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Technological Capability as a Critical Factor in Nigerian Development: the Case of Indigenous Refineries in the Niger Delta Region

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Abstract

The paper examined technological capability as a critical factor in Nigeria's development agenda, using indigenous refineries in the Niger Delta region as point of reference. It x-rayed the creativity, ingenuity and innovations in the establishment of indigenous refineries in the region. The paper posits that for Nigeria to move from consumption to a productive economy, indigenous technological capabilities in the oil and gas sector must be fully encouraged and harnessed. The present approach of the Federal Government in destroying the indigenous refineries should be reviewed; rather the ingenuity of the operators should be exploited and refined through articulate and robust research and development (R & D). Also, there is the need to review extant laws on refining of Petroleum products. This way the down and upstream sectors of the oil industry will be revolutionized with attendant boost on indigenous technological development and increase in indigenous production of petroleum products, particularly the Premium Motor Spirit (PMS).

Keywords: *Technology, capability, indigenous, refineries, local content.*

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Background to the Study

The economy is the collection of all productive activities in the society. It encompasses the activities involved the mobilization and organization of humans and materials for production and exchange of goods and services. The quantity and quality of goods produced is what distinguishes a strong economy from a weak economy. According to the neo-classical growth model, what enhances economic growth is the techniques and technological capacity of production, that is the "technical know-how". Its critical factor is the techniques for process and product development. Process development involves the introduction of new processes or techniques, typically embodied in new capital equipment used in production. Such development lowers the real cost of producing outputs. Product development on the other hand is a specialized activity done to improve the existing product or to introduce a new product in the market. It is also done to improve the earlier features or techniques or system. Product development can also be defined as the creation, innovation, utility enhancement or continuous improvement of earlier features (design, service, etc.) of an existing product or developing an entirely new kind of product to satisfy the requirement of its end-users. Figure 1 shows a diagrammatic representation of product development.

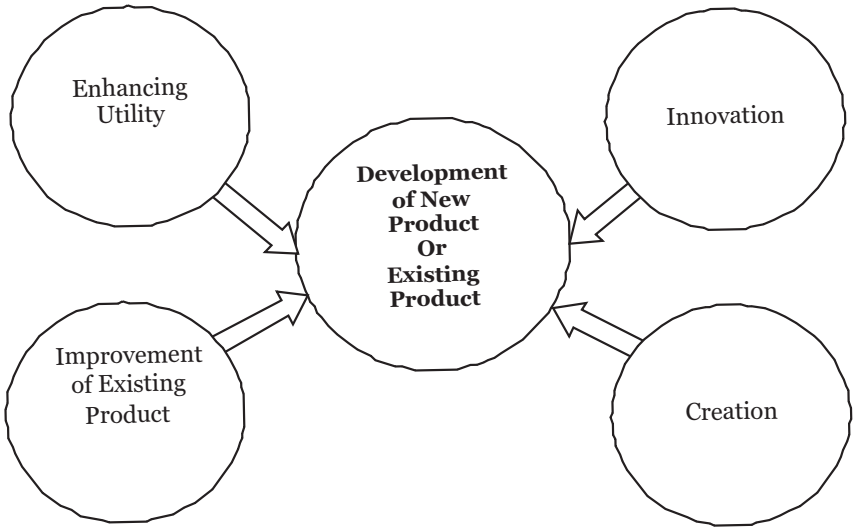

Figure 1: Product Development

Product development involves risk of investing precious time, capital and intellectual resources. Therefore, it is necessary that it is well planned. A good product development helps to:

i. Boost Productivity in the country
ii. Increase job creation
iii. Enhance the satisfaction level of the consumers (citizens).

