corruption.[i] So, rather than test the hypothesis, it is more important to quantify the extent of corruption in the Nigerian oil and gas industry. Given the size and the opportunities for corruption in the oil and gas industry because of its 'rentier' nature, minimizing corruption is an important national goal. More importantly, estimating the extent of corruption is critical because, without concrete data to back up the presence of corruption, it is just an accusation that runs the risk of being deemed politically motivated. With data, a hunch becomes a fact. With factual information on corruption, a country is better equipped to understand the extent of the problem and target its specific responses to corruption problems. Measuring and ascertaining the extent of corruption is critical to academic discourse, policy debate, and advocacy. This study covers the period from 1999 to 2014 and seeks to develop a measure and examine the extent of corruption in Nigeria's oil and gas industry. The focus is on the Oil and Gas industry of the economy because of the susceptibility of the sector to corruption. The paper is structured into five sections: introduction, literature review, research methodology, results and discussion, conclusion, and policy recommendation.

Concept and Measure of Corruption: A Review of the Literature

There is no single, comprehensive, universally accepted definition of corruption. An attempt to develop such a definition will invariably encounter legal, criminological, and political problems in many countries. The conceptualization of the term corruption has long been ideologically, morally, culturally, politically, and intellectually elusive to the point of losing sight of its detrimental and parasitic symbiosis with many nations, including Nigeria, and their citizens

worldwide. Although the systematic study of corruption is hampered by the almost non-existence of an adequate definition, virtually everyone who writes about it attempts, first, to define it, and almost all recognize that it is difficult to do so given the broad range of activities that could be included in the rubric of corruption. Jain (1998) reports that the definitions range from generic (narrow) to specific economic, political, social, and ethical definitions.

The narrow or generic definitions of corruption have ranged from defining it by a particular type of action peculiar to public office, such as using public or official positions in ways that contradict the public interests, abnormal behaviors that encourage private gains at public expense, unacceptable behaviors that openly violate the norms and expectations that is legitimate and acceptable to the society. In some instances, it is conceptualized as behaviors that are not only rotten and spoiled but unethically polluted and, as such, deviate from the formal and expected role the society expects from every member (Fatale et al., 2013). Also, Encyclopedia Americana[ii] defines corruption as a general term for misusing a public position of trust for private gain. This is the definition that many authors followed, though it does not capture corruption in the private sector. However, the word "misuse" also makes it appropriate for the private sector as well; hence, any misuse of a position anywhere amounts to corruption in this sense. The Encyclopedia Americana further admits that the definition of corruption in areas outside politics is not specific, not minding the fact that corruption in large, quasi-public enterprises and in private enterprises may be injurious to society and to the economy. Palmier's (1983) view of corruption aligns with the foregoing.

McMullan (1961) sees corruption as a situation whereby a public official accepts money or money's worth for doing something that he/she is under a duty to do or that he/she is under a duty not to do or exercise a legitimate discretion for improper reasons, also supported this narrow conceptualization of corruption. However, Friedrich (2017) sees corruption as the use of public office for private advantage. Abusing a privileged position in this way has not always been widely perceived as corruption in a given society, particularly if he/she is also making a positive contribution to the society. There is no necessary contradiction between private advantages and contributing to the general good, as many citizens will see such actions as at least acceptable and sometimes even just as a reward. Leff (1964) sees corruption as an extra-legal institution used by individuals or groups to gain influence over the actions of the bureaucracy. As such, the

existence of corruption only indicates that these groups participate in the decision-making process to a greater extent than would otherwise be the case. Heidenheimer (1970) identifies three basic categories of corruption, viz: 'black', 'white' and 'gray'. This categorization depends on the level of commonality of perception of a given act by public officials and citizens. 'White' acts are more or less accepted by both groups, whereas 'Grey' acts are those about which both officials and citizens disagree. 'Black' acts are perceived as wrong by both officials and citizens. This further shows that there is a wide range of definitions of corruption.

Considering the conflict that can arise between an abstract definition of corruption and its application to a complex real world, some writers have distinguished between what can crudely be called good, bad, and ambiguous corruption. For example, Katsenelinboigen (1983) identifies two basic types of corruption: (i) Actions whose harmful effects on society are questionable. According to him, this form of corruption involves redesigning the system and legalizing the appropriate actions of people in it. (ii) Actions that unambiguously harm society. Such acts should be treated as corrupt and criminal. Alatas (1991), while elaborating on corruption (so as to capture it in its entirety), divided it into seven distinct types: autogenic, defensive, extortive, investive, nepotistic, supportive, and transactive. Autogenic corruption is self-generating and typically involves only the perpetrator.[iii] Defensive corruption involves situations where a person needing a critical service is compelled to bribe to prevent unpleasant consequences on his interests. Extortive corruption is the behavior of a person demanding personal compensation in exchange for services. Investive corruption entails the offer of goods or services without a direct link to any particular favor at present but in anticipation of future situations when the favor may be required. Nepotistic corruption refers to the preferential treatment of or unjustified appointment of friends or relations to public office in violation of the accepted guidelines. The supportive type usually does not involve money or immediate gains but involves actions taken to protect or strengthen the existing corruption.[iv] Finally, transactive corruption refers to situations where the two parties are mutual and willing participants in the corrupt practice to the advantage of both parties.[v] The most prominent of all these in our circumstance is defensive corruption, not only because it appears to be at the core of the corruption phenomenon but also because the other forms appear to be offshoots of this fundamental type. There would be no corruption if the people were protected against the uncertainty in society.

