Revitalization of Coal Development in Nigeria for Industrial Advancement

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Abstract
Coal production in Nigeria has faced many challenges which inhibited its development and ultimately led to the closure of the industry. This paper seeks to discuss the reasons for the failure of the industry which could be: Lack of managerial skill, lack of government political will, misappropriation of funds, inadequate capital, and choice of inappropriate technology used for coal processing. Government bureaucracies and corruption. It is the view of the paper to discuss foreign technology for the coal production chosen and proffer solutions for those problems encountered as well as to come up with suggestions on ways of rejuvenating coal production in Nigeria. The collapse of the Nigerian Coal industry brought about the closure of numerous companies in South-eastern Nigeria which had great dependence on coal as their chief raw material. Examples of such companies are: The Turners- Emenite Roofing Sheet Manufacturing Company, Enugu; The Nigerian Cement Factory, Nkalagu; The Marine front at Portharcourt which used coal to fire boats; The Nigerian Steel Company, Enugu which uses coal for coke production for steel production, The Nigerian Railway Corporation used coal to drive engines and it collapsed, The Nigerian Project Development Institute depended much on coal, Chemical and Pharmaceutical Companies in Enugu which uses benzene for its works collapsed its production and relocated; Nigerian Briquette Company, Enugu and the Nigerian Gas Company, Enugu. The closure of the Nigerian coal industry also resulted in a reduction of power generated by the National Electric Power Authority since all their coal-fired power plants were grounded. As a result of the above developments, thousands of personnel and workers lost their jobs and the economic strength of many cities which hosted the coal mining activities waned drastically. This led to a rapid urban migration of personnel and workers to other cities of Port Harcourt, Lagos, and Abuja in search of jobs the closure of many companies also brought about a reduction in the country’s GDP.

Keywords
Coal Development; Prospects; Challenges

1.0 Introduction
Coal was discovered in Enugu, Nigeria in 1909. The Ogbete drift mine opened six years later. Its operations and others in the country were merged into a new corporation in 1950 known as the Nigerian Coal Corporation (NCC). The NCC was tasked with exploiting coal resources, and held a monopoly on coal and coke mining, production, and sales until 1999. The Nigerian coal production was managed by a Polish firm-KOPEX from inception until the time of collapse [1].

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Received June 13, 2017; Accepted October 08, 2017; Published October 20, 2017
Citation: Ocheri C (2017) Revitalization of Coal Development in Nigeria for Industrial Advancement. SF J Metallurgical Science 1:2.
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Nigeria's coal industry suffered a blow in the 1950s when oil was discovered. Up until this point, the Nigerian Railway Corporation was the largest consumer of coal in the country. However, after the discovery of oil, the Railway Corporation began to replace its coal burning trains with diesel-powered engines. An additional negative impact came when the Electricity Corporation of Nigeria began converting its power generation equipment from coal to diesel and gas as well. The Nigerian Civil War also negatively impacted coal production; many mines were abandoned during the war. Following the war, production never completely recovered and coal production levels were erratic. Attempts at mechanizing production ended badly, as both the implementation and maintenance of imported mining equipment proved troublesome, and hurt production. After the civil war, the Nigerian coal industry was not able to return to its peak production. Nigeria still holds large coal reserves, estimated to be at least 2 billion metric tons [2]. The discovery of bituminous coal suitable for use in coke production for the iron and steel industries opened up new domestic markets. With the loss of its largest domestic consumers, the NCC began exporting coal to Italy and the United Kingdom, as its low sulphur content was desirable. In 1999, the NCC lost its monopoly over the Nigerian coal industry as the Obasanjo government allowed private companies to begin operating coal fields in joint ventures with the NCC, with an eventual goal of completely selling off the NCC's assets to private investors. The Nigerian government planned to sell 40% to private investors and 20% to the Nigerian public, while retaining 40% [2].

