

A Systematic Review of Effective Management of the Petroleum Downstream Sector for Sustainable Economic Development in Nigeria

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Abstract:- The ineffective and inefficient performance of the Nigerian petroleum downstream sector negatively affects all sectors of the economy, thereby under-developing economic growth. The purpose of this document analysis research was to identify the benefits of effective management of the Nigerian downstream petroleum industry to enhance economic development. The sources of materials for this study include documents and literature from peer reviewed articles, journal, books, and case studies which are relevant to the management of Nigerian downstream petroleum sector. The findings indicate that, for effective management of the Nigerian petroleum downstream, the Nigerian government and the private sector should ensure availability of refined petroleum products all year round, involve in well-established gas and petrochemical business and industries, encourage human capital development for operational competence, and ensure appropriate allocation of resources to all aspect of the petroleum supply chain for efficiency. The findings may be used by investors and government agencies to create diversified economic areas for employment, increase revenue, poverty eradication, achieve sustainability, and enhance economic development.

Keywords:- Nigeria, Petroleum, Downstream, Management, Economy, Development, Efficiency.

I. INTRODUCTION

All other activities of the petroleum industry, which flow after the exploratory, discovery of oil and gas, treatment, transportation, and delivery to designated port or other process plant, are comprised within the downstream sector. The activities include crude refining, petrochemical production, gas treatment and conversion, storage, marketing, transportation of petroleum products as well as other ancillary services related thereto (NMDPRA, 2022). The motive for downstream sector development, especially petrochemical was to utilize indigenous oil and gas resources, that otherwise would have no alternative outlets to achieve economic development (Eseduwo, 2015).

The petroleum downstream sector development diversifies the economic base and maximizes the utility value of petroleum for both present and future purpose (Ugwakah & Ohaja, 2016). However, Nigeria, which is one the largest producer of oil and gas, has not been able to effectively manage and diversify its economy by developing

the downstream sector. Nigeria has a significant oil and gas resources that are currently underutilized and their economic values largely unrealized (Kenedy, Dietrich, & Toledano, 2021; Itsekor 2018). The extensive flaring of associated gas is environmentally unsound, being a major contributor to greenhouse gas emission as well as having local air quality effect (Eseduwo, 2015). Based on the foregoing, the question for what investors and government policy makers need to know about the petroleum downstream sector to enhance economic development is important.

II. CONCEPTUAL FRAMEWORK

The study is based on the resource based view theory (RBV). Barney (1991) established RBV to define the relationship between an organization's resources and sustained competitive advantage. Barney postulated that to achieve sustainable competitive advantage, leaders of an organization must acquire resources (a) for creating effective and efficient strategies, (b) uncommon in the industry, (c) that are imperfectly imitable, and (d) nonsubstitutable in the industry. Government and business leaders can utilize RBV to optimize resources to create value, leading to organizational effectiveness and efficiency (Barney, 1991; Crook & Esper, 2014; Zimmermann & Foerstl, 2014).

Nigeria is endowed with natural petroleum resources of crude oil and gas. Nigeria's sustainable economic development revolves around resource management from the oil and gas industry. Business leaders applying RBV may enhance effective economic growth in the Nigerian downstream petroleum industry (Chigbu, Ubah, & Chigbu, 2016; Osuala, 2013). Government and business leaders may solve the problem of economic sustainability through the application of optimal resources and capabilities management to all business segments of the Nigerian downstream petroleum industry.

III. REVIEW OF LITERATURE

The Nigerian oil and gas (petroleum) industry comprises of the upstream, the midstream and the downstream sector. In 2021, the regulatory authorities for the midstream and downstream were merged and known as the Nigerian Midstream and Downstream Petroleum Regulatory Authority (NMDPRA). The merger is in line with the signing into law of the petroleum industry Act 2021 and the privatization of the Nigeria National Petroleum Corporation

(NMDPRA, 2022). The upstream sector is involved with exploitation, exploration and discovery of crude oil and gas while the downstream involves refining, transportation, storage and marketing of refined petroleum products and gas, including petrochemicals (NNPC, 2021).

Nigeria petroleum sector contributes 15.8% of GDP, 83% of government revenue and 95% of export revenue. Sources of funds includes NNPC equity share, petroleum profit tax, royalties and other payments (Ugwakah & Ohaja, 2016). However low level of efficiency exists in the downstream sector; the refineries are non-functional, poor maintenance of refineries, poor management, pipeline vandalization, hostile political environment, bad roads, poor regulatory environment and also lack of competition (Nkogbu&Okorodudu, 2015; Kennedy,Dietrich, &Toledano, 2021). Nigeria, one of the largest oil producing countries in the world, relies almost entirely on the importation of refined petroleum products for its domestic need (Chigbu et al., 2016; Itsekor, 2018).