Going through all the above definitions, it could be reasonably argued that none of it is without problems. It should be noted, however, that these problems vary in the contents and scope that each of them covers. However, the problems notwithstanding, a critical look at the various definitions of the concept of corruption in the literature reveals that corruption is doing the wrong things instead of the right things. It is also believed that wrong things cannot bring forth good things; hence, the effect of corruption is assumed to be negative in most discussions in the economic literature. The present state of many public goods, such as schools, roads, railways, airports, hospitals, and the like, attests to the effects of what corruption can do to any economy. This explains why the (World Bank, 2000) identified corruption as the single greatest obstacle to economic and social development, as it distorts the rule of law and weakens the institutional foundations upon which economic growth depends.

To guide against conflicting conceptualization of corruption so as to be able to forge ahead in proffering solutions to it, negotiators of the United Nations Convention against Corruption (UN, 2004) considered not defining corruption at all but listing specific types or acts of corruption that is of interest to the particular circumstances and situation. For the purpose of this article, however, corruption will be conceptualized in line with the Stanford Encyclopedia of Philosophy[vi] and used in Garba & Okeshola (2009), which submits that the scope of corrupt acts is wide and the concept of corruption is intricate and connected in nature; hence, it is not feasible to arrive at a watertight and comprehensive definition of corruption. Therefore, the following simplified and extremely common and general definition should suffice:

A particular act performed by certain agent is an act of institutional corruption if and only if:

1. The act has a specific effect of sabotaging or contributing to the sabotaging of some institutional process and/or purpose of some institution; by this, the act also produced the effect of contributing to the debasement of the moral character of some actors of the institution;

2. In view of the above definition, at least one of (a) or (b) below is true:

a) an o[vii]fficial of an institution in performing an act of corruption envisaged or anticipated a particular result or should have predicted it;

b) that the officer of an institution and the agent attempting to corrupt could have avoided the consequences of this act if they had chosen to do so.

The analysis of the concept of corruption above revealed two scenarios. Firstly, it holds two parties liable, the corrupter and the corrupted, and secondly, the actions of the two parties obstruct some institutional process that was hitherto unhindered. In explaining corrupt behavior, therefore, it is pertinent to recognize (i) the moral recklessness and irresponsibility of the corrupter and the corrupted, (ii) the unwholesome behaviors/actions/choices, and (iii) the resultant effects on institutions, processes, and performances. The significance of this conceptual analysis is two-fold. First, it assists ab initio in identifying that the offenses at the base of corrupt actions are multifaceted; hence, second, an equally divergent range of anticorruption measures are needed to tackle corruption in its multi-dimensional forms and very different scenarios. Therefore, it is imperative that the conceptualization of corruption is comprehensive enough to cover as much of its occurrences as possible, as defined in Article 15-22 of the United Nations Convention Against Corruption (UN, 2004). Examples of these occurrences include bribery, embezzlement, misappropriation, diversion of public property, illicit enrichment, abuse of functions/office (whether in the public or private sector), as well as the stages and methods of laundering the proceeds thereof (Garba & Okeshola, 2009). Corruption is a classic example of an observable phenomenon that is not easy to quantify because its very nature is concealed. In an attempt to measure corruption, four approaches have been identified in the literature.

The Corruption Perception-Based Approach

First, the Corruption Perception-Based Approach is a perception-based corruption index that draws upon opinion surveys and expert estimates of how corrupt various countries are. The Corruption Perception Index (CPI) is a league table of international corruption, with the least corrupt countries at the top and the most corrupt at the bottom. It has been published annually by the Non-Governmental Organization (NGO) Transparency International since 1995.

Although the CPI has received wide publicity and fulfills Transparency International's aim of raising public and political awareness of corruption, its assumptions, and methodological limitations indicate that the results of the CPI should be regarded with caution. While the database has expanded and the statistical methods have become more sophisticated, critics claim the CPI still has important weaknesses, part of which is that constructing a league table on the basis of perception assumes that the perceptions of survey respondents are both accurate and representative. Using different surveys for different countries raises the issue of whether like is

being compared to like. Another major shortcoming of this approach is that Transparency International assumes corruption is a one-dimensional phenomenon varying along a single continuum. However, this is not always the case as it has so many facets, including embezzlement, bribery, and extortion, and the CPI does not distinguish among these types of behavior. Also, there is wide variation in the way corruption is organized, how the income from corruption is spent, and so on. These variations are likely to produce different economic outcomes. The CPI does not clearly show the difference between grand and petty corruption, knowing its effects are more devastating than those of other corruption. The index shows how systemic corruption is perceived by the chosen informants (Transparency International, 2011).

Owing to all these, some critics of the CPI have pointed out that the CPI has failed to take into account the supply side of bribery, which often originates from the developed world (De Maria, 2008). In the Nigerian context, the person who steals is not as guilty as the accomplishers. The inability of the organization to look at the other side of the coin in their rating has not been taken lightly by the critics of recent, as most of the countries that were rated as less corrupt serve as an avenue where looted funds are being kept. The equation for calculating the corruption perception index is given as:

$$CPI^{j} = 1\sum_{i=1}^{Nj} S_{j}^{i} \quad \ldots\ldots 1$$

Where Nj is the number of different corruption ratings sources of a country j (Transparency International, 2011)

The Bribe Payer Index Approach

Partly in response to the CPI criticism, Transparency International created the Bribe Payers Index (BPI) in 1998. BPI, on its own, is a league table of bribery in international trade, which ranks countries in terms of their perceived willingness to offer bribes. The BPI rankings are limited to bribes between leading exporting countries and senior public officials in a specified group of key emerging economies. It measures the supply side of bribery by identifying the country of origin of bribe givers, whereas the Corruption Perception Index (CPI) focuses on bribe recipients. Transparency International produces both indices, and the BPI was first published in 1999. The BPI is a useful way of showing how leading export countries help create and aggravate the incidence of corruption in developing countries. As such, it helps share the

'blame' for corruption between the developed and developing worlds. Although presented in a similar 10-0 numerical scale, the BPI differs from the CPI on the following grounds: (a) it is highly selective and biased, and (b) it is based on only one data source. Because it is based on the perceptions of business people, accountants, bankers, and lawyers, it is vulnerable to objections based on accuracy, representativeness, and reliability. Identifying countries rather than companies may give the potentially misleading impression that countries promote bribe-giving, but Transparency International claims there are too many multinational companies to rank. Finally, the BPI is a useful complement to the CPI but has serious methodological limitations (Hardoon & Heinrich, 2011).