In 2002, work stopped at NCC-operated mines and in 2003, the Nigerian government announced plans to create a technical advisory committee that would be tasked with reviving Nigeria’s coal industry. By 2004, the technical committee had still not issued their report, and the NCC found itself almost bankrupt. To raise funds, it began to sell off some of its assets in an attempt to pay off its mounting debts, including salary that was owed to its employees. In addition, the Enugu State Government protested the planned NCC privatization and demanded the ability to consult with the Federal Government on any planned sale [1]. While references are made in the news media to a possible sale of the NCC, the Nigerian Bureau of Public Enterprises, the government body tasked with selling public corporations, still lists the NCC as an asset for sale on their website as of April 2008, and no news reports to date provide any information about the supposed sale.

2.0 Review of Metallurgical Coke

In the production of steel, the next but important raw material is the metallurgical coking coal. The use of these coking coals is via the blast furnace route. In the 80s, it was established that about 401 million tones of coals in Nigeria were intrinsically deficient for the direct application to steel making. The issue of coke-able coals has therefore also attracted considerable metallurgical research, Adigwe discovered that it is possible to reduce the objection of the medium – rank Lafia – Obi (cooking coal) high sulphur content, moisture content and ash content from 44 % to only 10% [3].

Further work was set in motion to control the sulphur content as being investigated by Afonja; He further showed that Enugu coal estimated at 64.3 million tonnes reserves, characteristically of the low ash content can be upgraded to 30% in convection modern preparation with imported high rank coal. The drive would be to blend the imported coals with upgraded Lafia coal. Since its inception in 1979, the Research Centre of Nigeria Metallurgical Development Centre (NMDC), Jos has conducted applied research to ensure the inclusion of an appreciable percentage of locally available coals in metallurgical coke making at the Ajaokuta Steel Plant. Samples from Enugu, Okaba and Lafia coal deposits were extensively investigated and their results documented.

Table 1: Coal Reserves and Resources in Nigeria [4]

<table>
<thead>
<tr>
<th>State</th>
<th>Location</th>
<th>Indicated in Site Reserve Million T</th>
<th>Inferred Resources Million t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benue</td>
<td>Orukpa</td>
<td>57</td>
<td>73</td>
</tr>
<tr>
<td></td>
<td>Okaba</td>
<td>73</td>
<td>250</td>
</tr>
<tr>
<td></td>
<td>Ogbupoyoga</td>
<td>107</td>
<td>320</td>
</tr>
<tr>
<td>Delta</td>
<td>Asaba (lignite)</td>
<td>250</td>
<td>Unknown</td>
</tr>
<tr>
<td>Enugu</td>
<td>Enugu Area</td>
<td>54</td>
<td>200</td>
</tr>
<tr>
<td></td>
<td>Ezimo</td>
<td>56</td>
<td>60</td>
</tr>
<tr>
<td>Plateau</td>
<td>Inyi Lafia – Obi (Coking Coal)</td>
<td>20</td>
<td>Unknown</td>
</tr>
<tr>
<td></td>
<td></td>
<td>15</td>
<td>Unknown</td>
</tr>
</tbody>
</table>
2.1 Coal chemical Composition (Coal Grade)

Coals are selected by grade, which takes cognizance of the chemical quality in respect of ash, sulphur, phosphorus, alkali and chloride contents. If the chemical parameter of a particular coal exceeds limits specified at a coke plant, the coal may still be satisfactory for specific use, otherwise it is possible to formulate a blend with other coals or materials such that the final charge will lies within the limits specified. It should be noted that alkalis cause coke breakdown, scabs and other operating problems in the blast furnace. Consequently, the alkali content in a coal charge for coke making is always kept as low as possible. It is restricted to a maximum of 1.95% in the case of Ajaokuta Steel Company Limited [7]. Also chlorides pass into by-product section and require considerable water to remove from the tar recovered in the By-product plant. Because of its corrosive nature, chlorides also cause maintenance problems in the coal handling and coke oven plant. In April 1993, at Vukhim pilot plant Russia, a number of coals were used to compose coking coal blend for the operation of Ajaokuta Coke Oven Plant. Six coals from Australia, United State of America and Great Britain were subjected to a series of tests after which eight-charge variants were shot listed [8] and also some time in 1993, direct blending test of imported and Enugu coal was carried out on a 250 Kg pilot Oven at NMDC, Jos.

