

# INDUSTRIALIZATION AND ECONOMIC GROWTH: Analyses Using Crude Petroleum and Natural Gas Manufacturing, and Solid Minerals

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## Abstract

*This study analyzed the impact of industrialization on economic growth in Nigeria. Because of the link between industrialization and economic growth, both theoretical and econometric analyses were used to examine the contribution of industrialization to economic growth in Nigeria, using GDP as the dependent variable and crude petroleum and natural gas, manufacturing and solid mineral as independent variables from 1981-2013. The study adopted ordinary least squares (OLS) in formulating the model. The results show that crude petroleum and natural gas, manufacturing and solid mineral, significantly contribute to economic growth. On the whole, the adjusted  $R^2$  value shows that the explanatory power of the model is as high as 99%. The study recommends that creating the necessary environment to achieve strong performance of the industrial sector. Sustain the efforts at generating local materials for infant industries and support the campaign of local campaign initiative.*

**Key words:** Industrialization, Manufacturing, Economic Growth, Crude Petroleum, Solid Minerals.

## INTRODUCTION

Some regions and countries, notably in East Asia, are rapidly catching up to industrialized countries, while others, especially in Sub-Saharan Africa, are lagging far behind and the share of poor people in the population has even increased in some countries. Industrial development has had an important role in the economic growth of countries like China, the Republic of Korea (Korea), Taiwan. Some countries have managed to achieve growth with equity, whereas in others inequality has remained high. The growth stories of seven countries – China, India, Korea, Taiwan, Indonesia, Mexico and Brazil – are described and discussed as an illustration. The main

emphasis is on describing their growth processes and strategies, the role of industrial development, the contribution of a range of policies to growth performance, and the impact of growth on poverty and income inequality.

According to Bolaky (2011), industries are very essential in a developing country like Nigeria because the marginal revenue products of labour in the industrial sector are higher than the marginal revenue product of labour in the agricultural sector. Based on this, the releasing of labour force from agricultural sector to the industrial sector increases the marginal product of labour in the agricultural sector and increases the overall revenue and output of the society and hence contributes to economic-growth. Therefore, industrialization is an ideal policy option for sustainable economic growth in Nigeria and it is what the present regime needs to achieve its transformation agenda. Based on the above, Nigeria has designed policies to attract manufacturing and industrial activities during the colonial and postcolonial periods. In the colonial era, the focus was to extract raw materials from Nigeria to foreign based industries. Like the rest of African countries, the colonial government in Nigeria was interested in extracting raw materials for its industries at home. For this reason no conscious efforts was made to industrialize Nigeria. It used to be argued that countries should specialize in areas of production that they are best suited. Between the periphery and the centre, the centre had more advantage in industrial output and the periphery in raw materials (Jhingan, 2008). The emphasis of this paper was to look at industrialization and economic growth: analyses using crude petroleum and natural gas manufacturing, and solid minerals.

### Concept of industrialization

Industrialization is the process in which a society or country (or world) transforms itself from a primarily agricultural society into one based on the manufacturing of

goods and services. Individual manual labor is often replaced by mechanized mass production and craftsmen are replaced by assembly lines. Cap (2002). The process by which traditionally nonindustrial sectors (such as agriculture, education, health) of an economy become increasingly similar to the manufacturing sector of the economy. Sustained economic development based on factory production, division of labour, concentration of industries and population in certain geographical areas, and urbanization.

#### Concept of Manufacturing

Manufacturing is the production of merchandise for use or sale using labour and machines, tools, chemical and biological processing, or formulation. The term may refer to a range of human activity, from handicraft to high tech, but is most commonly applied to industrial production, in which raw materials are transformed into finished goods on a large scale. Such finished goods may be used for manufacturing other, more complex products, such as aircraft, household appliances or automobiles, or sold to wholesalers, who in turn sell them to retailers, who then sell them to end users and consumers. Manufacturing takes turns under all types of economic systems. In a free market economy, manufacturing is usually directed toward the mass production of products for sale to consumers at a profit. In a collectivist economy, manufacturing is more frequently directed by the state to supply a centrally planned economy. In mixed market economies, manufacturing occurs under some degree of government regulation. Manufacturing, the single most important sub-sector of industry, accounts for nearly two-thirds of industrial GDP. Within manufacturing, the most important sub-sectors are food processing, basic metallurgy, machinery and equipment, and chemical products. The production of motor vehicles, aircraft, certain electronic products and machinery and equipment are worldclass. Some of these industries are recipients of generous public incentives (World Trade Organization, 2004).

#### Concept of Minerals

A mineral is a naturally occurring substance, representable by a chemical formula, that is usually solid and inorganic, and has a crystal structure. It is different from a rock, which can be an aggregate of minerals or non-minerals and does not have a specific chemical composition. The exact definition of a mineral is under debate, especially with respect to the requirement a valid species is biogenic, and to a lesser extent with regard to it having an ordered atomic structure. The study of minerals is called mineralogy.