The underdeveloped gas industry in Nigerian petroleum downstream is a major factor hampering sustainable development in the nation. Nigeria is endowed with enormous gas reserves of about 206.5 trillion cubic feet, worth about \$803.4 trillion, ranking 1st in Africa, and 9th in the world (Nnodim, 2022). Nigeria is blessed with both associated and non-associated gas. However, Nigeria flares more associated gas than most nation in this world. The yearly rate of gas flaring in Nigeria is estimated to be 2.5 bcf which has a market value of over 4 trillion dollars. Nigeria flares valuable gas as a waste product for over 50 years. Nigeria has lost about 4 trillion dollars times 50 years in revenue to gas flaring (Eseduwo, 2015).

The top seven gas flaring countries of Russia, Iraq, Iran, the United States, Algeria, Venezuela and Nigeria are said to account for about 40% of global oil production and about 65% total gas flared into the atmosphere from their oil and gas activities (The World Bank, 2021). Within the last five years, the top seven countries have flared close 500 billion cubic meters of gas into the atmosphere. See Table 1 for volume of gas flared by the big seven between 2016 and 2020.

Table 1: Volume of gas flared by the top seven gas flaring countries for 2016-2020 (billion cubic meters)

Country	2016	2017	2018	2019	2020	Total
Russia	22.37	19.92	21.28	23.21	24.88	111.66
Iraq	17.73	17.84	17.82	17.91	17.37	88.67
Iran	16.41	17.67	17.28	13.78	13.26	78.4
United States	8.86	9.48	14.07	17.29	11.81	61.51
Algeria	9.10	8.80	9.01	9.34	9.32	45.57
Venezuela	9.35	7.00	8.22	9.54	8.59	42.7
Nigeria	7.31	7.65	7.44	7.83	7.20	37.43
Grand Total						465.94

Source: Extracted from The World Bank, 2021.

Gas flaring has several complex consequences in the areas of human health, animal health, natural environment, socio economic growth, and sustainable development (Ite&Ibok,2013). Gas flaring has adverse impact on climatic change resulting to global warming, emission of carbon dioxide and other greenhouse gases. Acid rain is a product of gas flaring. Acid rain contains compounds emitted from gas flaring in combination with atmosphere content. Other effect of gas flaring include effect on wild life, atmospheric contamination, damage to fishing water and lands for agriculture(Ite&Ibok,2013).

IV. SUSTAINABLE DEVELOPMENT IN NIGERIA PETROLEUM INDUSTRY

The concept of sustainable development(SD) involves the conscious development process which meets the needs of the present-day generation without jeopardizing the economic and ecological structure of the future (Eseduwo, 2015). Sustainable development in Nigeria simply refers to the development that meets the needs of presentday Nigeria society without jeopardizing the ability of the future generation to meet their own needs (Mensah& Casadevall,2019). SD is viewed from the social, economic, environmental and human perspective. Nigeria's economic backbone is rooted in the petroleum industry. SD in Nigerian downstream petroleum industry are the processes of refining, treatment, storage, transportation, marketing, usage and waste disposal of petroleum products without depleting the resources, destroying the environment for future generations and also preserving both economic and social needs of the future while meeting the needs of the present(Mensah& Casadevall, 2019).

Oil and gas is a depletable resource. Venting associated gas and gas flaring are known to be high sources of greenhouse gas. Petroleum consumption, both at residential and industrial premises results in environmental hazards. Moreover, the effective management of the petroleum downstream sector for economic sustainable development is a panacea to attaining millennium development goals and also to attaining energy security for Nigeria. Cox (2018) noted that oil and gas production underpins the global economy, promotes energy security, eradicate poverty and enhances clean environments. In the Nigerian downstream, Petroleum is utilized for transportation, petrochemicals, manufacture, chemical feedstock, electricity generation, and day to day activities, which affects almost all facets of living (Chigbu et al., 2016; Ugwakah & Ohaja, 2016).

V. RESEARCH METHOD AND DESIGN

The qualitative research method was utilized for this study. Researchers use qualitative method to comprehend and resolve in-debt problems related to a phenomenon (Yin, 2014). Abundance of qualitative research papers exist in the Nigerian downstream petroleum industry.