2.2 Coal Blend Studies

Lafia and Enugu coals have been co-carbonized and also co-carbonized with a prime coking foreign coal – Omgore coal from U.K. The effects of coking modifiers such as pitch have also been determined for the carbonization of Lafia and Enugu coals. Ashland A240

Table 2: Results of Proximate Analysis and coking Properties Determination of Nigerian coals [5]

<table>
<thead>
<tr>
<th>S/N</th>
<th>Origin of the Coal Sample</th>
<th>Proximate Analysis</th>
<th>Sulphur slot a.d</th>
<th>Crusable Swelling Numble (CSN)</th>
<th>Gray King Coke type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Mad</td>
<td>Aad</td>
<td>Vad</td>
<td>Vdat</td>
</tr>
<tr>
<td>1</td>
<td>Enugu (washed)</td>
<td>8.2</td>
<td>12.54</td>
<td>34.5</td>
<td>42.5</td>
</tr>
<tr>
<td>2</td>
<td>Onyeama</td>
<td>3.4</td>
<td>13.80</td>
<td>40.40</td>
<td>48.9</td>
</tr>
<tr>
<td>3</td>
<td>Okaba</td>
<td>9.4</td>
<td>11.60</td>
<td>35.30</td>
<td>44.70</td>
</tr>
<tr>
<td>4</td>
<td>Akpunuje</td>
<td>8.5</td>
<td>7.0</td>
<td>26.90</td>
<td>31.90</td>
</tr>
<tr>
<td>5</td>
<td>Lafia (original)</td>
<td>1.5</td>
<td>25.60</td>
<td>22.60</td>
<td>32.20</td>
</tr>
<tr>
<td>6</td>
<td>Lafia after beneficiation H.M.S. of 1.4g/CM3</td>
<td>1.6</td>
<td>11.30</td>
<td>22.10</td>
<td>30.0</td>
</tr>
</tbody>
</table>

Note: ad – as determined, daf – dried ash free, tot – total

Table 3: Petrographic Composition of Nigerian Coals (V – Vitrinite, E – Exinite, M – Micrinite, F – Fusinite, MS – Mineral Substance) [6]

<table>
<thead>
<tr>
<th>Coal Sample</th>
<th>Maceral Analysis</th>
<th>Maceral Composition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enugu</td>
<td>V</td>
<td>E</td>
</tr>
<tr>
<td>Okaba</td>
<td>55.5</td>
<td>19.5</td>
</tr>
<tr>
<td>Lafia</td>
<td>47.5</td>
<td>25.0</td>
</tr>
</tbody>
</table>

Note: The Leitz photometer then used is now broken down and obsolete
petroleum pitch was used. The resulting coke products were subjected to optical microscopy, micro strength tests and reactivity tests. As present research conducted by NMDC, Jos, the state of test, harnessing of relevant local materials and their preparedness for use in the steel industry was brought to the limelight [9]. Apart from the fact that Lafia / Obi coals would be blended with other imported coals, the Atito/Akpuneje coal (Nasarawa state) shows promising characteristics (Ash 14.9, Fixed carbon 53.5) [10]. Improved quality of coke was produced at a pilot scale from blend of Okaba and an imported coal (Agro- allied, supplied by ASP 1993), employing the pre-heating coking improvement technique. The pre- heated blend between Agro-allied coal (medium coking) an 5% Okaba coal almost satisfy ASP’s M10 (≤9% as against obtained value of 9.5%) and M40 (≥ 78% as against obtained value of 76.2%) requirements despite that Agro- allied low Free Swelling Index (FSI) of only 2.5 Consequently, primer coking coal [11] with an FSI of 6, blended with Okaba coal and an additive of bitumen, would no doubt result in a far more than 5% Okaba blend in the imported coal [12]. The execution of these would bring saving for the country to about $632 million per years as estimated for use in the first phase of Ajaokuta Steel Company Limited. Other basic raw materials that is important to steel making which has drawn the attention of researchers in the metallurgical / metal based industries is clay[13].

