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MANUFACTURING SUB-SECTOR DYNAMICS AND ECONOMIC GROWTH IN NIGERIA (1981-2022)

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ABSTRACT: *This study examined the impact of manufacturing sub-sectors dynamics on economic growth in Nigeria covering the period 1981-2022. Data for the study were extracted from the Central Bank of Nigeria (CBN) statistical bulletin and World Development Index (WDI) 2022. The method of data analysis used is the linear regression method with the application of the Error Correction Model (ECM). The major findings of the study reveal that Cement production (CP) contributes positively but insignificantly to economic growth in Nigeria (β = 2.622724 and p-value = 0.4414 > 0.05), Beverages and Tobacco Production (BTP) contributes positively but insignificantly to economic growth in Nigeria (β = 2.040513 and p-value = 0.0018 > 0.05), Chemical and Pharmaceuticals Production (CHP) contributes negatively but insignificantly to economic growth in Nigeria (β = -17.39120 and p-value = 0.5188 > 0.05) and Pulp paper and paper products (PPP) contribute positively but insignificantly to economic growth in Nigeria (β = 56.85029 and p-value = 0.5062 > 0.05). It is therefore the recommendation of the study that the government should create an enabling environment and adjust its taxation rate on these companies which is currently at 24% to around 18% and the federal and state governments should create a system to protect forests from illegal loggers who are indiscriminately exploiting and felling the national trees.*

KEYWORDS: Manufacturing, Sub-Sector, Economic Growth, Production.

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INTRODUCTION

Manufacturing is the production of merchandise for use or sale using labor, machines, tools, chemical, and biological processing or formulation. The term may refer to a range of human activities from handicrafts to high tech but is most commonly applied to industrial production, in which raw materials are transformed into finished goods on a large scale (Iyoha, 2014). Industrialization has been seen as a veritable channel for attaining an improved quality of life for the populace. Industrialization is the core driver of the modern economy. It catalyzes ensuring the transformation of an economy from one that is purely agrarian to an economy that fully harnesses its factor endowment and relies less on the supply of raw materials and finished goods from external sources. The critical role of the manufacturing sector in economic development is depicted in the sector's contributions to the Gross Domestic Product (GDP) of many developed countries. UNIDO (2019) affirmed that manufacturing activities play a significant role in economic expansion and wealth creation.

Manufacturing has been accepted as the major panacea to the economic prosperity of any modern economy. It is the means for the production of goods and services, the creation of employment opportunities, and a major source of income. The viewpoint of economists who propounded the structural change models is that the instrument for economic transformation lies in the structural change in an economy from primary production to manufacturing (Todaro & Smith, 2012). The development of the industrial sector in Nigeria of which manufacturing is a subset began with the first republic. It has been the cardinal objective of several development plans in Nigeria since it is considered the springboard to economic prosperity.

The Import Substitution Strategy was adopted in the 60s but it did not reduce Nigeria's dependence on the importation of manufactured goods. As observed by Adedipe (2017), this was not successful because the goods manufactured in Nigeria could not meet up with the international competition. Nigerian manufacturing became dependent on imports, especially during the oil boom of the 1970s. When the world oil market collapsed, the resultant reduction in oil earnings worsened the situation and it became worse for the sector which was dependent on imported raw materials (Abel, 2017).

A critical analysis of the historical trend of the manufacturing sector output reveals a fluctuating pattern. In 1981, the manufacturing sector output was ₦28.23 billion, this increased to ₦30.31 billion in 1982, ₦33.49 billion in 1983, and reduced to ₦29.42 billion in 1984. The fluctuating pattern was slightly addressed after the Structural Adjustment Program (SAP) that took place in 1986. In 1986, the manufacturing sector output was ₦41.63 billion, this further increased to ₦45.96 billion, ₦66.34 billion, ₦76.14 billion, and ₦87.96 billion between 1987 to 1990 respectively. The increasing trend still continued to the millennium period (2000s). It clearly revealed that the manufacturing sector output totaled ₦984.08 billion in 2000, ₦1,146.68 billion, ₦1,358.53 billion, ₦1,635.05 billion, ₦1,968.56 and ₦2,326.31 billion between 2001 to 2005 respectively. Historical statistical records further revealed that the manufacturing sector output increased further. However, the growth increase was not geometric as compared to previous years. In 2015, the output of the manufacturing sector was 8,973.77 billion. This was accompanied by an increase in 2016 of less than 20% percent which yielded 8,903.24 billion. From 2017 through 2020, it revealed an increase thus, ₦10,044.46 billion, ₦12,455.53, ₦16,781.06, and ₦19.539.66 billion respectively (Central Bank of Nigeria, 2020). However, this growth when adjusted in terms shows that the Nigerian manufacturing sector is underperforming.

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The economic growth in Nigeria has been adversely affected by the prolonged economic recession occasioned by the collapse of the world oil market in the early 1980s and the attendant sharp fall in foreign exchange earnings. The economy's problems may also include dysfunctional social and economic infrastructure, excessive dependence on imports for consumption and capital goods, poor institutional framework and management strategies, unprecedented fall in capacity utilization rate in the industry, and neglect of the agricultural sector, among others (Adesina, 2018). These have led to the problem of economic diversification to other sectors of the economy and also resulted in fallen incomes and devalued standards of living amongst Nigerians.