According to the United Nation Economic Commission for Africa (UNECA) (2011). African countries can utilize their resources for indigenous industrialization. Africa has almost 12% of the world's oil, 42% of its gold, 80% of Chromium and Platinum groups metal and 60% available land in addition to vast forest resources (Ekpo, 2015). African governments can add-value in the exploitation of these commodities "on top of offering

short-to-medium term comparative advantages on commodities. This value-added could as noted by UNECA, serve as a launching pad for economic diversification and industrialization for African economies. This approach could be effective through:

(i) Boosting indigenous skills and technological capabilities.
(ii) Develop an appropriately directed local content policy.
(iii) Adopt and implement a coherent industrial policy.
(iv) Adopt strategic intervention to insert indigenous firms in the supply chain.
(v) Improve policy implementation through coordination among ministries; and
(vi) Address policy bottleneck and infrastructure constraints

As noted by the report, for any industrial policy to be efficient and effective, African states need to design and implement innovative techniques, long term industrial policies, strategies and programmes.

This paper agrees with UNECA recommendations for adding value to commodity based industrialization. It therefore implies that, if Nigeria must be effective in its industrial policies, especially in the oil and gas sector, the present approach to the so called "illegal refineries" must be re-considered and viewed in positive perspective as adding-value to the commodity (crude oil). The "illegal refineries" must therefore be viewed within the context of boosting local content development, indigenous skills, technological capabilities and developing appropriate local content for the industry. Thus, the main aim of this paper is to examine the technological capabilities of the indigenous refineries in the Niger Delta region of Nigeria as a critical factor to national development, within the context of developing specialized local content in the oil industry. According to the Nigerian Oil and Gas industry content Development Act (2010) as cited by Aderemi (2010), local content is:

> *The quantum of composite value added to or created in the Nigerian economy by a systematic development of capacity and capabilities through the deliberate utilization of Nigerian human, material resources and services in the Nigerian Oil and Gas*

Statement of the Problem

It is an irony that Nigeria, since the discovery of oil in 1958 has not been able to develop the capacity to refine crude locally with at least 50 percent local content. Many decades after the establishment of four gigantic refineries, the mode and techniques of operations are still turn-key technology to indigenous staff and operators.

The resultant effects are frequent shut-down, low production capacity, shortage or scarcity of product and dependent largely on imported refined petroleum products to meet domestic consumption a situation that has given room for what is perhaps the largest sleaze in our history - "the fuel subsidy scam". According to Nwachukwu (2016), fuel subsidy costs Nigeria 1.5 Trillion Naira annually, more than the combined budgets for education, health, agriculture, rural development, transport, land and housing. This has caused successive governments to continuously mount desire to build functional refineries in the country. The matter is made worse by the age of the refineries, the newest of which is about 35 years old. This is further lent credence by the fact that crude reduces drastically with age. In its best form, one gets about 51% of Premium Motor Spirit (PMS) per barrel of crude. But given the ages of our refineries, they can hardly refine more than 40%. Thus, given Nigeria's consumption rate of about 45 Million litres of PMS per day,

these aged refineries that currently produce only 12 Million litres per day can hardly meet local requirements (Ibe-Kachukwu, 2016).

At some point, licenses were issued to private businesses, at another time the government has given assurances of the construction of Greenfield refineries and in another stance even signed a Memorandum of Understanding (MOU) with an American firm for the construction of six modular refineries under a joint venture at a cost of N4.5bn, all of which are yet to materialize. This cost is outside the billions of dollars already spent trying to turn around the existing refineries (Nze, 2016). It is instructive to state that Section 3(1) of the Petroleum Act states that; no refinery shall be constructed or operated in Nigeria without a licence granted by the Minister. Other Sub Sections outline the procedures and the licence fees payable.

Also, the Petroleum Refining Regulations Act of 1974 specifies *inter alia* in part 1 Section 1(1) that;

> *Application for a licence to construct or operate a refinery shall be made to the Minister in form A in the Schedule to these Regulations.*

These regulations specify elaborately the procedures and processes involved in establishing a refinery. Thus, the operations of the indigenous refineries in the Niger Delta region offend the provisions of these and other ancillary laws. Thus, in the quest to bridge the gap between production and consumption of petroleum product in Nigeria, a lot of indigenous refineries tagged "illegal refineries" have sprung up in the oil – rich Niger Delta region and its environs. The "illegality" in the indigenous refineries is premised on;

i. Non licencing of the "refinery" in line with extant laws.
ii. Sources of the crude for refining (spills, vandalism and theft).
iii. The mode of operations are under pressure because of fear of arrest.

