

Research Article

Examining the Effects of Ailing Ajaokuta Steel Plant on Industrialization and Technological Growth in Nigeria

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Abstract

Nigeria, out of the exigency to feed her bulging population established a mega iron and steel complex in Ajaokuta, Kogi state to drive technological innovation for productive activities in the country. The steel project was designed to serve as a catalyst for growth and development of industries as well as other sectors of the Nigerian economy. While the existing literature is replete with studies focusing on the factors undermining the operations of Ajaokuta Steel Plant, the effects of underutilized Ajaokuta Steel Plant on the Nigerian economy has received less academic attention. It is against this backdrop that the study examined the effects of ailing Ajaokuta Steel Plant on industrialization and development of technology in Nigeria. The study relied on documentary method of data collection and qualitative descriptive method of data analysis. The study revealed among others that the ailing state of Ajaokuta Steel Plant has adversely affected the growth of indigenous technologies and industries in Nigeria. The failure of the Ajaokuta Steel Plant to produce iron and steel products for the creation of indigenous means of labour has made the Nigerian economy an outrageous consumer of foreign techs and manufactured products. This has not only halted country's quest for industrialization but has truncated its ability to manufacture what it consumes.

Keywords

Ajaokuta Steel Plant, Industrialization, Technological Innovation, Productive Activities, Development

1. Introduction

The quest to provide for the material needs of society is as old as the origin and development of man. Historically, the driving force of societal transition from one mode of production to another has always been the change and improvement in the productive forces. The provision of basic needs of society is fundamental to its existence and sustainability just as economic activity (labour) is at the nucleus of all existential

conditions. Thus, Ake argues as follows:

Just as economic need is the primary need, so economic activity is man's primary activity [7]. The primacy of work, that is economic productivity, is the corollary of the primacy of economic need. Man is first and foremost a worker or a producer. It is by man's productive activity that he is able to obtain the economic means which he needs to sus-

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tain life. In short, man must eat in order to live but must work in order to eat. Thus, productive activity is the condition for all other activities.

Essentially, various epochs of societal evolutionary cum dialectical processes are characterized by landmark commitments of man in devising relevant machineries to explore the objects of nature. It is a truism that all man needs for his survival are gifted by nature but most of them exist in forms unsuitable for immediate societal consumptions until they are transformed with the aid of human creativity using relevant technologies. Ake argued that it is by man's labour through the use of needed tools which ultimately makes nature suitable to his needs [7]. Highlighting the importance of technological innovation to industrial development of societies, Obikwelu noted that metallic and non-metallic materials (raw materials for creating technologies) are so important that they set the milestones for the civilization and industrialization of man [30]. The advancement of these material technologies has set varying defining moments of human civilization, namely, the Stone Age, Bronze Age and Steel Age, among others.

Specifically, the steel development which gained massive prominence in the 18th Century Europe ushered in the era of industrialization. Development of steel has not only spurred several economies of the world into prosperity but has become the cornerstone of world's technological trends. For instance, the industrial revolution in the 18th century England (1740-1840); the Railway system innovation (1850-1900); the invention of Electricity and Internal Combustion Engine (1900-1950); the evolution of petrochemicals, electronics, computing and aerospace (1950-1980); and the emergence of nanotechnology were products of iron and steel works [30]. Mohajan observed that industrial revolution which became the most distinguished turning points in human history transformed human and animal labour technology into machinery, such as the steam engine resulting in global economic growth, increase in production and consumption of common people [28]. The consequence of changes in technology especially in Europe and America was rise in productivity and improvement in human living conditions as well as other components of ecological communities.

The quest for exploitation of Africa's rich solid minerals (e.g., iron ore) for steel production which would serve as a

catalyst for industrialization and technological innovation has been a top agenda not only in Nigeria but African continent in general. For instance, on the wing of innovation, the African Union Science, Technology and Innovation Strategy for Africa- STISA- 2024 places science, technology and innovation at the epicentre of Africa's socio-economic growth and development [5]. STISA- 2024 is designed to transform critical sectors such as agriculture, energy, environment, health, infrastructure, mining and water. The priority is to achieve Sustainable Development Goals (SDGs) in key areas such as eradication of hunger and achieving food security, physical and intellectual mobility, technology and wealth creation, among others. Also, within the Framework of Agenda 2063, the African Union seeks for technology-led industrialization [5]. The intention is to galvanize the continents resources and change the narrative in the global trade which classified Africa as a "supplier" of raw materials in exchange for manufactured goods.