#### Theoretical Framework

Industrial development is a driver of structural change which is key in the process of economic development.

Recent research suggests that economic development requires structural change from low to high productivity activities and that the industrial sector is a key engine of growth in the development process. Virtually all cases of high, rapid, and sustained economic growth in modern economic development have been associated with industrialization, particularly growth in manufacturing production (Szirmai 2009).

In a 2 sectors analyses: a small industrialized economy and an agricultural sector. The industrialized sector is typically located in a few urban pockets and operates, more or less like any modern industrial economy (modern or urban sector), technologically advanced. Larger agricultural sector: primitive modes of production, vast majority of population is very poor-living at or near subsistence consumption (primitive, traditional, rural or subsistence sector); low wages, very low productivity close to zero. Workers in the industrial sector earn higher wages than those in rural sector, wage gap related to productivity gap. Assumption of duality an analytical convenience. While developed countries may have traits of dualism, the claim behind the dual economy literature is that such dualism is much sharper than LDCs

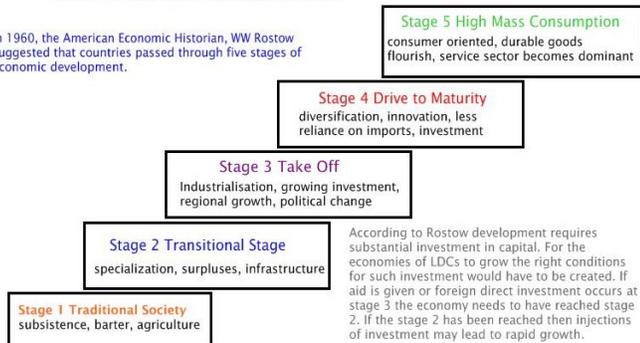
#### Empirical Review

Dollar and Kraay (2004), who examined impacts of increased trade on growth and inequality, found changes in growth rates to be highly correlated with changes in trade volumes. No systematic relationship between changes in trade volumes and changes in household income inequality was found, and they conclude that on average greater globalization is a force for poverty reduction. Still, the impact of trade liberalization is likely to vary between countries, depending for instance on factor endowments, and liberalization creates both winners and losers. Similarly to international trade, the impact of foreign direct investments on income inequality is likely to vary between countries. Any foreign direct investment (FDI)-inequality relation depends e.g. on the sectorial composition of FDI, its impact on demand for unskilledworkers, the skill bias of technical change induced through FDI, and theregional distribution of FDI (see e.g. Cornia, 2005) China's reforms started in the late 1970s and early 1980s with agricultural reform, which de-collectivized agricultural land and privatized land-userights. Investments in rural infrastructure were increased, mandatory delivery of output to the state by farmers was reduced, and farmers were enabled to have a more market-oriented o

Rostow's Model - the Stages of Economic Development

<http://www.bized.co.uk/virtual/dc/copper/theory/th9.htm>

In 1960, the American Economic Historian, WW Rostow suggested that countries passed through five stages of economic development.



output mix (Ahya and Xie, 2004). Due to reforms, agricultural growth averaged almost 10 per cent per year during 1980-1984 and 6.2 per cent per year in the 1980s as a whole (Ahya and Xie, 2004), decreasing poverty in rural areas. Successful reform in the agricultural sector contributed substantially to reform and expansion of the manufacturing sector. Due to increased productivity in agriculture, surplus labour became available to migrate to the manufacturing sector. Furthermore, due to increased

Table 1: Results

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	95.0% Confidence Interval for B	
	B	Std. Error				Lower Bound	Upper Bound
1 (Constant)	-614.342	307.723		-1.996	.055	-1243.707	15.022
CPN	.735	.140	.277	5.246	.000	.449	1.022
SM	432.758	33.929	.641	12.755	.000	363.365	502.152
MF	5.272	1.321	.100	3.991	.000	2.571	7.974

income, farmers were able to increase their expenditure on goods and services produced by the domestic manufacturing sector (Dutta, 2005).

Link between Industrialization and Economic Growth

- i. Focus on the share of manufacturing in the total commodity production (i.e. agriculture and industry, including mining, manufacturing, construction and utilities) rather than in total GDP. The share of manufacturing in commodities is set out against a country's per capita gross national income in 2000.

- ii. Szirmai finds a significant positive correlation of 0.79 between the logarithm of income per capita and the share of manufacturing.
- iii. Major exceptions among the advanced economies are primary exporters such as Norway, Canada and Australia.
- iv. Among the developing countries, Taiwan, Thailand and Brazil rank higher in terms of industrialization than in terms of income. Nevertheless, the table illustrates the general point about industrialization. The poorest countries in the table are invariably those with the lowest shares of manufacturing (and the highest shares of agriculture). The more prosperous countries are the more industrialized ones.