3.0 Nigerian Coal Resources and Locations

Nigerian coal has been found suitable for use as boiler fuel, production of high calorific gas, domestic heating, briquettes, formed coke and the manufacture of a wide range of chemicals including waxes, resins, adhesives and dyes. Their characteristic properties (low sulphur and ash content and low thermoplastic properties), make these sub-bituminous coals ideal for coal- fired electric power plants. Some Nigerian coals can also be used to produce formed-coke of metallurgical quality.

The domestic coal market is latently large. Besides the potential for power generation, Nigeria currently imports coals of various grades and qualities including coke, pellets, briquettes, Anthracite, coking coal and form coke. There is also the potential for coal exports to countries such as China, Israel, Japan, Ghana, the U.S., Europe and India. The Nigerian government has recognized the need to revitalize the country's coal mining industry to provide fuel for power generation and domestic use. Under a grant from the United States Trade and Development Agency (USTDA), Nigeria's Ministry of Solid Minerals Development undertook a Feasibility Study in 2005 to determine the potential for coal resource development. The Study is being conducted by BehreDolbear and Company (USA), Inc.–an international mining consulting firm [14].

3.1 The Anambra Coal Basin

The coal deposits of the Anambra Basin, located in southeastern Nigeria, appear to contain the largest and most economically viable coal resources. This basin covers an area of approximately 1.5 million hectares and is constrained by the Niger River on the west, the Benue River on the north and the Enugu Escarpment on the east. The coal is predominantly in one seam that outcrops along the eastern side of the basin at the base of the Enugu Escarpment and dips gently toward the centre of the basin. However, coal outcroppings have been reported at Idah and Dekina on the northwestern side of the basin, demonstrating that coal exists on the western side of the basin as well as the east. Exploration within the basin is limited, but there are four small coal mines in the eastern outcrops of the basin northwest of the city of Enugu and two smaller mines farther north.

3.2 Kogi District

The Kogi Coal District, covering 225,000 hectares of the Anambra Coal Basin, lies on the northeastern side of the basin. Two areas within the district have been explored to a limited degree. The greatest amount of available drill data has been found in Ogboyoga, which is further north, 27 holes have been drilled and cored and 15 separate measurements have been taken of outcrops of the main coal seam in stream drainages. BehreDolbear used the guidelines of the Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves (also known as the JORC Code) to delineate a total of 123 million metric tons of coal (Demonstrated) underlying an estimated 8,900 hectares. An additional 165 million tons of coal classed as non-reportable resource by the JORC Code definitions, is projected to lie in the Ogboyoga area. The coal thickness in this area is approximately 2.0 meters. The other area of interest is Okaba, the site of a small idle surface mine. 17 core holes have been drilled near Okaba, all of which intersected the main coal seam. No outcropsamples have been reported for this area. A total of 100 million tonnes of demonstrated coal (JORC) have been estimated to underlie...
2,770 hectares in the Okaba area and an additional 435 million tones of non-reportable coal resource are projected to the west of existing drilling. In total the Kogi Coal District is estimated to have a Demonstrated Coal Resource of 223 million tonnes averaging 3.6 meters thick, which underlies 8,900 hectares, or 4 percent of the District. The total non-reportable resources by JORC Code are 600 million tones.