The bribe-payer index is calculated as

CRR (country x) = 0.5 (PR + FR + ER)…….… 2

Where: CRR = Corporate Risk Rating

PR = Political Risk Rating

FR = Financial Risk Rating

ER = Economic Risk Rating

Schlessinger and Meir's Approach

Another approach to measuring corruption was that of Schlesinger and Meier (2002). They made comparisons based on arrest and conviction data for corruption offenses. This would have been better or rather superior to that of perception, but it is not without its shortcomings. The approach relied heavily on information about the corruption in court cases. In a country with an honest judiciary, the most reliable information about corruption is found in court cases. Courts are spending huge resources on establishing which transactions have, in fact, taken place and to judge whether they have actually been corrupt. The problem with court cases is that they were so few, compared to the underlying number of corrupt acts, that they cannot be used either as indicators of social occurrences or of general frequency. For the same reason, court data are difficult to use for cross-country comparisons. Apart from this, the judiciary must be honest in all senses of the word, but this was assumed in the analysis of Schlesinger and Meier (2002), which in most cases is not true globally.

The Opacity Index Approach

Furthermore, Barth, Hall, Kurtzman, Wei, & Yago (2001), in a bid to simplify the measurement problem, provide a hybrid approach known as the "Opacity Index," which incorporates multi-component indices and perceptual ratings of nations with transparency problems. Opacity is the lack of clear, accurate, formal, easily discernible, and widely accepted practices in the broad arena where business, finance, and governments meet. As the globalization of economic life advances, all participants recognize that the relative opacity or transparency of a country's capital markets varies enormously. There emerged a view that greater opacity raises greater obstacles to the economic progress of countries and their citizens. Similarly, there is the belief that greater transparency across many dimensions of capital markets encourages investor confidence and keeps the costs of doing business under control. The Opacity Index, first introduced in January 2001, identifies the causes and measures the costs and effects of large-scale and small-scale risks associated with the lack of transparency in countries' legal, economic, regulatory, and governance structures that can confound global investment and commerce.

The opacity index uses the O-factor in the computation of corruption.

$$Oi = 1/5 * [Ci + Li + Ei + Ai + Ri] \quad \ldots\ldots 3$$

Where: O refers to the composite factors

C refers to the impact of corrupt practice

L refers to the effect of legal and judicial opacity (including shareholder rights)

E refers to economic/policy opacity

A refers to accounting/corporate governance opacity

R refers to the impact of regulatory opacity and uncertainty/arbitrariness

It is, however, important to point out that the opacity index is not without its adverse effects. Opacity can adversely impact the cost and availability of capital in several different ways. Domestic capital markets may suffer from relative underdevelopment if proper disclosure of information is not made to investors who are deciding where to place their funds. International investors may be reluctant to fund projects if they are uncertain that funds will be allocated to

their purported uses. In addition, the lack of clear, consistent, and reliable practices in the realms of legal disputes, regulation, and national economic policy may negatively impact the quantity of funds available for investment in countries. Similarly, awareness of unofficial (and often illegal) payments required by bureaucrats may dissuade investors from purchasing securities or investing in physical plants in the countries.

While these perceptual scales have helped in understanding the cause and effects of corruption and put pressure on governments and society to address the corruption problem, they are obviously imperfect owing to their subjective nature. Perception data are just estimates of how corrupt a society is thought to be and are thus open to influence and distortion from the full range of factors affecting any human judgments. The more obvious limitation of these approaches is that they treat whole societies as units of analysis, and thus, they are far removed from analyses that focus on specific countries or provinces.

There are no obvious answers to these problems, yet finding valuable ways to compare the level of corruption over time remains necessary for an empirical-focused study. Of all the approaches, the most suitable one for this study is the opacity index. The industry under consideration is shrouded in secrecy, as not much is known about its activities, which invariably erodes transparency and accountability.

In line with this, a corruption equation can be set out as follows, following Klitgaard (1988):

$$C = R + D - A \quad \text{……...……..…….4}$$

In the above equation, C stands for corruption, R for economic rent, D for discretionary powers, and A for accountability. Put differently, it can, therefore, be established that corruption is an increasing function of rent, and it is also an increasing function of discretion.

$$C = f\left(R\right), \frac{\partial R}{\partial C} > 0, \frac{\partial^2 R}{\partial C^2} > 1 \quad \text{……...…….…...5}$$

$$C = f\left(D\right), \frac{\partial D}{\partial C} > 0, \frac{\partial^2 D}{\partial C^2} > 1 \quad \text{…….……6}$$

The equations state that the more opportunities for economic rent (R) exist in a country, the larger the corruption will be. Similarly, the greater the discretionary powers (D) granted to administrators, the greater will be the corruption. However, the more administrators are held

accountable (A) for their actions, the less corruption there will be, and hence, a minus sign in front of A. (Mathematically speaking, we can say C varies directly with R and D and inversely with A).