Considering the significance of material and steel production to technological and industrial advancement of society, the Nigerian government in 1968 initiated a steel development policy which was aimed at leveraging the avalanche of mineral deposits (particularly the iron ore) in the country to create indigenous tools or technologies in order to facilitate industrialization process [29]. Moreover, the establishment of steel industry in Nigeria began with a bilateral relationship between Nigeria and defunct Union of Soviet Socialist Republics (USSR) in 1968. Following this tie, a tech-contract was signed between the Nigerian government and the USSR Techno-Export Company in 1971 [31]. This contract was meant to provide a detailed geological examination of Nigeria for raw materials which were found richly in the present day Kogi state (especially iron ore, bitumen, and dolomite) required to sustain the steel industry. Also in 1971, the Nigerian government created the Nigerian Steel Development Authority (NSDA) which was mandated to identify, locate and acquire locally sourced raw materials for the operation of steel company. In 1975, Tiajpromexport (TPE), a USSR company in a project report submitted to the government of Federal Republic of Nigeria justified the construction of Nigerian steel complex at Ajaokuta (see Figure 1 below) so as to exploit the abundance of iron ore at Itakpe, Kogi state.



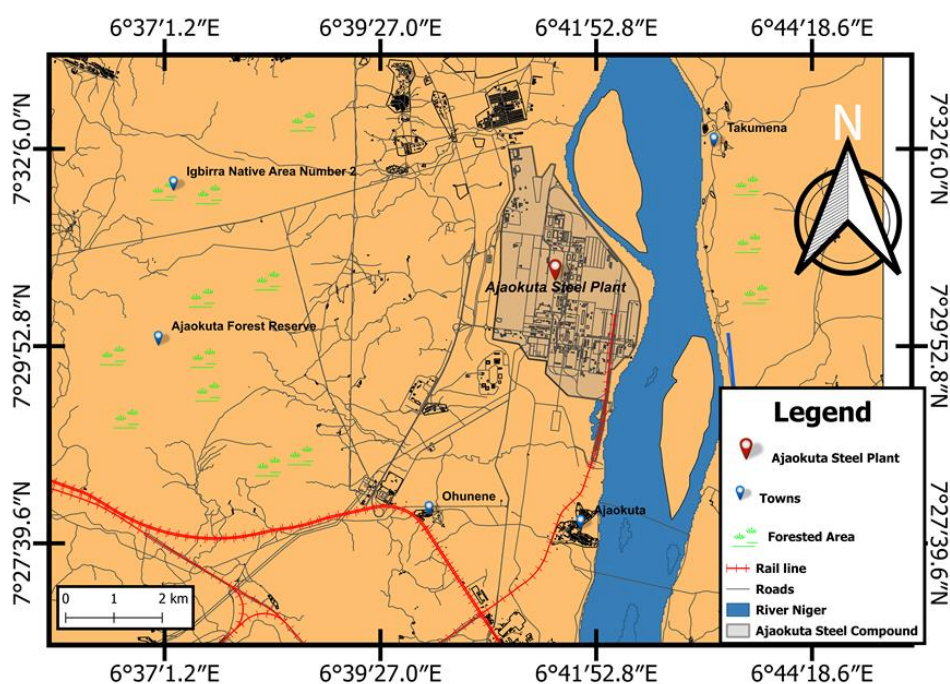
Figure 1. A cross section of Ajaokuta Steel Company.

Source: Nairametrics (6 June, 2023).

See <https://nairametrics.com/2023/12/06/ajaokuta-steel-company-fg-budgets-n4-45-billion-seeks-n35-billion-from-investors/>

Ajaokuta is a town located in Kogi State, Nigeria, situated on the left bank of the Niger River and approximately 38 kilometers southwest of Lokoja, the capital of Kogi State. It is located on latitude: $6^{\circ}40'11''$ E and longitude: $8^{\circ}48'19''$ N of the Greenwich meridian (see **Figure 2** below). Ajaokuta is situated in the central part of Nigeria, within the tropical rainforest belt. Ajaokuta experiences a tropical climate characterized by two main seasons: the wet season and the dry season. The wet season typically lasts from April to October,

with heavy rainfall, while the dry season extends from November to March, with lower precipitation levels. The climate is hot and humid with temperatures ranging from 30°C to 35°C (86°F to 95°F) on average during the day, while nighttime temperature ranges from 20°C to 25°C (68°F to 77°F). It has an area of 1362km^2 and a population of 122321 as at 2006 population census. The town is home to the Ajaokuta Steel Mill, the largest steel mill in Nigeria.



Source: Designed by the authors

Figure 2. Map of the Study Area.

Consequently, following the establishment of ASP in 1979, the Beneficiating Plant was constructed at Itakpe (the location of iron ore deposit) to supply iron concentrates to the steel plants. During the Third National Development Plan (1975-1980) therefore, the Nigerian government commissioned the construction of additional steel plants at Ovwian-Aladja in Delta state based on the Direct Reduction Route of iron production [31]. This project was meant to utilize abundant natural gas flared in the oil-fields rich region. Within the same period, the government established three (3) Rolling Mills, and each was sited at Katsina, Oshogbo and Jos respectively. In 1987, the Federal Government of Nigeria established the Raw Materials Research and Development Council (RMRDC) under the Federal Ministry of Science and Technology to ensure the availability and steady supply of raw materials to the steel plants. This was followed by the establishment of the National Metallurgical Development Centre (NMDC) to undertake researches and projects on beneficiation of raw materials and development of processes for efficient exploitation of these locally available raw materials. To complement these efforts, the Nigerian government established the Metallurgical Training Institute (MTI) located at Onitsha and was designed to provide personnel training for the Steel Industry.