This illegality in the mode of operations has prompted this paper to investigate the operations of these indigenous refineries, the inherent technological capability and its implication to national development.

Conceptual Issues on Indigenous Refinery

An indigenous refinery as used here is a processing plant that has been constructed entirely using local content on skid mounted structures. Each structure contains a portion of the entire process plant and through interstitial piping, the components link together to form an easily manageable process. The refinery has the capacity of producing 10,000 barrel per day and the plant is not automated but is less capital intensive and more of labour intensive (cheap labour) which is peculiar to African environment. For instance, most of the materials used for production are constructed indigenously; made up of drums, Cotonou boats, pipes, fire woods, crude oil among others. 10 to 20 personnel can operate an indigenous refinery effectively. It requires an initial capital out lay and less than one million Naira to setup. Thus, the refinery is simple, efficient and cheap to set up. The relatively small investment cost allows for indigenous private investors to enter the refining business much easier. This is the case of the Niger Delta region where over 2,000 indigenous refineries have been setup by private investors who took advantage of the cheap labour and availability of raw materials in the area.

An indigenous refinery can be likened to modular refineries in America and other parts of the world. The indigenous refineries are innovations, and creations of Nigerians and for Nigeria which has been tagged with a negative connotation "illegal" with its product tagged "illicit". Nigeria and other African countries must be reflective and proactive in taking decisions about innovations, creativity, ingenuity and improvement of their indigenous technological capability. It is worthy of mention that in the long days of colonial rule, the indigenous (African) gin was tagged "illicit" and therefore banned. In its place, foreign brewed gin dominated the indigenous market, thus stifling the ingenuity in the indigenous brewers.

Technological capability is the use and assimilation of new technologies to choose, acquire, generate, and apply technologies that are suited to their development objectives. Such capabilities would determine the rates and patterns of development and industrialization. Though the concept is somewhat elusive, it is clear that capabilities cannot be acquired overnight and that they will vary over time and space. Technological capability can also vary between sectors. In the industrial sector, the elements of technological capability in Production engineering, manufacture of capital goods, and research and development, etc. are different from those essential for the services sector. For example technological capabilities may exist in both large and small industrial sectors.

In a survey undertaken by United Nations (UN) in Asia (India, Bangladesh, and Thailand), Latin America (Ecuador and Peru), and Africa (Mali and Rwanda), an examination of technological capabilities in the small – scale informal sector of developing countries found, contrary to expectations, that even very small metal-working production units possess some capacity to adapt and modify tools and equipment. In some cases, these units demonstrate an indigenous capacity and ingenuity to manufacture simple equipment (www.premiumtimesng.com).

In general, technological capabilities in developing countries like Nigeria whether considered in macro terms or in terms of elements, would depend on such factors as: adequate number and quality of human resources with practical experience, skills, and aptitude; useful technological information on sources and conditions of technology transfer; institution for education and training for research and development, and for engineering design and consultancy; favourable natural environment and factor endowments, attitudes and customs. The fourth development decade of the United Nations gives a prominent place to human resources development and employment generation. Similarly, the UNDP has adopted human development as a major goal for its development efforts.

If the development of human capabilities and potential is the goal of the current decade, (administration), technology policies and programmes would need to be considered in the context of achieving this goal. The focus of Nigerian government needs to shift from foreign technology to indigenous and institutions like the Nigerian National Petroleum Corporation (NNPC) and other regulatory bodies responsible for promoting capabilities in the oil and gas sector need to interface with the operators of the indigenous refineries (illegal refineries) as to tap into the technology, improve on the techniques and products. In a related statement, the endogenous growth theory holds that economic growth is primarily the result of endogenous growth and not external forces. It states that

investment in human capital, innovation and knowledge are significant contributors to economic growth (Romer, 1994). The theory also focuses on positive externalities and spillover effect of a knowledge-based economy which will lead to economic development. From the view point of the endogenous theory, if Nigeria must develop, then the economic growth (country's productive capability) must be endogenous, that means that its technological know-how and techniques of production must come from within and not external particularly in the oil and gas sector which is the main source of revenue for the country. From the above, it therefore means that for Nigeria to affirm the much needed technological development, indigenous technological innovations must be embraced, nurtured and refined. This is further lent credence by the fact that such other development options as technology transfer, import substitution, use of turn-key technology among others have over the years failed to lead to the desired significant technological development and impact on local content particularly in the downstream sector of the oil industry.