3.3 Benue District (Omkpa-Ezimo)

The Benue Coal District, covering 175,000 hectares of the coal basin, is immediately south of the Kogi District along the eastern outcrop of the Anambra Basin. It also has two areas of interest. The more northern of the two, Orukpa, includes a small idle surface mine and a total of 11 drill holes. Six coal outcroppings have also been measured in streams in the area. Based on these data, BehreDolbear estimates that a reportable coal resource of 81 million tons (Demonstrated-JORC) exists along the outcrop. Another 117 million tones of non-reportable coal, as defined by the JORC Code, is projected to exist west of the existing drilling. The average coal thickness is 3.1 meters. Immediately south of the Orukpa area is the Ezimo area. This area has limited exploration, with only four drill holes penetrating the main coal seam. Based upon this limited data, a total of 43 million tones of demonstrated coal resource have been projected for the Ezimo area. An additional 263 million tones of non-reportable coal resource is projected to exist west of the existing drilling. The average coal thickness in this area is also 3.1 meters. In total the Benue District (Orukpa-Ezimo) is estimated to have a Demonstrated Coal Resource of 124 million tonnes, which underlies 4,700 hectares, or 3 percent of the District. The total non-reportable resources, as defined in accordance with the JORC Code, are 380 million tonnes which underlie 4,700 hectares, or 3 percent of the District. The total non-reportable resources, as defined in accordance with the JORC Code, are 380 million tones.

3.4 Enugu District

The Enugu Coal District, covering 270,000 hectares of the coal basin, is centered on Enugu City, south of the Benue District. It has supported the largest amount of commercial mining in the past. In addition to two underground mines, there are a total of 36 drill holes drilled in the area. Previous studies have estimated the demonstrated coal resource to be 49 million tones averaging 2.2 meters thick. An additional 111 million non-reportable tones of in-place coal are inferred to exist west of the old mine workings.

3.5 Other Coal Deposits

Other potentially significant coal and lignite resources in Nigeria include:

The Inyia Deposit south of the city of Enugu with a potential resource of approximately 10 million tons; The Afikpo deposit located south and of Inyia in an area that is heavily populated, where mine development might be expensive; The Lafia Obi deposit located northeast of the mining districts described above with an estimated inferred resource of 33 million tones of potential metallurgical coal resources. Over 139 holes have been drilled and exploration shafts have been sunk in the area. The Nigerian Government has paid considerable attention to the potential commercialization of this resource, but additional exploration is required before this can be defined as a commercial resource; The Gombe deposit is located east of Lafia-Obi. Preliminary drilling has indicated the presence of metallurgical grade coal, but no resource estimates have been made for this area; The Asaba Lignite deposit is on the coastal plain south of the Anambra Basin. A total of 19 holes have been drilled in two areas. Although these data are limited they strongly suggest that a significant lignite resource exists in this area. More exploration is required to determine if it is an economic resource.

4.0 Potential Power Generation from Coal-Fired Plants

It appears that the Kogi District and the Benue (Orupka-Ezimo) District can each support a coal-fired power plant with ultimate capacity of approximately 3,500 MW [14]. These plants would be built in phases to match the production buildup of the associated coal mining operations. They will probably consist of several units in the size range of 500 to 700 MW. Based on the economics and logistics of coal transportation it is recommended that the power plants be sited near the portals of the underground mine where coal can be conveyed directly to the generating facility. This region is considered to be tropical, so sufficient water might be available to operate a plant with cooling towers. If sufficient water is not available, it might be more economical to build a 50 to 76 kilometer pipeline from the Benue River to the plants than to transport the coal to a plant located on the river. Based on their coal resource potential these Districts should
ultimately be able to support electrical generating capacity of approximately 7,000 MW. There is the possibility that a third power plant of 2,500 to 3,500 MW might be supported by Enugu's resources.

5.0 Nigerian Energy Policy on Coal

The nation's coal industry faces some daunting challenges, which need to be addressed if the potential for coal utilization is to be optimally exploited. These include creating and finding markets for the coal, increasing the productivity of the coal mines, reducing cost of production through mechanization and establishing a cost-effective transportation system through an expansion of the rail system and port facilities for the export of coal [2]. The nation's coal industry faces some daunting challenges, which need to be addressed if the potential for coal utilization is to be optimally exploited. These include creating and finding markets for the coal, increasing the productivity of the coal mines, reducing cost of production through mechanization and establishing a cost-effective transportation system through an expansion of the rail system and port facilities for the export of coal [3].

5.1 Policies

The nation shall pursue vigorously a comprehensive programmed of resuscitation of the coal industry. Extensive exploration activities to maintain a high level of coal reserves shall be carried out. Private sector as well as indigenous participation in the coal industry shall be activity promoted. The exploitation and utilization of the coal reserves shall be done in an environmentally acceptable manner [15].