Research Methodology

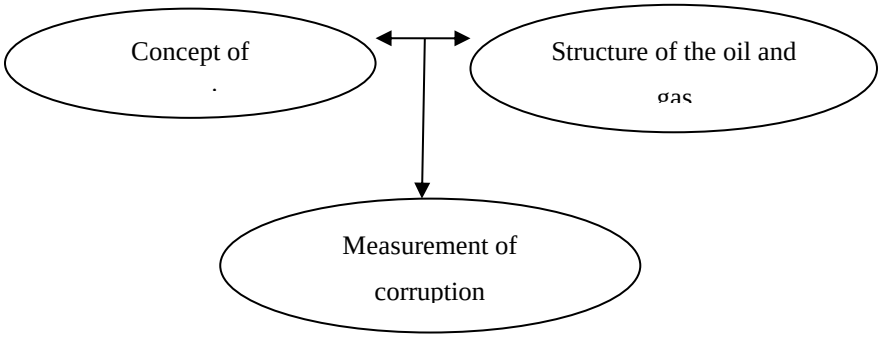
The research methodology begins with a conceptual framework that clarifies the concept of corruption and the context of a corruption analysis in the Nigerian oil and gas industry. Afterward, we present the empirical framework that explains how corruption is measured. Therefore, following the Stanford Encyclopedia of Philosophy, the following conceptual analysis of corruption is adopted that is a particular act performed by any agent is an act of institutional corruption if and only if;

i) the act has a specific effect of sabotaging or contributing to the sabotaging of some institutional processes and /or purpose of some institutions and
ii) the act contributes to the debasement of the moral character of some actors in the institution.

The study considers acts that sabotage or contribute to sabotaging economic processes and economic targets of the oil and gas industry to be corruption. Such acts include weakening institutions, compromising strategies and policies, and leading to inefficient management of oil and gas resources and delays in remittances of oil and gas revenue to the federation account.

The study's objectives require measuring corruption in the oil and gas industry. Figure 1 shows how the study conceptualized the problem. The concept of corruption and the structure of the oil and gas industry guide the measurement of corruption.

Figure 1: Conceptual Framework



The oil and gas industry is classified into upstream and downstream. The study thus identified potential points of corruption in the upstream and downstream and quantified those that could be quantified. Various reports have been produced about corruption in the oil and gas industry. Table 1 shows a summary.

Table 1: Summary of the Findings of the Various Committee/Probe Panels

S/N	Reporting Committee/Probe Panel	Nature of Findings/Remarks	The Extent of Loss
1.	The Audit Report on NNPC (1999-2000)	Overshooting of production target amounting to 375.45 million barrels	$9.4 billion or ₦1.05 trillion
2.	Senate Joint Committee on Downstream (2011), backed by PPRA figure	Shoddy subsidy regime	$9 billion ₦1.4 trillion back by PPRA ₦1.348 trillion
3.	Sanusi Lamido Sanusi Allegation	Non—remittance of Oil Revenue	$20 billion
4.	Bern declaration	Denial of tax earnings.	$6.8 billion
5.	AigImokhuede Presidential Committee Report	From the indicted 21 companies	₦382 billion
6.	Ribadu Taskforce	Collection/remittance problem	₦843 billion
		- sales of domestic crude oil in 2011 (revenue due to government)	₦137.572 billion
		- proceed from gas sales from the Bonga oil field	($946.878) million
		- poor business plan resulting in the loss-making of 16 subsidiaries (2009)	₦298 billion
		- signature bonus losses	₦566 million

Source: Bayo Ajagunna (2012), unraveling the fuel subsidy scandal, The SUN (April 19, 2012) the fuel subsidy probe.

The reports in Table 1 suggest key points of corruption in the upstream. These include overshooting of production (OP), non-remittance of oil revenue by NNPC (NR), non-payment of taxes and royalties by oil companies (URT), oil theft(CT), and the non-accounting of crude allocated for domestic consumption (NADC). These suggest that the corruption in the upstream (CORU) can be computed as;

CORU = OP + NR + NADC + CT + OT.…….....……..7

Over-production is measured as;

$OP = Q_N - Q^*_N$; $OP \geq 0$ ..……8

When OP >0, it implies that there is overproduction, and where it is equal to zero, there is no overproduction.

Non-remittance by NNPC is measured in equation 8 as the difference between expected revenue from the sales of crude allocated to NNPC (ER) and the actual remittance (AR); That is;

NR = ER – AR.……..……..9

Under-payment of royalties and taxes (URT) is given by expected royalties and taxes (ERT) less actual royalties and taxes paid (ART):

URT = ERT- ART ……...…….10

Crude oil theft (COT) is measured by expected daily losses (EDL) to the crude thieves announced by the government

COT = EDL……..…11

The non-accounting of crude allocated to domestic refineries could be measured as:

NADC = DCAL *CP……12

Where DCAL = domestic crude allocation losses

CP = crude price

Equation 6 could be re-written as:

CORU = OP + NR + NADC + CT……13

This assumes that the losses due to corruption are additive. It is possible that the various sources may not be independent. This would cause CORU to either under or overshoot the true extent of corruption. For the purpose of this study, the components are assumed to be independent.

Table 1 also highlights some of the key points of corruption downstream, among which are the losses from refining inefficiencies (RI), revenue losses from excess product import (EPM), and losses to subsidy (LS). It is clear from the reports that the loss from the subsidy deals is significant. The indictment of some marketers and prominent members of the society gives credence to the position of the report. From the reports, the measure of corruption in the downstream (CORD) could be estimated as;

CORD = RI + EPM + LS……..14

In calculating the losses from refining inefficiencies, the study compared the Nigerian design yield to the California design yield, which reflects an international standard, as presented in Table 2.