In the 1970s, the Asian Tigers, China and India did something truly remarkable that have turned them into economic super powers. They looked inwards and found solution to their peculiar challenges, ignoring advice from Western agents and the World Bank and did what they believed would work for their environment. They developed their own technology through indigenous factories which started crudly initially but with time, improved so much that the rest of the world now learn from them. Today, China and India have not only been able to meet most of their indigenous technological needs, but are also exporters of these technologies and resulting industrial products.

The Federal Government should therefore view the establishment of indigenous refineries differently and see it as a launching pad in the development of technological capabilities, innovations, creativity and knowledge-based techniques in the oil and gas sectors (See Fig. 2). Nigerian government can add value to the existing local content, build on the existing knowledge, improve the standard of the refined products and its techniques of production through research and development (R & D) and regulate their operations through government regulatory agencies.

Figure 2: Indigenous Refinery
Source: http://www.nigerianmonitor.com

Nigeria as a country can also achieve our own technology by working out models that are peculiar to our own environment and situations.

Production Capability Model for Nigerian Indigenous Refinery

Mathematical representation of production capabilities:

$Pd = f(Tc, Er, In, Po)$ 4.1

where

Pd	=	Productivity of the Refinery
Tc	=	Technological capability proxied by the number of indigenous refineries opened.
Er	=	Employment rate, proxied by number of people employed in the refinery.
In	=	Earned income proxied by barrels of refined oil sold.
Po	=	Environmental Pollution proxied by reduction in pipeline vandalism

Equation (4.1) is explicitly stated in econometric form.

$Pd_t = \alpha_0 + \alpha_1 Tc + \alpha_2 Er + \alpha_3 In + \alpha_4 Po + U_{it}$ 4.2

where

Pd_t	=	Productivity of the Refinery at time t.
Tc_t	=	Technological capability at time t.
Er_t	=	Employment rate at time t.
In_t	=	Income at time t.
Ro_t	=	Pollution at time t.

The apriori or Presumptive signs in equation 4.2 are that α_1, α_2 and $\alpha_3 > 0$ while $\alpha_4 < 0$. The variable Tc, Er, In and Po are the explanatory variables, α_0 is the intercept while the parameters α_1, α_2, α_3 and α_4 are the elasticity coefficient of the target variable with respect to productivity of the refinery. The signs and magnitude of this parameter will measure the nature of the effect or impact of the indigenous technology Ui is the error term.

According to Amartya Sen "Capabilities" Approach; what really matters for status as a poor or non poor person is the "capability to function". He added that:

> *What matters is not the things a person has or the feelings these provide, but what a person is, or can be, and does or can do. What matters for well-being is not just the characteristics of commodities consumed, as in utility approach, but what use the consumer can and does make of commodities. (Todaro and Smith, 2004).*

Borrowing a leaf from Amartya Sen's ideology, what matters to Nigerians is not that we have crude oil, or the feelings that we are among the major oil producing nations. But what matters is the ability to put this commodity (crude oil) to functioning; what can we do out of this commodity (crude oil) that is our "capability to function". Can Nigeria boast of being involved in the conversion of this crude oil to other products using its local content and techniques? Are we involved from the upstream sector to downstream sector of oil production? As noted earlier, technological capability is the ability to discover new methods of production, developing new products and introducing new techniques.

Effect of Technological Changes in Development of Nigeria

Technical change is synonymous with a change in the production function. When there are technical changes, they lead to an increase in the productivity of labour (L) and capital (K) as represented in figure 6.