5.2 Objectives

To promote production of coal for export. ii. To promote effective utilization of coal for complementing the nation's energy needs and as industrial feedstock. To attract increased investment into, and promote indigenous participation in, the coal industry. To utilize coal in meeting the critical national need of providing a viable alternative to fuel wood in order to conserve our forests. To minimize environmental pollution arising from the utilization of coal.

6.0 Challenges of Coal Development

From records of operation and maintenance of the production phase, documented are the details of the Nigerian Coal corporation inadequacies and these inadequacies were traced to the several factors such as [16]:

Machinery and equipment failures

Equipment failure was pervasive and frequent. It is obviously technical issues that grounded the coal industry in Nigeria. Lack of robust technical support and background was the main root of the cause that led to the demise of the economic gain from coal.

Geological and infrastructural weaknesses

The geological problems were very severe. Very little was known about the characteristics and nature of the mine waters, the constraints the fault patterns would have on the long wall layout, or the roof and floor pressures. One consequence was excessive weight on the powered roof supports along the face line. The undulating seam floor made it impossible to establish a definite gathering ground for mine water. This posed severe problems to long wall operations and also created excessively acidic mine waters. Within 2 months of operation, the Polish pumps began to break down as a result of the excess acid in the water. The pumps were made of cast iron and not easily repaired.

The operations also suffered considerably from inadequate transportation. Railway wagons needed to evacuate the coal were in very short supply, and the resulting dumping of coal created blockages in the coal bunkers. Nominal production targets could not be met, and what was produced could not find its way to the consumer. Power supply was inadequate, and outages were more the rule than the exception. The estimated production loss resulting from power outages alone was about 21 000 t in 215. Power outages also created severe flooding problems because the pumps were inoperative most of the time.

Human resources deficiency

As already pointed out, different stages of technology acquisition demand different levels competence were deficient. Although a broad well suffice in the pre-investment phase, specific to the investment phase. At the time of the technical change, junior staff made up 87.5% of total human resources at Nigerian Coal industry, professionals and management staff, 12.5%.
Lack of Government Political will and Interest

After the oil boom, the government lost interest in coal production because much revenue was generated from crude oil and that led to much dependence on the oil even till today. The coal industry lost grip of government adequate funding for its operations. It is also unfortunate that government has shown in most case lack of political will to revive the industries.

Due to Lack of Managerial Skill

In most industries and establishment in Nigeria, the issue of lack of managerial skill has been major factor why most of such industries and companies have failed. It has been recurrent decimal where people who are not knowledgeable in the engineering profession have been placed on the management level and at the end of their tenure have plunged such establishment to total collapse due to lack of skill to run or management such companies.

Misappropriation of Funds

The Nigeria scenario has really played out today where most of the funds given to the Managing Directors/Chief Executives have been misappropriated. In some cases funds made for such establishments have been stashed away, stolen or being used for project that had no relevance with the companies. A lot of such scenarios have taken place in Nigeria.

Inadequate Capital

It is also a worrisome issue that the government sometimes do not made appropriate funds available to companies or establishment to run or manage the affairs which include overhead cost, capital project / budget thereby making the companies to have issues with salaries, staff welfare and other related matters.

Choice of inappropriate technology used for coal processing

Government has also failed in the area of technology for the processing of coal. It is still worrisome that some companies are still using very out dated technology to process coal thereby making it very difficult to achieve results [17].

Government bureaucracies

The bureaucratic bottle neck cannot be over discussed as Governments are yet to change most of such policies making importation of materials [18], equipment and mode of operation very difficult and cumbersome.

Corruption

Corruption has been a very disturbing factor in Nigeria today where those place in position of authority have stolen the country dry. Monies meant for managing such companies have been stolen to the point that nothing is left to run or manage such companies. Very recently, in Nigeria some Chief Executives have been found guilty in this regards and when they were relieved of their job they have refused to hand over to the next person. It is also in the news that some have started burying looted funds in cemeteries, forests and other places in order to hide them completely. The issue of whistle blowers has continued to expose such loots.