Table 2: The Global Standard for Refining Petroleum Products

Product	Percent of Total (Cafn) %	Percent of Total (NIG) Actual yield	Percent of Total (NIG) Design yield
PMS	51.4	30.81	32.28
Distillate Fuel Oil	15.3%	22.41	23.72
Jet Fuel /DPK	12.3%	15.98	14.28
Still Gas	5.4%		
Marketable Coke	5.0%		
Residual Fuel Oil	3.3%	16.84	17.5
Liquefied Refinery Gas	2.8%	0.98	2.27
Asphalt and Road Oil	1.7%		
Other Refined Products	1.5%	2.17	3.5

Lubricants	0.9%

Source: California Energy Commission, Fuels Office, PIIRA database.
*Calculate output as –yield X 158 X 445,000 (E.g. 0.514 X 158 X 445,000 = 36.1) {For Nigeria RI, (0.318 X 158 X 445000 = 22.4) and 36.1-22.4 =13.7}

From Table 2, it was observed that both the design and actual yield fall short of the global standard for the PMS and higher than the global standard for other products. The performance gap for each barrel of crude in terms of the PMS is 32.5322 liters [(0.514-30.81) x 158] for each barrel. This implies that for 445,000 barrels allocated for domestic consumption, about 14.48 million liters (32.5322x445000) are lost to poor design, production wastages, and inefficiencies. Had Nigeria the global standard design, it would produce 36.14 million liters of PMS daily. This would have considerably reduced, if not eliminated, the import demand for petroleum products, which is taking up to about 15% of annual forex allocation (Garba, 2015).

While Nigeria's OPEC allies (Saudi Arabia, Kuwait, Libya, Algeria, and Venezuela) continue to expand their National Oil Companies to develop their economies and meet their national product needs, Nigeria keeps on importing the products that she can domestically refine. The refining inefficiencies give rise to excess imports, which in turn fuel corrupt subsidy regimes, which several investigative reports have shown to be highly inflated and wasteful.

The aggregate corruption in the industry (CORT) is the sum of (CORU) and (CORD). Thus, the aggregate effects are the sum of upstream (CORU) and downstream (CORD) effects. Equations 3.1- 3.8 will guide the measurement of the sizes of corruption. Some areas where corruption becomes an issue are measurable, while some are not. This study used measurable ones and, therefore, relied more on secondary data.

Also, the data used to estimate corruption in the upstream and downstream was sourced from the Annual Statistical Bulletin of the Nigerian National Petroleum Corporation, the Organization of Petroleum Exporting Countries (OPEC) website, International Financial Statistics (IFS), publications of the International Monetary Fund (IMF), and the World Bank, as well as the reports of the various probe panels.

Results and Discussion

The areas where corruption became an issue in the oil and gas industry were the upstream and downstream subsectors. The documentary evidence presented in Table 1 identified the key points of corruption in the upstream and downstream sectors.

In the upstream (CORU), overshooting of crude oil production (OP) beyond the OPEC-approved quotas and crude oil theft were identified and quantified as measures of corruption in that subsector. Therefore, CORU = OP + CT.

Overproduction (OP) Over-production is measured as;

$OP = Q_N - Q^*_N$; $OP \geq 0$, where Q_N is the NNPC Crude Production, and Q^*_N is the OPEC-approved quotas. When OP >0, then it implies that there is overproduction, and where it is equal to zero, there is no overproduction. The detail of this calculation is presented in Table 3.

Table 3: Overproduction Value (Naira)

YEAR	OPEC QUOTAS (000B/D)	OPEC QUOTAS (000B/A)	NIGERIA CRUDE OIL PRODUCTION (000B/A)	OVERPRODUCTION (000B/A)	CRUDE OIL PRICE ($)	EXCHANGE RATE (N)	OVERPRODUCTION (BILLION$)	OVERPRODUCTION (BILLION N)
1999	1885	688025	774703	86678.00	22.3	94.9	1.93	183.4
2000	2157	787305	828198	40893.00	35.76	102.48	1.46	150.0
2001	1911	697515	859627	162112	29.23	111.6	4.74	529.0
2002	1778	648970	725860	76890.00	28.5	126.56	219	277.2
2003	2092	763580	844100	80520.00	33.86	129.79	272	353.0
2004	2142	781830	911045	129215.0	44.81	132.86	579	769.3
2005	2265	8265	918973	92248.00	57.57	130.84	531	694.8
2006	2306	841690	869197	27507.00	65.03	128.28	179	229.6
2007	2406	878190	803001	-75189.00	69.51	124.28	-522	-648.7
2008	2519	919435	768746	-150689	95.25	117.72	-1435	-1689.3
2009	2519	919435	780348	-139087	55.96	149.36	-778	-1162.0
2010	2519	919435	896043	-23392	73.44	152.67	-172	-262.6
2011	2519	919435	866245	-53190	107.5	153.9	-572	-880.3
2012	2519	919435	852777	-66658	109.5	157.5	-730	-1149.8
2013	2519	919435	800488	-118947	105.7	157.3	-1259	-1980.4

2014	2519	919435	798542	-120893	96.29	158.55	-1164	-1845.6

Source: Annual Statistical Bulletin OPEC 1999, 2014; 2015; and NNPC 1999, 2014.