However, the establishment of Ajaokuta and Delta Steel Companies in 1979 by the Nigerian Steel Development Authority was the boldest step undertaken by the government for her technological growth and industrial development. The steel projects were designed to serve as a catalyst for the growth of other sectors of Nigeria's economy especially the technological and industrial sectors. Accordingly, Okpighe & Alajemba states that Nigeria is blessed with abundant raw materials such as iron ore, coal, natural gas and limestone and the steel project should lay the right foundation for industrial development [34]. Yet, for over four decades of policy summersaults, the integrated iron and steel complex at Ajaokuta appears to be in a state of distress. Although Nigeria has invested at least \$5 billion on the ASP, with more than 3000 workforces, not even a single ton of steel has been produced [14, 21].

Several studies such as Olatunji, Ihuoma, Eromo, and others examined various challenges militating against the operations of ASP and identified barriers such as legal battles between the government of Nigeria and foreign contractors, inaccurate project planning and design, policy inconsistency and public corruption, among others [35, 19, 14]. Thus, there is dearth of empirical studies on the nexus between the ailing Ajaokuta Steel Plant and poor state of industrialization and technological growth in Nigeria. Whereas research in more advanced economies focus on the transformation of already established technologies and industries, the equivalent studies on Nigeria have always been saddled with how to revamp the country into a tech-driven and industrialized economy. It is against this background that the study examined the effects of

ailing Ajaokuta Steel Company on industrialization and technological growth in Nigeria.

2. Literature Review

2.1. Theoretical Literature

The chaos theory

Against megaprojects' execution and complex organizational success, Chaos theory explains why the relationships between "causes and effects" are usually nonlinear, that is complicated [11, 17]. Furthermore, Chaos theory explains why megaproject breakthrough is not completely explained from the context of general parameters such as project financing, accuracy of planning, effective leadership and communication, availability of machineries and control, among others [12]. According to Olatunji, the overarching uniqueness of Chaos theory is that it explains why project outcomes are not entirely predictable by observable finite parameters [35]. Moreover, in mechanics and mathematics, Chaos theory has to do with the study of apparently random or unpredictable behaviour in systems governed by deterministic laws [43].

Situating the explanatory measures of Chaos theory in the context of "Ajaokuta Steel Plant and its effect on technological growth and industrialization in Nigeria", one can deduce that though the Ajaokuta Steel Company and technological development in Nigeria may be familiar in terms of "cause and effect" relationship, apparently the former (Ajaokuta Steel Plant) does not guarantee the latter (technological growth). By this, the construction of mega steel plant in Nigeria is not deterministic of the nation's future technological advancement and industrialization because of the unpredictable disorderliness, confusion and uncertainty which various components or elements of the integrated steel complex produced, arising from conflict of interests among its diverse stakeholders.

Indeed, the Chaos theory is a suitable explanatory framework for the problematic of this study, which is the paradox of steel development in Nigeria. In fact, the Ajaokuta Integrated Steel Plant represents a system characterized by chaos- that is, complications, disorderliness, uncertainty and confusion. From the outset, the mega steel plant was established to serve as a bedrock for technological growth and industrialization of Nigeria until these efforts were undermined by "chaos-inducing factors" emanating from the new crop of unpatriotic leaders who prioritized personal aggrandizement and primitive accumulation of wealth over public good or happiness for the generality of Nigerians. The predominance of neo-patrimonial, prebendal and patronage system in Nigeria has continued to hinder the operation of Ajaokuta Steel Plant. It is on this note that Achebe in his "Trouble with Nigeria", pigeonholed Nigeria's problem of underdevelopment to corrupt and inept political leadership [2].

Apparently, these chaotic factors that have not only plagued but stagnated Nigeria's foremost and largest industrial project at Ajaokuta, Kogi state for several decades often manifested in various forms such as public corruption, policy inconsistency and discontinuity, inadequacy of project planning, inadequate budget allocation, inflation of contracts and legal disputes, among others. For instance, part of the factors that halted progress at Ajaokuta Steel Plant includes budget deficits arising from economic recessions and political corruption, court disputes between the Nigerian government and foreign interest in the steel factory, international arbitration between the Nigerian government and the Mittal Steel subsidiary, Global Infrastructure Nigeria Ltd (GINL), project discontinuity across various administrations, and lack of trusts, among others [8, 27, 36, 33, 21]. As a source of chaos, the governing elite's misuse of proceeds from the petroleum products, policy inconsistency and discontinuity have not only stifled development infrastructure in Nigeria but put them in perpetual crisis [1]. According to Kattan, Chaos theory studies the behaviour of dynamical systems that are highly sensitive to initial conditions [23].