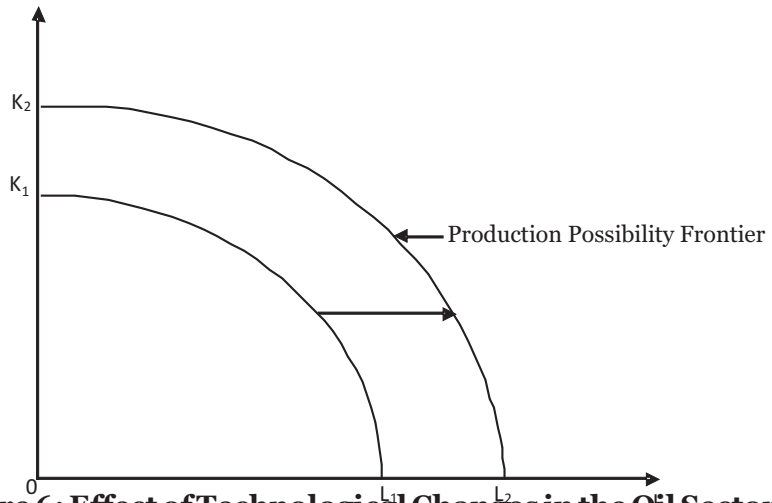

Figure 6: Effect of Technological Changes in the Oil Sector

The technical changes in the production of petroleum products in the Niger Delta region, through its local content, and techniques will bring about increase in the production frontier of the oil sector. Hence, it is pertinent to note that this expected increase in production process will also increase employment rate by engaging more labour force and increase the use of indigenously produced machines for its operations. This increase in labour force and use of local content will reduce capital flight from Nigeria as we will no longer need so much expatriate and heavy equipment that cannot be operated by our people as represented in the model, the era of Turn key Technology in the oil sector will be over. Increase in productivity from L_1K_1 to L_2K_2 of Production Frontiers will also increase income, thus increasing the relevant base of both the investors and government.

Thus, the government can now earn more tax through the purchase of the investor's input resources like the Jerry cans, boats, pipes, engines among others. The staff of the indigenous refineries are not left out, as they will earn income through their wages and salaries. The increase in productivity will also reduce poverty and improve the overall wellbeing of Nigerians. In the main, adopting the indigenous refinery will have multiplier or spillover effects on other macro economic variables. Hence, it is of the view of this paper that the federal government should reconsider the present approach of burning the indigenous refineries given its enormous contribution to the technological capacity and the overall development of the country.

Development can be defined as economic growth plus positive changes in the society. While economic growth means increase in production of goods and services, positive changes in the society are indicated as:

i. Reduction in poverty level
ii. Increase in productivity through technological and structural changes
iii. Reduction in unemployment rate

Reduction in inequalities, among others.

Benefits of Legalizing Indigenous Refineries

From the foregoing, some of the benefits of indigenous refineries include;

1. It will increase the technological capacity of the nation. Thus, it will be a right step in the much talked about local content in the industry.
2. It will increase the value and worth of the nation by using local content.
3. Operation of indigenous refinery will help to curb the insistent scarcity of petroleum product.
4. It will increase job opportunity by creating job for the teeming youths in Nigeria.
5. Indigenous refineries when fully in operation will reduce pressure on the Naira as foreign exchange spent on importing the product will be conserved and the so called subsidy scam eliminated.
6. It will increase income to the federal government through the payment of tax.
7. It will reduce poverty by providing income for the employees of the indigenous refineries and profit for the employers.
8. It will reduce oil theft and vandalism by appropriately procuring crude from authorized agencies.
9. It will reduce environmental pollution by ensuring that they operate within the global standards.
10. It will increase Nigeria's Gross Domestic Product (GDP) by increasing – productivity of the industry and other subsidiary industries.
11. It will reduce conflict and crime in the area by gainfully engaging the youths.

The Role of Government in Sustaining Technological Capability

If Nigeria must transform her economy from consumption economy to a productive economy, then the policy framework must go beyond providing adequate security, enabling environment for private foreign investors and the implementation of the prescription of Washington consensus to indigenization of its technological utilization of microeconomic foundations emphasizing that technology is not only the engine of growth but can also be derived within the economic system as postulated by Romer growth model.

i. The microeconomic founding prescribe bottom – top approach and not top-bottom for development. Hence government can tap into the latent skills of the operators of indigenous refineries in the Niger Delta with the view to developing the potentials and perfecting the product to a high quality one.
ii. For an effective capacity building, the government can through research and development (R & D) improve on the techniques of operations and adequately train the manpower.
iii. The government, through policy framework should formalize the activities of the indigenous refineries by licensing their operations in Nigeria just as it is presently doing for the "illegal" miners in the Northern Nigeria.