Crude oil theft (COT) is measured by expected daily losses (EDL) to the crude thieves announced by government agencies. The calculation of crude oil theft is based on the estimate of the former naval chief that Nigeria loses 100,000 barrels of crude oil to oil thieves daily. From here, the annual values were computed and multiplied by the price of crude oil converted into naira equivalent. The result is presented in the table 4 below:

Table 4: Crude Theft

YEAR	Crude Theft(MILLION BARRELS)	CRUDE OIL PRICE($/BARREL)	LOSSES TO CRUDE THEFT(MILLION $)	EXCHANGE RATE(N)	LOSSES TO CRUDE THEFT(BILLION N)
1999	36.5	22.3	813.95	94.9	77.2
2000	36.5	35.76	1305.24	102.48	133.8
2001	36.5	29.23	1066.895	111.6	119.1
2002	36.5	28.5	1040.25	126.56	131.7
2003	36.5	33.86	1235.89	129.79	160.4
2004	36.5	44.81	1635.565	132.86	217.3
2005	36.5	57.57	2101.305	130.84	274.9
2006	36.5	65.03	2373.595	128.28	304.45
2007	36.5	69.51	2537.115	124.28	315.3
2008	36.5	95.25	3476.625	117.72	409.3
2009	36.5	55.96	2042.54	149.36	305.1
2010	36.5	73.44	2680.56	152.67	409.2
2011	36.5	107.5	3923.75	153.9	603.9

2012	36.5	109.5	3996.75	157.5	629.5
2013	36.5	105.87	3864.255	157.3	607.9
2014	36.5	96.29	3514.585	158.55	557.2

Source: Annual Statistical Bulletin OPEC 1999, 2014; NNPC 1999, 2014; CBN 1999, 2014 and Leadership Newspaper (March 4, 2015 naval chief comment).

Table 5: Measurement of Corruption in the Upstream (Billion Naira)

Year	Over Production (Billion N)	Crude Theft (Billion N)	CORU (Billion N)
1999	183.4	77.2	260.6
2000	150.0	133.8	283.8
2001	529.0	119.1	648.1
2002	277.2	131.7	408.9
2003	353.0	160.4	513.4
2004	769.3	217.3	986.6
2005	694.8	274.9	969.7
2006	229.6	304.45	534.05
2007	-648.7	315.3	-333.4
2008	-1689.3	409.3	-1280
2009	-1162.0	305.1	-856.9
2010	-262.6	409.2	146.6
2011	-880.3	603.9	-276.4
2012	-1149.8	629.5	-520.3
2013	-1980.4	607.9	-1372.5
2014	-1845.6	557.2	-1288.4

Source: Extract from Tables 3 and 4

In the downstream (CORD), the measure is the summation of refining inefficiency (RI) and excess product import (EPM). It is important to point out that refining inefficiency arises from two sources: design inefficiency and capacity underutilization. In calculating refining inefficiency and capacity underutilization, the following assumptions were made:

i. The standard yield is 51.4%
ii. The design yield is 32.28%, while the actual yield is 30.81%
iii. Daily crude allocation is 445,000 barrels
iv. 1 barrel is equal to 158 liters
v. 1 gallon is equal to 3.785 Liters
vi. Design in efficiency = Standard yield –Design yield
vii. Yearly allocation of crude 445,000 x 365 (barrels)
viii. Yearly loss = Design inefficiency x yearly allocation

Following the above assumption, the design inefficiency and capacity underutilization were computed and presented in the table 6, 7, and 8.

Table 6: Design Inefficiency (From the Actual Yield)

Year	Annual Capacity(Million/barrels)	Standard yield(million/barrels)	Actual yield	Design Inefficiency (million/br)	Design Inefficiency (billion'ltrs)	NNPC Price /liters(n)	Value of design ineff (billion'n)
1999	162.4	84.1	50	34.1	5.4	20	107.7
2000	162.4	84.1	50	34.1	5.4	22	118.5
2001	162.4	84.1	50	34.1	5.4	22	118.5
2002	162.4	84.1	50	34.1	5.4	26	140.1
2003	162.4	84.1	50	34.1	5.4	40	215.5
2004	162.4	84.1	50	34.1	5.4	40	215.5
2005	162.4	84.1	50	34.1	5.4	40	215.5
2006	162.4	84.1	50	34.1	5.4	40	215.5
2007	162.4	84.1	50	34.1	5.4	40	215.5
2008	162.4	84.1	50	34.1	5.4	40	215.5
2009	162.4	84.1	50	34.1	5.4	65	350.1

2010	162.4	84.1	50	34.1	5.4	65	350.1
2011	162.4	84.1	50	34.1	5.4	65	350.1
2012	162.4	84.1	50	34.1	5.4	97	522.5
2013	162.4	84.1	50	34.1	5.4	97	522.5
2014	162.4	84.1	50	34.1	5.4	87	468.6

Source: Annual Statistical Bulletin OPEC (1999, 2014) and (NNPC 1999, 2014).

Note. Annual Capacity (AC) is obtained by multiplying the daily crude allocation by the number of days a year. The standard yield is calculated by multiplying the annual capacity with the global standard for PMS (0.514). The design yield (from the actual yield) is obtained by multiplying the annual capacity with the actual capacity of the refineries (0.3081). The design inefficiency is therefore obtained by subtracting the design yield from the standard yield. To get the design inefficiency in liters, the design inefficiency in barrels is multiplied by 158, which is the number of liters in a barrel. Finally, the value of design in efficiency in Naira is obtained by multiplying the design inefficiency by the depot price of the product.