2.2. Empirical Literature

Specifically, the study reviewed empirical literature related to our study's units of analysis and observation, namely, the Ajaokuta steel development, industrialization and technological growth in Nigeria. The dilemma of steel production and technological innovation in developing societies, particularly in Nigeria has elicited myriads of academic interrogations. Notably, some academic literature identified public corruption as a major factor that plagued the operations of Ajaokuta Steel Complex. There is unanimity among scholars that corruption is a hindrance to Nigeria's development and contributes to backwardness of Africa [39, 22, 42, 44]. For instance, Amzat on a study of how the Nigerian government officials collaborated with Indians to wreck the multi-billion-dollar Steel Companies, rip off host communities and tax payers, revealed that rampant corruption in terms of price inflation for materials culminated in the shutdown of rolling plants in Katsina, Jos and Oshogbo which were meant to leverage the outturns of steel production in Ajaokuta and Delta to produce bars and wire rods [9].

In the same vein, Jimoh investigated the current state of Ajaokuta steel project and attributed the failure of this ambitious industrialization project to decades of corruption and current lawsuits from the Mittal Steel subsidiary- Global Infrastructure Nigeria Ltd (GINL) that purchased license to manage the project under former President Olusegun Obasanjo [21]. On this note, the authors raised pertinent question about whether steel-led industrialization process, rather than other technological means is still sufficient enough to justify reviving the ailing steel plants in Nigeria. Relatedly, Abdulrahman, Aminu and Fadeyi studied the socio-economic effects of failed steel projects in Nigeria and concluded that

corruption has mitigated the operation of the steel plants, stressing that those public officials and governing elites who benefited from kickbacks in Ajaokuta steel project could neither allow the project to function nor facilitate the revival of the steel mill.

Other studies emphasized that inadequate strategic planning and insufficient data about the availability and exploitation of raw materials also undermined the operations of steel plants in Nigeria. On this, Abdulrahman considered poor planning, contracting strategy, design, funding and instability in Nigeria's political and administrative systems, as responsible for operational challenges bedevilling the steel plants [1]. Also, Matusevich and Olatunji argued that due to lack of strategic ideas among the Nigerian political leaders and their economic lackeys, the steel plant being an evolving industrialization project in the country was hindered by paucity of data for adequate planning at that time [27, 35]. He further stated that the knowledge base, proven market, technology and the infrastructure support to drive the megaprojects were non-existent. Flyvbjerg agreed with the above and stressed that the success of greenfield depends largely on intensive planning, strong information and knowledge base, provision for resource inputs, etc. considering the long gestation periods of such projects [16].

Abdulrahman on the other hand perceived the Ajaokuta steel mill as a paradox, owing to the fact that "too much plans were made on building a steel mill plant but less planning or attention was given to the availability of the quantities of the resources and technologies that could be used to harness the raw materials" [1]. They also advanced that lack of provisions in the masterplan establishing the Ajaokuta steel mill for machineries to harness raw materials (ore deposits) for the steel industry undermined its operation. Based on this, Olatunji averred that there were no technology and skills to drive the much-needed Ajaokuta steel project in Nigeria [35]. While the motivation for the establishment of mega steel plants in Nigeria was based on the historical iron forging that predated colonial escapades in the country [24, 13], the planners of Ajaokuta steel project were unaware of the fundamental differences between the traditional iron forging and Ajaokuta steel plant's integrated processes, in terms of significant need for limestone in steel production, which was only made known to the steel project initiators during the advanced stages [35].

Another challenge interrogated by scholars as undermining the steel production in Nigeria was the insufficiency of coking coal. Though there are huge deposits of coal in some parts of Nigeria including Enugu and Lafia-Obi, Agbu and Abdulrahman et al. argued that they are not suitable for steel production due to lack of coking properties associated with Enugu coal deposits and high concentration of ash and Sulphur, as well as structural problems associated with Lafia-Obi coal deposits [6, 1]. Further, Matusevich revealed how the management team for the Ajaokuta Steel Plant was made aware of the quality of iron ore deposit in Nigeria only after

the exploratory studies were already completed and construction phase begun in full force [27]. However, while the initial steel project design was made for an ore with much higher ferrous content, the need for an emergency major re-design became unavoidable [1, 35].

Additionally, some scholars shared the views that poor policy formulation and faulty implementation process were showstoppers that plagued the operation of Ajaokuta steel plant for several decades. For instance, Abdulrahman et al. x-rayed various policy regimes associated with the Ajaokuta steel project, and discovered that no specific government policy exists to ensure the completion and continuous operation of steel mill. In a related context, other studies found government's policy inconsistency and discontinuity as culpable for the current non-performance and inactivity of the Ajaokuta steel mill [1]. Arising from this, Jimoh et al. observed the "unwillingness of successive administrations to ensure continuity, as seen by the handovers from Obasanjo to Shagari, from Shagari to Buhari, and again from Obasanjo to Yar'Adua" [21]. According to them, this obnoxious act of policy discontinuity has destroyed several projects and has increased the number of unfinished government projects in the country, including the Ajaokuta steel plant.