According to Mr. Udengs Eradiri, President, Ijaw Youth Congress (IYC):

> *I commend the Minister of Solid Mineral Kayode Fayemi for encouraging illegal miners to form cooperatives for the formalization of their activities. (NAN, 2016). Such an arrangement should be extended to the operators of illegal refineries in the Niger Delta who have exhibited ingenuity in refining the product in makeshift refineries.*

Current Government Approach Towards Indigenous Refineries

Going by above assertions, it therefore means that the present approach of the Federal Government of Nigeria in destroying indigenous refineries needs to be reconsidered. Table 1.1 shows the number of indigenous refineries destroyed in Niger Delta by Government Agencies between 2013 to 2015.

Table 1.1: Number of Indigenous Refineries Destroyed in Niger Delta and its Environs, 2013 – 2015.

Date	LGA/States	No. of Indigenous/Illegal Refineries Destroyed	Other Materials Destroyed	No. of Persons Arrested	Government Agencies
14/03/13	Warri, South –West LGA, Delta State	5	Drums, tankers, boasts	0	Taskforce on illegal bunkery and pipeline vandalization.
19/04/13	Atani, Ogbaru LGA Anambra	23	453 metric turns of crude oil Jerry cans, Tankers	0	Nigeria Security and Civil Defence Corps (NSCDC)
26/12/13	Niger Delta Region	1,951	39,760 metric turns, 81-barges, 1,117 Cotonuo boats, 1873 surface tank, 82 tanker trucks	1,857	Joint Military Taskforces (JTF) Commander (Maj-Gen. Bata Debiro press release).
07/15	Oteghele Community Warri South West LGA, Delta State	31	700 metric turne, tankers, drums, boats, etc.	0	
06/15	Onne, Bolo and Alakiri, Ke, Bille, Rivers State.	78	500 metric turns, Tankers, Boats, Jerry Cans	18	Nigerian Navy
07/15	Iguododo/Arhionmwon Warri West, Edo/Delta States	31	1,000 metric tons	18	Operation Pulo Shield JTF (Lt. Col. Isa Ado).
07/15	Kantu Forest Warri, Delta State	9	500 metric turns	0	JTF
17/06/15	Oteghele Community, Warri West, Delta State	7	500 metric turns	-	Nigerian Navy
25/09/15	Rivers, Bayelsa, Abia States	10	-	-	Nigeria Security and Civil defence corps (NSCDC Adulahi Gana)
Total 2015	Niger Delta region	**746**	-	-	JTF Nigerian Navy NSCDC

Source: Researcher, 2016

Conclusion

Technological capabilities are a panacea to the development of Nigeria. Hence this paper urges the Federal Government of Nigeria to welcome and encourage any sector (with special preference to the oil sector which is the main source of revenue of the country) that exhibits that capability of innovating, creating and developing new techniques of production to advance our technological capabilities for the overall interest of Nigeria.

Recommendations

Based on the foregoing presentations, the following recommendations are made:

i. There is need for government to reconsider the present approach of destroying indigenous refineries in the Niger Delta, rather, government should see the ingenuity in the creative and innovative ability of the operators of these refineries.

ii. Government should key into the local content used in establishing these indigenous industries and improve the techniques and processes of refining as to reduce environmental hazard and make the industry more effective and efficient.

iii. The government should adopt the indigenous refineries as home-grown technology/innovation which need to be nurtured, developed, and sustained through co-ordinate Research and Development (R & D) for increased performance of the economy.

iv. Government should regulate and coordinate the activities of the operations in order to maintain standards.

v. Relevant departments in our tertiary institutions should key into this innovation and mount training and re-training programmes for the operators of indigenous refinery to update and improve their knowledge on varying issues relating to their operations.