The study design is document analysis. Document analysis involve analyzing documents to elicit meaning, gain knowledge, and develop empirical mastery of the subject (Corbin & Strauss, 2008; Rapley, 2007). Document analysis was adopted because of the availability of

literatures; peer reviewed articles, journals, books, and the internet, on the subject regarding effective management of Nigerian petroleum downstream for economic sustainable development. Also, case studies on downstream development of selected petroleum nations were reviewed. Data were categorized and results generated.

VI. RESULTS

After extensive research, the effective management of the petroleum downstream sector for sustainable economic development in Nigeria can be summarized under the following subheadings

- Availability of refined petroleum products
- Increase in foreign direct investment
- Gas business and industrialization
- Petrochemical products
- Promotion of human capital development for operational efficiency
- Efficient resource allocation to all segment of the petroleum supply value chain for efficiency

VII. AVAILABILITY OF REFINED PETROLEUM PRODUCTS

A continual reoccurrence is the shortages (scarcity) of refined petroleum products in the Nigerian downstream petroleum industry. Petroleum product is the backbone of the Nigerian economy. Every sector of the economy relies on petroleum products for transportation, electricity or heat source. The shortages of refined petroleum product cripples and undermines the economic growth and hence prevents sustainable development of the Nigerian state (Chigbu et al., 2016; Kennedy et al., 2021). Itsekor (2018) dissected strategies for mitigating petroleum product shortages in the Nigerian downstream. An effective management will lead to product availability, which may enhance economic growth, eradicate poverty, generate employment, and hence lead to sustainable development of the economy (Nkogbu&Okorodudu, 2015).

VIII. INCREASE IN FOREIGN DIRECT INVESTMENT

Foreign Direct Investment (FDI) means an investment by a foreign cooperation. FDI involves investing in assets abroad and establishing controls in the operation of the firm. Different types of foreign direct investments exist; (1) company carry out the same activities as at home, (2) different stages of activities are added to the product abroad, (3) where an unrelated business is added abroad to form a conglomerate. FDI is an indicator for growth of any economy.

FDI is believed to be good for an economy as it provides jobs and increase domestic capital thereby eradicating poverty. (Diez&Spearot, 2011; Hatzius, 2011).

Nigeria received \$3.46 billion inflows from FDI in 2019. According to the United Nation Conference on Trade and Development (UNCTAD), Nigeria rebounded by 71% from \$2b in 2018 to \$3.4b in 2019, making Nigeria the top FDI recipient in west Africa. The FDI inflows into Nigeria

are concentrated on the oil and gas development sector based on the viability of the sector (Bailey, 2020).

Nkogbu and Okorodudu (2015) reiterated that the petroleum is the most vibrant, strategic, sector of Nigeria and that all economic activity revolves around the petroleum sector. The effective management of the downstream sector will open up the sector for foreign investment and creation of jobs leading to economic growth and development of the country. Nkogbu and Okorodudu calls for Strategic management of the sector by officials in all cadre of leadership. Management should exhibit transparency, accountability, and integrity in all departments and sector of the industry. In most cases, Leaders in this sector are not accountable and transparent in the management of the oil and gas industry, leading to non-economic development and transformation of lives in Nigeria (Nkogbu&Okorodudu, 2015)

Ari (2020) posited that oil and gas FDI is positively influenced by market seeking, natural resource seeking, and labour (efficiency) seeking firms. Nigeria is endowed in all areas. FDI promotes host countries export preparedness. However, Mukhtar (2017) noted that FDI has no significant impact on economic growth because most foreign firms repatriate the funds.

IX. GAS BUSINESS AND INDUSTRIALIZATION

Nigeria has recorded a huge loss of revenue to gas flaring in the downstream sector. Nigeria loses about \$2.5 billion dollars to gas flaring on daily basis. Nigeria loses billions of dollars to gas that is either burnt or vented on daily basis. Much of the flared gas can be converted for domestic use or electricity generation to meet prevailing shortage in the country (Uwem & Enobong, 2017). The flaring of gas takes place in the production, processing, which has adverse effect on the environment, energy, and the economy. The resultant effect is inability to meet up with the nation S.D. goals. Maintaining the natural environment is a precursor for S.D and poverty reduction. Therefore, there is need to develop a utilization approach for associated gas in the Nigeria downstream sector (Uwem & Enobong, 2017).