Table 7: Design Inefficiency (From the Design Yield)

YEAR	ANNUAL CAPACITY (MILLION BARRELS)	STANDARD YIELD (MILLION BARRELS)	DESIGN YIELD (MILLION BARRELS)	DESIGN INEFICIENCYF (MILLION BARRELS)	DESIGN INEFFICIENCY (MILLION LTRS)	PRICE/ LTR	VALUE OF DESIGN INEFFICIENCY (BILLION N)
1999	162.4	84.1	52.5	31.6	50.0	20	100.1
2000	162.4	84.1	52.5	31.6	50.0	22	110.1
2001	162.4	84.1	52.5	31.6	50.0	22	110.1
2002	162.4	84.1	52.5	31.6	50.0	26	130.1
2003	162.4	84.1	52.5	31.6	50.0	40	200.2
2004	162.4	84.1	52.5	31.6	50.0	40	200.2
2005	162.4	84.1	52.5	31.6	50.0	40	200.2
2006	162.4	84.1	52.5	31.6	50.0	40	200.2
2007	162.4	84.1	52.5	31.6	50.0	40	200.2
2008	162.4	84.1	52.5	31.6	50.0	40	200.2

2009	162.4	84.1	52.5	31.6	50.0	65	325.3
2010	162.4	84.1	52.5	31.6	50.0	65	325.3
2011	162.4	84.1	52.5	31.6	50.0	65	325.3
2012	162.4	84.1	52.5	31.6	50.0	97	485.4
2013	162.4	84.1	52.5	31.6	50.0	97	485.4
2014	162.4	84.1	52.5	31.6	50.0	87	435.4

Source: Annual Statistical Bulletin OPEC 1999, 2014; NNPC 1999, 2014

Table 8: Capacity Underutilization

YEAR	ANNUAL CAPACITY (MILLION BARRELS)	PROCESSED CRUDE (MILLION BARRELS)	CAPACITY UNDERUTILIZED (MILLION BARRELS)	CAPACITY UNDERUTILIZED (%)	PMS LOSSES (MILLION BARRELS)	PMS LOSSES (BILLION LTRS)	PRICE /LTR	PMS LOSSVALUE (BILLION N)
1999	162.4	66.4	96.0	59	29.6	4.7	20	94
2000	162.4	36.2	126.1	78	38.9	6.1	22	134.2
2001	162.4	81.5	80.91	50	25.0	3.9	22	85.8
2002	162.4	79.5	82.98	51	25.5	4.0	26	104
2003	162.4	44.8	117.6	72	36.2	5.7	40	228
2004	162.4	38.0	124.3	77	38.3	6.1	40	244
2005	162.4	70.6	91.78	56	28.3	4.5	40	180
2006	162.4	43.5	119.9	73	36.7	5.8	40	232
2007	162.4	19.1	143.4	88	44.2	7.0	40	280
2008	162.4	39.3	123.1	76	38.0	6.0	40	240
2009	162.4	17.8	144.7	89	44.6	7.0	65	455
2010	162.4	34.9	127.6	78	39.3	6.2	65	403
2011	162.4	39.4	123.0	75	37.9	6.0	65	390
2012	162.4	33.6	128.8	79	39.7	6.3	97	611.1
2013	162.4	35.2	127.2	78	39.2	6.2	97	601.4
2014	162.4	23.34	139.1	86	42.9	6.8	87	591.6

Source: Annual Statistical Bulletin OPEC 1999, 2014; NNPC 1999, 2014.

NOTE. Annual capacity (AC) is obtained by multiplying the daily crude allocation by the number of days in a year. The crude processed by the refineries in the year is subtracted from the annual capacity to arrive at the capacity underutilization in barrels. The percentages of capacity underutilization are computed by dividing the capacity underutilization by the annual capacity and multiplying the result by 100. To get the value for the PMS losses in barrels, the capacity underutilized (barrels) is multiplied by 0.3081, and to get the losses of PMS in liters, the value in barrels is multiplied by 158 in line with the earlier assumptions. The PMS losses in Naira value are obtained by multiplying the PMS losses in liters with the depot price of PMS per liter.

Table 9: Refining Inefficiency (Design Inefficiency + Capacity Underutilization)

YEAR	DESIGN INEFFICIENCY (BILLIONS N)	CAPACITY UNDERUTILIZATION (BILLION N)	REFINING INEFFICIENCY (BILLION N)
1999	107.7	94	201.7
2000	118.5	134.2	252.7
2001	118.5	85.8	204.3
2002	140.1	104	244.1
2003	215.5	228	443.5
2004	215.5	244	459.5
2005	215.5	180	395.5
2006	215.5	232	447.5
2007	215.5	280	495.5
2008	215.5	240	455.5
2009	350.1	455	805.1
2010	350.1	403	753.1
2011	350.1	390	740.1
2012	522.5	611.1	1133.6

2013	522.5	601.4	1123.9
2014	468.6	591.6	1060.2

Source: Extract from Tables 7 and 8

Table 10: Measures of Excess Import

YEAR	PMS LOSSES(B'LTRS)	RETAIL PRICE OF PMS(GALON/$)	RETAIL PRICE OF PMS (LTS/$)	LOSSES TO EXCESS IMPORT(B'$)	ERN	LOSSES TO EXCESS IMPORT(B'N)
1999	4.7	1.14	0.30	1.4	94.9	132.86
2000	6.1	1.48	0.40	2.4	102.48	245.952
2001	3.9	1.42	0.38	1.4	111.6	156.24
2002	4.0	1.35	0.36	1.4	126.56	177.184
2003	5.7	1.56	0.41	2.4	129.79	311.496
2004	6.1	1.85	0.49	3.0	132.86	398.58
2005	4.5	2.27	0.60	2.7	130.84	353.268
2006	5.8	2.57	0.68	3.9	128.28	500.292
2007	7.0	2.8	0.74	5.2	124.28	646.256
2008	6.0	3.25	0.86	5.2	117.72	612.144
2009	7.0	2.35	0.62	4.4	149.36	657.184
2010	6.2	2.78	0.73	4.6	152.67	702.282
2011	6.0	3.52	0.93	5.6	153.9	861.84
2012	6.3	3.62	0.96	6.0	157.5	945
2013	6.2	3.51	0.93	5.8	157.3	912.34
2014	6.8	3.36	0.89	6.1	158.55	967.155

Source: Annual Statistical Bulletin OPEC (1999, 2014) and (NNPC 1999, 2014).