vi. Indigenous refineries regulatory body should be put in place to encourage and monitor the operations of the industry. Such body should among others ensure their registration, regulation and periodic monitoring.

vii. The extant laws on refining of petroleum products in the country should be reviewed to accommodate and ensure the activities of indigenous refineries.

viii. Effective enlightenment and mobilization on the benefits and acceptable means of establishing indigenous refineries should be evolved.

ix. Mechanism be worked out for legitimate purchase of crude for the operators as well as marketing of their products. This way, cases of vandalism of pipelines and crude theft will be reduced.

x. Loans, grants and other incentives should be made available to the operators to help them improve on their activities and products.

References

Aderemi, T. (2010). *A review of the nigerian oil and gas industry content Development Act, 2010*. Retrieved from http://www.thenigeriabusiness.com/column28

Akpakpan, E. B. (1991). *The Economy; Towards a New Type of Economics*. Port Harcourt: Belport publisher

Akpakpan, E. B. (2006). *The struggle for development. Why have some people been so unsuccessful?* 10th Inaugural lecture of University of Uyo, August 19, 2004.

Daily Times News. *Destruction of Illegal Refineries in Niger Delta*. Retrieved https://www.dailytimes.ng/shutting.illegal...

Ekpo, A. H. (2011). Theoretical basis for planning in Nigeria: Evidence from a petroleum export economy Nigeria. *Journal of Economic and Social Studies,* 53(3): 311 - 324.

Ekpo, A. H. (2015). African: development or underdevelopment. Ignatius Ajuru University of Education, Faculty of Social Sciences. *Journal of Social Sciences,* (13):1, pp1-18.

Ibe-Kachukwu, E. (2016). *Refineries back in Production but need $700 Million Dollars to produce at maximum capacity*. Retrieved from http://www.bellanaija.com

Jhiingan, M. L. (2003). *The economics of development and planning. 36th ed.* Delhi, India: Vrinda Publications Ltd.

Kalyan_city_blogs_pot.com/...aning_html/Technological Capabilities. *Retrieved 28/02/16*

Lukman, R. (2011). *Nigeria: Private refinery owners will face three hundles*. From http://www.africa.com. Retrieved 28/02/16.

News Agency of Nigeria (NAN) (2016). *Legalize operations of modular refineries in Niger Delta*. Retrieved 6-3-16. http://www.informationng.com/2016/03/legalize.operations

Nigeria Navy (2015). *Destruction of seven illegal refineries in Oteghele Community Warri South West, L. G. A. Delta State*. Retrieved 28/02/2016. http://www.nairaland.com/.../destruction_illegal

Niyi, A. (2013). *23 illegal refineries discovered in Anambra State*. Information Nigeria. http://www.informationng.com/2013/04/23-illegal-refineries-discovered-in-anambra.html Retrieved 28/02/16.

Nwachukwu, E. (2015). *The scam of fuel subsidy*. Retrieved 01.03.16.

Nze, S. (2016). *Illegal refineries and the criminalization of local ingenuity*. Retrieved 28/02/15.https://nzesylva.wordpress.com/of-illegal-refineries

Petroleum Act (1959). *Laws of the Federation*.

Petroleum Refining Regulations Act (1974). *Laws of the Federation*.

Romer, P. M. (1994). The Origins of Endogenous Growth. *Journal of Economic perspectives,* 8, Winter, pp. 3 – 22.

Solow, R. M. (1956). A Contribution to the Theory of Economic Growth. *Quarterly Journal of Economics,* 70, February, pp. 65 – 94.

Todaro, M. P. & Smith, S. C. (2004). *Economic Development, Eight (ed).* Delhi, India: Pearson Education (Singapore) Pte. Ltd.

UNECA (2013). *Making the most of Africa's commodities: Industrializing for growth, jobs and economic transformation*. Addis Ababa.

United Nations Economic Commission for Africa (UNECA) (2011). *Economic Report on Africa 2011: Governing Development in Africa, The Role of the state in economic transformation*. Addis Ababa.

Vanguard News (2014). *Between illegal and Modular Refineries in Niger Delta*. Retrieved 28/02/2016.