Methods of data Analyses and Model specification

The methods of analysis or estimation techniques include Ordinary Least Square (OLS) method, and multiple regression is adopted to test the causal relationship between industrial outputs to GDP. The test of the hypotheses earlier stated would be done at 5% level of significance and as

Such, the generalization of the study findings would be limited to this extent. The study hypothesized that industrialization does not have a significant effect on the economic growth of Nigeria. The model proxied Gross Domestic Product (GDP) as the endogenous variable to measure economic growth while crude petroleum and natural gas (CPN<sub>g</sub>), solid minerals (SM<sub>i</sub>), and manufacturing (MF<sub>i</sub>) represents the exogenous variables.

The econometric form of the model is specified as;

$$GDP = f(CPN_g, SM_i, MF_i)$$

The econometric equation becomes;

$$GDP = b_0 + b_1 CPN_g + b_2 SM_i + b_3 MF_i + u_i \dots \dots \dots (i)$$

Where;

b<sub>0</sub> = Intercept of relationship in the model/constant

b<sub>1</sub> – b<sub>3</sub> = coefficient of each exogenous variable

u<sub>i</sub> = Error term

Estimates and Analyses

Table 2: Result II

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin - Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.998a	.995	.995	949.3093	.995	2002.711	3	29	.000	1.98

a. Predictors: (Constant), MF, SM, CPN

b. Dependent Variable: GDP

### Normality Test for Residual

The Jarque-Bera test for normality is an asymptotic, or large-sample, test. It is also based on the ordinary least square residuals. This test first computes the skewness and kurtosis measures of the ordinary least square residuals and uses the chi-square distribution {Gujarati, 2004}.

The hypothesis is:

$H_0: X_1 = 0$  normally distributed.

$H_1: X_1 \neq 0$  not normally distributed.

At 5% significance level with 2 degree of freedom.

JB = 16.077

While critical JB >  $\{X^2_{(2)}df\} = 5.99147$

### Discussion of Findings

It is important at this point to state the implication of our findings. An examination of model indicated that changes in industrial output exerted a significant influence on the country's Gross Domestic Product in the study period (1981-2015). And also CPN, SM, MF influences significantly on the GDP. Ochiama (2007), Agba and Ushie (2009) posit that, Nigeria's per capita production of electricity dwindles as her population increases and cannot support industrial activities. The effects of epileptic and insufficient electricity supply in the country are grievous as most factories are close down, while small and medium enterprises (SMEs) are unable to effectively operate in Nigeria. Consequently, some firms are compelled to generate power and this not without consequence; it increases the cost of production and the final consumer bears the burden. Corruption is also one of the most vital obstacles to industrialization in Nigeria. High level corruption among government official have enormous impact on infrastructural development in the country (Agba, Ikoh, Ushie&Agba, 2008). Corruption threatens electricity supply in the country, it was widely reported that billions of Dollars was spent during President Obasanjo's tenure on power projects, and what Nigerians got in return was "blackout" while the bank accounts (both local and foreign) of contractors swollen (Agba, et.al, 2009). Corruption could also be responsible for the lack of adequate finance for the industrial sector, since monies from Banks for Industry (BOI) ends up in wrong hands. However Ukaegbu (1991) argue that, lack of finance cannot necessary be a challenge to industrialization, since the number of Nigeria millionaires grew remarkably over the years; rather investors prefer commerce to industry. He also observes that inadequate labour is not impediment to industrial development, since many graduates in science, engineering and technical education are

unemployed in Nigeria. Ukaegbu posit that the claim that inadequate physical infrastructure militate against industrialization is erroneous and a kind way of neglecting the fact that "infrastructure are the products, and not the agents of industrialization". These arguments strengthened our position in this research that foreign competition and the superficial transfer of technology among others occasioned by globalization pose the greatest challenge to industrialization in Nigeria.

### Conclusion and Recommendation

Based on the above revelation in this study, we conclude that the industrial output has a significant impact on economic growth and development in Nigeria. Furthermore, the analysis reveals that CPN, SM, MF has a positive impact on economic development in Nigeria though significant but varies. To achieve the level of economic growth and development that is desired, the government have to strive to reduce the challenges of manufacturing. Industrial sector is continues to be the backbone of economic growth and development based on this fact, and revelation from the empirical analysis conducted on this sector in Nigeria, we make the following policy pronouncement.

1. Creating a conducive environment to achieve strong performance of the industrial sector.
2. Sustaining efforts at generating local materials for infant industries and support the campaign of local contempt initiative.
3. The deregulation of interest rate should be pursued to a local conclusion. This is because the problem of high interest rate has actually frustrates the efforts of prospective investors from acquiring loan for investment which has in turn affected and has negative implications for the economy.
4. Development of strong institutional structures to support the growth and development of a sustainable small and medium enterprises (SMES) sub-sector

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