Leaders in position should develop a master plan for conversion of gas to-be flared into useful products or re-injection. Natural gas can be curbed into industrial utilization in the production of feed stock for cement plant, fertilizer plants, glass manufacturing industries, electricity generation, and food industries. Gas components can be converted into fertilizers to boost agriculture for both local and international markets (Aigbedion&Iyayi, 2007). Uwem & Enobong (2017) emphasized the investment opportunities for natural gas, in areas of compressed natural gas (CNG) and liquefied natural gas (LNG) plants for locomotives, cleaner and cheaper energy.

Gas flaring has hampered the income of inhabitant of communities they operate. Several gas re-injection programs have been adopted by several government regimes with minimal success. Gas programs that will assist the economy include gas re-injection programs, biological remediation,

good health facilities, good schools, forest conservation, provision of drinking water, industrialization, and job creation, rural electrification, and functional market. A sustainable development path will be achieved if these afore-mention factors are put in place (Eseduwo, 2015).

Furthermore, government can utilize both domestic and export market to generate revenue to impact sustainable development. Nigeria has huge market in developed nations for demand of natural gas. The activities of the Nigeria LNG limited is a good example of how Nigeria can effectively utilize natural gas, generate revenue and eradicate poverty towards achieving sustainable development. Eseduwo (2015) affirmed that sustainable development can only be achieved if the ruling class has the political will to preserve and develop associated gas reserves towards boosting the economy and reducing environmental degradation. Government should enact law and legislation to control gas flaring, which exist in other developed nations of the world. Ending gas flaring will enhance sustainable development in Nigeria (Uwem & Enobong, 2017).

The percentage of gas flared in Nigeria has been reducing since 2002 because of some gas utilization efforts by NNPC in joint venture with some multinationals. The quantity stood at 10% in 2018 in terms of volume of gas flared. However, Nigeria still ranks in the top ten gas flaring countries in the world with over 7 billion cubic feet as shown in Table 1.

X. PETROCHEMICAL INDUSTRY FOR DIVERSIFICATION OF ECONOMY

The petrochemical industry is almost non-existence or dead in the Nigerian petroleum downstream sector. The raw material for petrochemical products are basically oil and gas which are readily available in Nigeria for products roll out. Petrochemical is one of the non-oil exports that generates revenue, which is important in economic and sustainable development (Azerbaijani, Salahi, &Refaie, 2014).

The activities of downstream petrochemical companies in Iran provides economic, social and national interest; affording new technologies, generating revenues and increasing employment. Petrochemical industries create a close connection between the local economy and the petroleum sector. The petrochemical sector can diversify Nigeria economy from crude seller to an exporter of end products, thereby generating employment, and income to the economy, that may enhance Sustainable development (Ahmedeadeh, Naami, &Hashemi, 2021).

XI. PROMOTION OF HUMAN CAPITAL DEVELOPMENT FOR OPERATIONAL EFFICIENCY

The promotion of human capital development will enhance the development of the downstream sector for operational efficiency. Human resources (HR) are a fundamental and crucial asset of any firm, industry, or a country (Navimipour et al., 2015). The Nigerian petroleum industry needs personnel with the preferred education, skills level, and problem-solving abilities, significant for industrial

performance and economic growth, would serve as a positive human capital development for the country (Monday, 2015). The petroleum business is an international business which requires skilled personnel to be involved in planning, research, and forecasting (Monday, 2015). These processes ensure availability and sustainability of product supply at a minimal cost, which guarantees the economic and sustainable development of the Nigerian nation (Itsekor, 2018).

XII. EFFICIENT RESOURCE ALLOCATION TO ALL SEGMENT OF THE PETROLEUM SUPPLY VALUE CHAIN FOR EFFICIENCY

In a case study research, Itsekor (2018) identified strategies regarding how to efficiently utilize resources in the downstream petroleum supply chain management to mitigate petroleum supply shortages and enhance sustainable economic development in Nigeria. The supply value chain for refined products in the downstream involves sourcing of the products from international trade or NNPC to getting the product to the end user (DPR, 2020). The petroleum downstream sector comprises of four segments: (a) the marine segment, (b) the bulk storage segment, (c) the transportation segment, and (d) the retail outlet segment where products are dispensed to the customers (NNPC,2021). Itsekor (2018) affirmed that firms should participate in all the segments of the value chain and there should be appropriate allocation of resources; human, financial, technological, and equipment to all the segments. This will lead to efficiency in the supply and hence sustainable business development in Nigeria.