This corroborates the assertion that Nigeria is a hub for abandoned government projects in the sub-Saharan Africa, with the existence of large quantum of uncompleted projects—about 56,000 in number, estimating to cost about N12 trillion as of 2021 (Nigerian Institute of Quantity Surveyors, 2012 cited in [45]. On the area of policy summersault, several instances abound in existing literature. Providing an instance of inconsistency in a major policy document in Nigeria, Ohimain noted that the vision 2020 document targeted the production of 2 million metric tons of steel products from Delta Steel Company, whereas in reality, the plant was designed to produce 1 million tons of liquid steel at full capacity [32].

Furthermore, some critiques argued that the Ajaokuta steel complex failed to perform because the component machineries are antiquated with obsolete blast furnace model of steel production. According to Manning and Fruehan, many more alternative machineries have emerged after the blast furnace model of steel production, with some proven to be more viable than the hitherto approach [26]. Moreover, there is a mainstream argument in literature about the prevailing international conspiracy against Nigeria not to produce steel since the country is among the leading importers of steel products from the West. Okpigha and Alajemba argued that "international politics" caused a devastating setback to the operation of Ajaokuta Steel Mill [34].

On this note, Ihuoma perceived the dominance of foreign contractors in Ajaokuta Steel Plant as misery of this industrial project [19]. Ohimain clearly observed that these contractors were mostly foreigners, so there is a notion whether what was designed as the Ajaokuta steel mill was the actual thing [32]. In a related literature, the decision of Nigerian political leaders to shutout its historical allies such as the Great Britain and

the United States of America from the Ajaokuta steel project in favour of the Soviet Union, had a negative impact on the project's completion and operation due to myriad of socio-cultural barriers with the new Soviet allies [27, 35].

Other issues raised in extant literature about the current state of Ajaokuta Steel Company include inadequate budget allocation, limited resources to finance the giant capital-intensive steel development project and the adoption of Structural Adjustment in 1986 which provided a conduit-pipe for large scale importation of steel products. Moreover, another group of scholars are in consensus that the discovery of crude oil in Nigeria which guaranteed immediate return on investment shifted government's attention from other sectors of the economy. On this, Ifaturoti and Ku, Mustapha and Goh stressed that gross underperformance of the Nigerian manufacturing sector is a result of overbearing dependence on crude oil without any strategic effort to accelerate growth with oil revenues in other sectors of the economy [18, 25].

Specifically, Abdulrahman et al. argued that with the period of oil windfall in Nigeria, government lost focus and concentration leading to its inability to complete the Ajaokuta Steel Plant, as all energies were directed at constructing oil refineries and oil wells in the country [1]. In the same vein, Falola noted that with increasing oil and revenues in the 1970s and early 1980s, the Nigerian government initiated multiple megaprojects almost simultaneously [15] which includes oil and gas exploration projects, hydro-electric plant, massive infrastructure for transportation, major agricultural projects, and integrated steel and rolling plants, which were considered as overambitious for an incipient socio-economic formation with weak financial base [35].

Thus, the existing literature on the green field Ajaokuta Steel Plant and other related projects is quite revealing and has shown that this national asset is confronted with myriad of challenges. In summary therefore, for more than four decades, the Ajaokuta Steel Plant has remained in the national front-burner, and is perceived as neither a total failure nor a significant breakthrough. However, while the extant studies have considerably interrogated various debacles militating against the Ajaokuta Steel Plant, the effect of this non-performing megaproject on industrialization and the nation's quest for technological growth has not received adequate empirical examination. This is the research gap this study has attempted to fill.

3. Methodology

The study relied on data triangulation (comprising qualitative data generated with the aid of documentary method) as a method of collection. Documentary method of data collection is characterized by qualitative data generated from secondary sources such as textbooks, journal articles, official publications, media reports, and others which were used in all sections of the study, aiding discussion of results. Most of the secondary data were collected with the aid of universal search

engines such as the Google, PubMed, Ref list, CrossRef, Google Scholar, PMC free articles and ScienceDirect. Meanwhile, qualitative descriptive method of data analysis enabled us to provide detailed presentation, explanation and discussion of qualitative data utilized in this study.

4. Discussion

Examining the Effects of ailing Ajaokuta Steel Plant on Industrialization and Technological Growth in Nigeria

The establishment of steel complexes, rolling mills and oil refineries, among others by the Nigerian government was driven by the 'patriotic spirit' expressed in terms of political will. The rationale for establishing iron and complexes at Ajaokuta and Aladja as well as the rolling mills at Jos, Oshogbo and Katsina was to utilise the available natural resources (solid and liquid minerals) to forge relevant tools that would drive the industrialization of Nigeria. In the first instance, the setting up of steel industry in Nigeria was indeed a giant stride and a genuine commitment to develop the economy. Obikwelu and Nebo noted that the Nigerian government scored a passing grade for its efforts to place Nigeria in the world steel map [31]. The Nigerian steel plant located at Ajaokuta is the largest of its kind in Africa and its operation combined with the gas and electricity plants would be a leading factor in the industrialization of Nigeria [34].