Table 11: Measures of Corruption in the Downstream

YEAR	Refinery Inefficiency (Billion N)	Excess Import (Billion N)	CORD
1999	201.7	132.86	334.56
2000	252.7	245.952	498.652
2001	204.3	156.24	360.54
2002	244.1	177.184	421.284
2003	443.5	311.496	754.996
2004	459.5	398.58	858.08
2005	395.5	353.268	748.768
2006	447.5	500.292	947.792
2007	495.5	646.256	1141.756
2008	455.5	612.144	1067.644
2009	805.1	657.184	1462.284
2010	753.1	702.282	1455.382
2011	740.1	861.84	1601.94
2012	1133.6	945	2078.6
2013	1123.9	912.34	2036.24
2014	1060.2	967.155	2027.355

Source: Extract from Tables 9 and 10

Table 12: Measures of Aggregate Corruption

YEAR	CORU(Billion N)	CORD (Billion N)	CORT (Billion N)
1999	260.6	334.56	595.16
2000	283.8	498.652	782.452
2001	648.1	360.54	1008.64
2002	408.9	421.284	830.184

2003	513.4	754.996	1268.396
2004	986.6	858.08	1844.68
2005	969.7	748.768	1718.468
2006	534.05	947.792	1481.842
2007	-333.4	1141.756	808.356
2008	-1280	1067.644	-212.356
2009	-856.9	1462.284	605.384
2010	146.6	1455.382	1601.982
2011	-276.4	1601.94	1325.54
2012	-520.3	2078.6	1558.3
2013	-1372.5	2036.24	663.74
2014	-1288.4	2027.355	738.955

Source: Extract from Tables 10 and 11

Conclusion and Recommendation

This study found that there is a persistence and enlargement in the scope of corruption in Nigeria's oil and gas industry. The study also found that the oil and gas industry is highly vulnerable to large-scale corruption. From the evidence gathered in the research, it was observed that a fertile ground for the growth of a corrupt system would emerge and continue to be sustained in a country if it satisfied the following three conditions:

i) If there is an existence of a large number of laws, rules, regulations, and administrative orders that restrict business and economic activities, thereby creating a huge opportunity for generating economic rent.
ii) When the administrators are granted large discretionary power with respect to interpreting rules and are given a lot of functions to decide on how rules are to be applied and;
iii) When there are no effective mechanisms and institutional arrangements in the country to hold administrators accountable for their actions.

These conditions are prevalent in the Nigerian economy, and they need to be urgently addressed as they breed and sustain corruption. Therefore, corruption in general and in the oil and gas industry in particular will thrive where there is opacity and unaccountability. To come out of this situation, therefore, requires openness in transactions and accountability at all levels.

Putting an end to the corruption in the Nigerian oil and gas industry can only be achieved through concerted, coordinated, and sustained action by the government. This has to be with discernible proof by its actions that it sincerely wishes to address it. To clearly demonstrate this, it is recommended that the government should take the following actions:

- **Provision of perfect information on the activities in the industry.** The Nigerian oil industry is shrouded in secrecy, and the Nigerians have the right to know exactly what is going on in the industry under citizens' right to information. The corporation's website should contain the following information: the state of the refineries in terms of their capacity installation and utilization. This will enable the industry players to know firsthand what is going on in the industry.

- **Arrest and prosecute those involved in oil stealing**. Since those who are involved in this act of corruption are not ghosts, and they live among us, the government should consider the state governors' appeal to prosecute and punish the numerous oil thieves that have been caught, no matter how highly placed. Once this is done, to forestall future occurrences, as part of its action, the government should extend its fight against oil thieves by criminalizing the buying of stolen crude by the international community. Furthermore, local traditional leaders should be engaged in providing security for petroleum facilities within their domain instead of outside contractors who are not familiar with the local terrain.

- **Entrenchment of Institutional quality.** One of the sure ways of achieving the above recommendations is to ensure that the leadership of various institutions, such as the Police, Armed Forces, and other security agencies, is above board in terms of integrity. By strengthening these institutions, the level of corruption in the oil and gas industry will be drastically reduced.

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[i] See Table 1 for a Summary of the Findings of the Various Committee/Probe Panels

[ii]Britannica, T. Editors of Encyclopedia (2018, December 19). Corruption. Encyclopedia Britannica. https://www.britannica.com/topic/corruption-law

[iii] A good example would be what happens in cases of insider trading. A person learns of some vital information that may influence the price of goods in the market and either quickly buys or gets rid of large amounts of goods before the consequences arising from this information come to pass.

[iv] For example, a corrupt regime or official may try to prevent the election or appointment of an honest person or government for fear that the individual or the regime might be probed by the successor(s).

[v] For example, a corrupt businessperson may willingly bribe a corrupt government official in order to win a tender for a certain contract.

[vi] Miller, Seumas, "Corruption", The Stanford Encyclopedia of Philosophy (fall 2008 Edition), Edward N. Zalta (ed.), URL = <https://plato.stanford.edu/archives/fall2008/entries/corruption/>.

[vii] 2022, for example, the oil and gas sector contributed 36.87% to total government revenue and 78.74% to total government export revenue (NEiTi, 2024).