XIII. DEREGULATION OF THE PETROLEUM DOWNSTREAM SECTOR

One vital ingredient that will aid the development of the downstream sector is economic liberalization or privatization. Privatization or liberalization aims to reduce the barriers to investment entry and encourages competition to reallocate resources more efficiently (Adelabu, 2012). This movement towards an investor-friendly international economic order has become noticeable in the agenda of international economic negotiation. It has taken on a variety of forms which can be described by the following: deregulation, decontrol, de-monopolization, de-bureaucratization, de-centralization, investment promotion, privatization, and commercialization as well as globalization (Waisman, Cassen, Hamdi-chief, &Hourcade,2014).

While the upstream sector is largely operated by the international oil companies, the downstream is well regulated by the federal government of Nigeria. Several researchers and economic bodies have clamored for complete deregulation of the downstream, to create a free market and allow investors to thrive in the industry (Chigbu et al., 2016; Kennedy et al., 2021). For effective management of the downstream, government should take up the role of regulatory activities and leave the petroleum business to the private sector.

In the downstream, NNPC assets include 22 depots, networks of pipelines, and several marketing outlets across the country (NNPC, 2021). These assets should be transparently privatized to enhance economic growth. Furthermore, concrete actions such as zero-duty on imported refinery materials and a relaxation of the regulatory framework in the oil industry, be offered to investors, to build private refineries as carried out in order climes (Oruwari& Dosunmu, 2017).

XIV. CASE STUDY OF SOME SELECTED EMERGING NATIONS IN MANAGING THE DOWNSTREAM SECTOR

Venezuela has 14 refineries and refines 1.28 million of the 2 million barrels per day (bpd) crude oil. Saudi Arabia has 9 refineries, Brazil has 13, Malaysia and Libya have 6 respectively. Other Arab gulf states have been investing in new refineries (Oruwari, 2018). The afore-mentioned countries are fully engaged in refining petroleum products both for home and export consumption, hence the absence of fuel shortages in these countries.

Niger republic has completed a workable refinery, while Gabon and Coted'Ivoire now refines and export fuel. Ghana is building another refinery to consummate its newfound oil producing status with a view to exporting refined products (Asamoah, 2011). The Federal government of Nigeria has not started full refining of the country's abundant petroleum resources for both domestic and foreign consumption.

Nigeria's inability to refine her petroleum resources is because of the work of oil import cartel and irresponsible government insiders who opposes and discourages refining. This is in line with the well-known submission by erudite late professor Aluko (2004) that "for every shipload of petrol import, the profit as at 1998 was \$110,000 U.S. dollars". Given such quantum of profit, the cartel would not allow setup any refineries to work and will not set up refineries. Also, expert asserts the preference for Nigerian importation of refined products in to flawed industry structure, corruption and weak governance (Adelabu, 2012; Osuola, 2013).

XV. CONCLUSION AND RECOMMENDATIONS

Ineffective management of the Nigerian petroleum downstream industry has undermined the development of the Nigerian economy to enhance sustainable economic development. Efficient and effective management of the petroleum downstream is a sure panacea to achieving sustainable economic development in Nigeria. The Nigerian petroleum downstream is made up of all activities in the refining of crude, storage of refined products, gas processing, petrochemical industry, transportation, and marketing of oil and gas products. Based on the research findings, the following are recommendations for policy makers, and leaders in authority to implement to achieve sustainable economic development in Nigeria.

- Ensure constant availability of refined petroleum products to drive the smooth working of the economy. Renovate

old and build new refineries to meet up with the growing population and export demands.

- The federal government should tie the role of the multinational continual participation in the upstream oil sector to concurrent investment in domestic refining.
- Establish policies for maximum gas utilization, eradicate flaring and venting of gases to improve the environment, enhance revenue, and generate employment.
- Ensure efficient allocation of human, financial, machines, and technological resources to all segment of the downstream supply value chain to achieve effectiveness.
- Ensure promotion of human capital development in the sector for optimal operational efficiency.
- Revive and develop the petrochemical industry for economic diversification to generate wealth, create employment, eradicate poverty.
- Create enabling conditions and policies to encourage inflow of FDI into the petroleum downstream sector.
- At the right time, with the right perlatives and policies in place, deregulate the downstream and allow government to provide enabling environment and regulatory activities in the downstream.

Implementing these strategies by policy makers and business leaders across the petroleum downstream will lead to achieving sustainable development in Nigeria. The findings indicate a resurrection of the refineries, building new refineries, activation of the petrochemical industry, optimum gas utilization. Others include appropriate allocation of resources across the supply chain, and promoting human capital development across the sector. Effective management of these sectors will create new businesses, generate employment, eradicate poverty, and enhance sustainable economic development in Nigeria.

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