The derailment of Ajaokuta Steel Plant and absence of strong technologically driven economy is an indictment to the successive administrations in Nigeria. This has not only defeated the rationale for the establishment of steel plants in the country but has negated every effort aimed at building an industrialized economy. The Ajaokuta Steel Plant symbolizes Nigeria's biggest stride for industrialization and was designed to create indigenous technology capable of setting the milestone for development of Nigeria. The project has also received huge investment funds from the outset till date. For instance, Eromo and Jimoh et al. observed that the Ajaokuta steel project has gulped over US\$5 billion, with more than 3000 people currently under its payroll, working for the maintenance of a facility which has not produced a ton of steel products since inception [14, 21]. Consequently, rather than producing, Nigeria is among the Africa's leading importers of iron and steel products, and spends more than \$3.3 billion annually on importation of steel, yet the country has abundance of iron ore and bitumen as well as steel factories to utilize these resources [34].

Comparatively, Egypt, Libya and South Africa featured in the 2021 list of world steel producers while Nigeria was conspicuously missing despite the location of a multibillion-dollar iron and steel mills in the country. There is no doubt that strong iron and steel sector is pivotal to industrialization and technological advancement of any society. Brazil, Taiwan and South Korea which were once at parity with Nigeria in terms of development indices have joined the map of leading steel producers and technologically advanced

countries in the world, leaving the country behind. With all the investments in the steel sector, it is therefore sad that the mega steel project conceived and executed through the patriotic zeal of past Nigerian leaders has failed to contribute to the development of Nigeria [37]. Arising from the chaotic state of steel projects in Nigeria, this section discussed the effects of dilapidated Ajaokuta Steel Plant on industrialization and technological growth in Nigeria. This is guided by the following measures:

Dearth of suitable technology for the growth of manufacturing sector in Nigeria

Increasing dependence of Nigerian economy on foreign technologies

Dearth of Suitable Technology for the Growth of Manufacturing Sector in Nigeria

A vibrant iron and steel sector is necessary for building strong infrastructure and an economy driven by information, communication and technology (ICT). Nigeria is endowed with all the objects of nature (raw materials) such as iron ore, coking coal, limestone and natural gas, among others needed for steel development [32, 29]. The rationale for the establishment of steel plants in Nigeria was to develop and drive local production of goods by creating indigenous technology suitable for the manufacturing of these products within the country. According to Oluyole, the Ajaokuta Steel Company located in Kogi state of Nigeria was conceived to serve as a bedrock for technological growth and industrialization of Nigeria [37]. They noted that the integrated Ajaokuta steel plant was envisaged to have multiplier effects on all sectors of the Nigerian economy such as the industrial and manufacturing, agriculture, transport and construction sectors, among others.

Consequently, the failure of Ajaokuta Steel Plant to energize technological advancement in Nigeria is thus, implicated in the nation's weak manufacturing sector. Virtually all the countries in the world with strong manufacturing base have corresponding capacities for steelmaking. Even some countries such as Japan and South Korea, etc. with notable scarcity of raw materials for steel production have improvised means to produce steel and are today ranked among world's leading steel producers. As a result of the failures of Ajaokuta Steel Plant in Nigeria, the economy is plagued by weak technological growth which is implicated in the low productivity of industrial and manufacturing sectors. Due to the inability of steel plants and rolling mills to provide the essential infrastructure for industrial development in Nigeria, the nation's economy is currently suffering from the effects of lack of technological growth especially when viewed against the following parameters:

1. Nigeria cannot produce locally heavy-duty machines such as tractors and trucks, lathe and drilling machines and automobiles, among other machineries necessary for carrying out her capital projects.
2. Nigeria lacks the technological knowhow to explore and exploit its natural environment.

3. Due to weak technological base, Nigeria lacks the capacity to refine its abundant raw materials into finished products of premium values. Instead, it exports these raw materials as unfinished products to industrialized economies. This often results in trade deficits considering the cheap values of these raw materials in the global market compared to the cost of imported finished products.
4. The Nigerian economy is dependent on advanced and progressive economies for industrial machineries and their spare parts.
5. Agriculture in Nigeria is largely subsistent, driven by crude implements as large-scale and mechanized agricultural production remained a mirage due to unavailability and inaccessibility of essential technologies involved in driving mechanized food production.
6. The Nigerian economy is persistently plagued with insecurity as the nation struggles to provide adequate security of lives and property owing largely to the fact that it cannot produce its own security infrastructure to de-

fend herself against internal and external aggressions if the need arises [20].