6.1 Prospects of Coal Development

This section focused on the period 1976-82, the period during which the major investment was made on coal production. However, to provide a context for analysis, the physical output preceding the period is given below: This shows high rate of liquidity of the corporation. Nigerian Coal Corporation's liquidity problem was so severe that regular overdraft spending was needed to cover operating costs.

Figure 5.1: Coal production rose steadily from 1915 to 1960

<table>
<thead>
<tr>
<th>Period</th>
<th>Average output (t/ year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1960/61–1966/67</td>
<td>645,000</td>
</tr>
<tr>
<td>1967/68–1969/70</td>
<td>281,000</td>
</tr>
<tr>
<td>1970/71–1975/76</td>
<td>Nil ( during civil war)</td>
</tr>
</tbody>
</table>

Table 4
Figure 5.1 and table 5.1 show how coal production rose steadily from 1915 to 1960. Thereafter it started reducing till there was no production at all in year 2010. A sharp fall in production was observed in the mid-sixties till 1970, which was the era in which oil was discovered in Nigeria. This confirms the assertions made by the authors that the oil boom was a major cause of the fall of the coal production industry in Nigeria.

### Industrial Revolution

It is known that the revitalization and development of coal in Nigeria will boast employment generation for Nigerian youths and will also create wealth for the country.

### Power Generation

Nigeria is known as a country which does not have sufficient power supply to her citizens and the revitalization of the coal will assist the government to have more megawatts to run industrial machineries and to power some equipment.

### Economy recovery

The present economic challenge could be changed for better if all the necessary parameters are put in place.

### 7.0 Recommendation

Nigeria's goal is to revitalize the coal mining industry and expand power generation by attracting foreign companies to develop these large coal resources and construct coal-fired generating plants that will connect to the country’s electrical distribution grid [4]. The exploitation of coal for electricity generation and the production of coal briquettes for domestic and industrial heating will bring a number of benefits including: Increased and more reliable electricity supply, Lower cost electrical energy, Expanded industrialization of the economy, Increased employment and human resources development, Increased capacity utilization of existing industries, Increased national income through taxes, Reduced deforestation and prevention of desert encroachment in the northern parts of the country. Power generation through the use of coal could be sufficient to supply at least one-third of the remaining megawatts needed in Nigeria and there are still large deposits of coal in Nigeria which will succor the high energy demand of the populace. The Government’s intention to dive into power generation from nuclear resources should be discouraged because we do not have the technical capacity to manage the technology of nuclear power plants and its intricacies. Instead of the government going to spend huge amounts of funds in nuclear power exploitation, such an amount of fund could be sunk into the coal powered plants for generation of electricity because it is cheaper and its technology is simple.

### 8.0 Conclusion

Coal production in the Nigerian coal industry increased annually from 583,487 tones to a peak of 905,397 tones before the independence. After 1959, production decreased significantly each year, until today no production is recorded in Nigeria. Several factors contributed to its failure, prominent among them is poor technical method chosen to operate with. This trend showed a decrease in the coal production and how it has affected other sectors of the economy. There is high need for government to map out strategies which would be applicable to revive the industry [19]. This include intensifying efforts to drive for coal exploration and production activities, completing the privatization of the coal sector, incentives to indigenous and foreign entrepreneurs so as to attract investment in coal exploration and production, fast-tracking the passage of the new minerals and mining bill for assent by the President. Continuing the exploration and concession of the coal deposits for open biddings to investors and ensuring transparency in the acquisition of mining titles. It must be known that most coal deposits could be revived and made functional. These are just but few measures in addition to what we ought to do to revive
the coal industry which has collapsed wholly due to total neglect. The abundant coal deposit underneath various seams of most lands in Nigeria should not be allowed to be wasted or remain untapped. The time is set to arise and derive the energy which is in our coal and also reduce the burden of Nigerians due to lack of power to run most of our companies for optimal results.

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