Accordingly, a critical examination of Nigeria shows that the country is not in the affirmative in terms of technological development [20], and it is blamed on a number of factors such as relegation of indigenous knowledge during planning and execution of major projects, lack of vision-oriented industrial policies, high corruption index and internal insecurity, among others. Due to barrenness of indigenous technology, Nigeria cannot manufacture or produce what its teeming population of over 200 million people needs. This makes the country an outrageous importer of finished products from industrialized economies of the world. For instance, within six-month period in 2022, Nigeria imported \$14.5 billion worth of food and petroleum products, among others [41]. Table 1 below showed the top 10 imports in Nigeria for the year 2021. As shown in Table 1, iron and steel products which Nigeria's biggest industrial project, the Ajaokuta Steel Plant was designed to manufacture, are among the nation's top 10 imports.

Table 1. Nigeria's Top Ten Imports in 2021.

Ranks	Product Names	Amount in US Dollars	Percentages
1	Mineral fuels including oil	US\$16.3 billion	31% of total imports
2	Machinery including computers	\$7.5 billion	14.2%
3	Vehicles	\$3.5 billion	6.6%
4	Electrical machinery, equipment	Electrical machinery, equipment	5.9%
5	Cereals	\$2.8 billion	5.3%
6	Plastics, plastic articles	\$2.5 billion	4.9%
7	Pharmaceuticals	\$1.4 billion	2.6%
8	Articles of iron or steel	\$1.2 billion	2.2%
9	Optical, technical, medical apparatus	\$1.1 billion	2.1%
10	Sugar, sugar confectionery	\$987.1 million	1.9%

Source: Workman (2022).

The above product groups represent the highest dollar value in Nigeria's import purchases during 2021. The percentage share each product category represents in terms of overall imports into Nigeria is also shown in the Table 1. According to Workman, these top 10 categories represent more than three-quarters- 76.7 percent of imported goods into Nigeria during 2021 [46]. The Ajaokuta Steel Plant, among other integrated projects within the steel subsector was established to produce tools that would serve as catalysts for technological and industrial transformation of Nigeria. Paradoxically, with penury of suitable technology and resultant unproductive economy, Nigeria is today importing what ordinarily should

be produced within the country. The overbearing dependence on foreign made goods due to deficiency of appropriate technology to produce them locally, has plummeted the number of industries in Nigeria and converted industrial hubs to warehouses of imported goods and event centres [38]. The effects of this on the productivity and development of Nigeria are so frightening.

Meanwhile, since 2019, Nigeria became the largest economy in Africa ahead of South Africa [12], yet its manufacturing output is abysmally low and behind her African peers including South Africa, Morocco, Egypt, Kenya, Botswana, and so on. In the recent ranking of performing indus-

tries in Africa, 8 out of 10 best performing industries are based in South Africa while the Nigerian based companies missed out. This is corroborated in the annual survey of Africa's Top 250 performing Companies based on market capitalization for the year 2020. In this survey, South African based industries accounted for 102 out of 250 best performers while her Nigerian counterparts accounted for a paltry number, 15 out of 250 companies [4].

This yawning gap in performance of the Nigerian industrial sector is largely due to the nation's prevailing poor state of technology and aloofness of its political leaders to channel proceeds of lucrative oil and gas commodities towards advancing the productive forces as catalyst for industrialization. On this note, Ifaturoti and Ku, Mustapha and Goh pointed out that gross underperformance of the Nigerian manufacturing sector is a result of overbearing dependence on crude oil without any strategic effort to accelerate growth in other sectors of the economy with oil revenues [18, 25]. With the Nigerian manufacturing sector struggling to produce due to the ailing iron and steel sector and underdeveloped local

technology, dependence on foreign made goods remains largely inevitable.

Increasing Dependence of Nigerian Economy on Foreign Technologies

The idea of establishing the Ajaokuta Steel Company was envisaged to serve as a foundation for Nigeria's industrialization through the creation of indigenous technology that would produce the real needs of Nigerian citizens. The steel factory was also designed to serve as a backbone and a boost to national development and technological advancement in the country. Conversely, the failure of this mega industrial steel plant in achieving the desired goal of stimulating tech revolution, industrial growth and economic development, has resulted in decades of Nigeria's dependence on foreign technologies and products. Due to the underdevelopment of its technology, Nigeria is ranked in the bottom-low- 118 out of 132 countries of the 2021 Global Innovation Index [47]. This can be found in Table 2 below.

Table 2. 2021 Global Innovation Index - GII Ranking on Selected Countries.

Countries	GI Rank	Score	Income Group Rank	Regional Rank
Singapore	8	57.8	8	2
Mauritius	52	35.2	41	1
Brazil	57	34.2	11	4
Tunisia	71	30.7	7	9
Morocco	77	29.3	8	12
Kenya	85	27.5	9	3
Egypt	94	25.1	13	17
Nigeria	118	20.1	28	16

Source: World Intellectual Property Organisation (2021).

Thus, Nigeria largely relies on other nations especially of Asia, Western Europe and North America for virtually everything developmental and technological. Table 3 below showed Nigeria's major suppliers of imported technological products in the world.

Table 3. Nigeria's Major Suppliers of Imported Technologies.

Ranking	Supplying Countries	Percentage of imported technologies
1	Mainland China	24.7% of the global total
2	Netherlands	10.3%
3	India	8.8%
4	Belgium	7.3%
5	United States of America	6.1%

Ranking	Supplying Countries	Percentage of imported technologies
6	Russia	4%
7	South Korea	2.8%
8	Norway	2.5%
9	Germany	2.4%
10	France	2.3%
12	Brazil	2.2%
13	Italy	2%

Source: <https://www.worldstopexports.com/nigerias-top-10-imports/>

From the country-specific data presented in Table 3, it is revealed that about 75.6 percent of all imported technological products into Nigeria in 2021 were fabricated by manufacturers outside the African continent, with mainland China topping the chart, accounting for about 24.7 percent of the global total import into Nigeria. Netherlands trails China as second major supplier of foreign-made technological products to Nigeria with about 10.3 percent of the world total. India is the third which accounted for 8.8 percent, followed by Belgium with 7.3 percent of the total tech imports into Nigeria. The United States of America and Russia accounted for 6.1 percent and 4 percent of the total technological imports into Nigeria respectively. Meanwhile, South Korea, Norway and Germany accounted for 2.8 percent, 2.5 percent and 2.4 percent of the global technological imports into Nigeria in the year 2021. On the other hand, France, Brazil and Italy accounted for 2.3 percent, 2.2 percent and 2 percent of the world's total technological import into Nigeria.

Continently, Nigeria imported technologies and products in the year 2021 in the following order: 46.5 percent of Nigeria's global total imports by value came from Asia; 40.1 percent of major suppliers are in Europe; 7.2 percent of tech and products imports from North America; 2.9 percent from Latin America; 2.6 percent from the African continent; and 0.7 percent from the Oceania led by New Zealand and Australia [46]. Furthermore, Workman identified some of the capital-intensive technologies and products imported into Nigeria especially in the year 2021 [46]. These include heavy machinery (such as bulldozers, excavators, road rollers); sort/screen/washing machinery; rubber/plastic article making machines; refrigerators, freezers, and air conditioners; temperature-change machines; motorcycles, cars, trucks, and tractors; automobile parts and accessories; public-transport vehicles, trailers, special purpose vehicles, armoured vehicles and tanks; and chassis fitted with engine, among others.

Virtually all technologies used in Nigeria today are imported. On this context, the Nigerian economy is described as a mere shell [10]. In the Information, Communication and Technology (ICT) subsector alone, the former Director-General of the National Information Technology Development

Agency (NITDA), Professor Isa Ali Ibrahim, asserted that Nigeria spends on a yearly basis an average of \$2.8 billion on importation of various ICT products and services [3]. In the same vein, the Director-General, National Office for Technology Acquisition and Promotion, Dr. Ibrahim DanAzumi, while emphasizing on the need for indigenous production of technology as a catalyst for economic development of Nigeria, stated that more than 90 percent of technologies powering the Nigerian economy are imported [40]. Similarly, the chaotic technological sector of the Nigerian economy is described and is in reality a dependent one. This is because, the technological basis of the economy is largely foreign as about 80-90 percent of its technology use in local manufacturing are imported [10].

5. Conclusion

From the empirical discussion presented above, coupled with the information from key government stakeholders about the current state of technological growth and industrialization in Nigeria, it is glaring that Nigeria has retrogressed to a major consumer of foreign technologies. The irony is that most of these technologies were supposed to have emanated from the value-chains involving the mega steel plants and rolling mills, as well as research outputs from the tertiary institutions such as the universities, research institutes, polytechnics and colleges of education in Nigeria. Thus, the study concluded that the fragile state of the Ajaokuta Steel Plant is implicated in the slow progress to Nigeria's technological growth and industrialization, making dependence on foreign technologies inevitable. The failure of the Ajaokuta Steel Plant to deliver iron and steel products for the creation of indigenous means of labour has instead made the country an outrageous consumer of foreign techs. This has not only halted Nigeria's quest for industrialization but has truncated its ability to manufacture what it consumes, thereby leaving the country in a paradox of poverty in the midst of abundance of human and material resources. Meanwhile, the stagnation of this mega Ajaokuta steel project is not only the result of protracted legal disputes between the

Federal Government of Nigeria and foreign interest in the company, but also an outcome of orchestrated machination by the organized syndicates from within and outside the public sector, who converted the steel project to a conduit-pipe for primitive accumulation of wealth. This explains why the steel mill has continued to receive huge budgetary allocations without corresponding performance on yearly basis.

Abbreviations

STISA	African Union Science, Technology and Innovation Strategy for Africa
SDG	Sustainable Development Goals
USSR	Union of Soviet Socialist Republic
NSDA	Nigerian Steel Development Authority
TPE	Tiajpromexport
ASP	AJaokuta Steel Plant
RMRDC	Raw Materials Research and Development Council.
NMDC	National Metallurgical Development Centre
MTI	Metallurgical Training Institute
GINL	Global Infrastructure Nigeria Ltd
ICT	Information Communication Technology
NITDA	National Information Technology Development Agency

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Conflicts of Interest

The authors declare no conflicts of interest.

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