Currently, Nigeria's manufacturing sector grew by 5.89% (year-on-year) in real terms in Q1 2022, an increase of 3.61% points from the preceding quarter which recorded a growth rate of 2.28%. Nominal GDP growth of the sector was recorded at 11.72% year-on-year in Q1 2022, showing a fall of 20.38% points from the same quarter of 2021 (32.10%). The sector contributed 10.20% to overall GDP in real terms in Q1 2022, higher than the contribution in the first quarter of 2021 and lower than the fourth quarter of 2021 which stood at 9.93% and 8.46%.

Nigeria continues its recovery from the 2016 recession, sustaining an estimated 2 percent growth rate in 2019. The collapse of global oil prices during 2014–16, combined with lower domestic oil production, led to a sudden slowdown in economic activity. Nigeria's annual real GDP growth rate, which averaged 7 percent from 2000 to 2014, fell to 2.7 percent in 2015 and to -1.6 percent in 2016. Growth rebounded to 0.8 percent in 2017, 1.9 percent in 2018, and then plateaued at 2 percent in the first half of 2019. In 2020, Nigeria experienced its deepest recession in four decades, but growth resumed in the fourth quarter as pandemic restrictions were eased, oil prices recovered, and the authorities implemented policies to counter the economic shock. As a result, in 2020 the Nigerian economy experienced a smaller contraction (-1.8 percent) than had been projected when the pandemic began (-3.2 percent) (World Bank, 2021). The Nigerian manufacturing sector offers special opportunities for capital accumulation. Capital accumulation is one of the aggregate sources of growth (Szirmai, 2019). It is much lower in agriculture and services; thus, an increasing share of manufacturing will contribute to economic growth. It is therefore pertinent to investigate if such a relationship is obtainable in Nigeria. However, the Nigeria manufacturing sector comprises thirteen sub-sectors, namely: oil refining; cement; food, beverages, and tobacco; textile, apparel, and footwear; wood and wood products; pulp paper and paper products; chemical and pharmaceutical products. Other sub-sector activities include non-metallic products, plastic and rubber products; electrical and electronic; basic metal and iron and steel; motor vehicles and assembly; and other manufacturing. It is based on the foregoing that this research is aimed at carrying out an empirical investigation of the impact of the manufacturing sub-sector on economic growth in Nigeria covering the period 1981-2022.

Over the years, Nigeria's high import of manufactured products and weak export of processed goods are evidence of the inherent weakness of the sector. Meanwhile, the weak performance of the manufacturing sector is also reflected in the low share of non-oil exports to total export earnings as well as the high share of manufactured goods in total imports. Data from the National Bureau of Statistics (NBS) show that non-oil exports as a percentage of total exports averaged 7% in the past three years, while manufactured and processed products as a share of total imports increased from 31% in 2014 to 38% in 2019. Between 2005 and 2018, for instance, the sector grew by an annual average of 12%, fueled largely by increasing consumer

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demand and the GDP rebasing exercise, which expanded the scope of manufacturing to include 13 subsectors. Growth in the sector was led by only a few sub-sectors such as Cement, Food, Beverages and Tobacco. Despite the sector's rapid expansion, increases in non-oil/manufactured goods exports were only marginal even as Nigeria experienced sharp growth in imported food items and manufactured products. Imports remained the dominant source of inputs into food, beverages, and tobacco in Nigeria, accounting for more than 70% of all raw materials (McCulloch, Balchin, Mendez-Parra & Onyeka, 2020). However, the Nigerian manufacturing sector is faced with many challenges, ranging from near nonexistent power, inadequate funding, insecurity, poor infrastructures, and irregular taxes, among others, to poor business development strategies. Judging the performance of the Nigerian manufacturing sector from a holistic dimension will not only pose problems for policy conclusion but may not be an accurate representation of the manufacturing sector status/performance in Nigeria. Studies such as the one conducted by Adofu, Taiga and Tijani (2015), Dogara (2018), Tunali and Boru (2019), Olarewaju (2018), and Haraguchi and Benson (2019), among others, that have been carried out in this area have also failed to analyze the manufacturing sub-sector specifics on economic growth in Nigeria. This is because some of the manufacturing sub-sectors may be performing well relative to others. This study is therefore focused on estimating the impact of the manufacturing sub-sector on economic growth in Nigeria.

LITERATURE REVIEW

The Concept of the Manufacturing Sector

The manufacturing sector refers to those industries that are involved in the manufacturing and processing of items and indulge or give free rein in either the creation of new commodities or in value addition (Adebayo, 2017). To Dickson (2010), the manufacturing sector accounts for a significant share of the industrial sector in developed countries. The final products can either serve as finished goods for sale to customers or as intermediate goods used in the production process.

Loto (2012) refers to the manufacturing sector as an avenue for increasing productivity in relation to import replacement and export expansion, creating foreign exchange earning capacity, and raising employment and per capita income which causes unrepeatable consumption patterns. Mbelede (2012) opined that the manufacturing sector is involved in the process of adding value to raw materials by turning them into products. Thus, the manufacturing industry is the key variable in an economy and motivates the conversion of raw materials into finished goods. In the work of Charles (2012), manufacturing industries create employment which helps to boost agriculture and diversify the economy in the process of helping the nation to increase its foreign exchange earnings.

Manufacturing industries came into being with the occurrence of technological and socioeconomic transformations in the Western countries in the 18th-19th centuries. This period was widely known as the industrial revolution. It all began in Britain and replaced the labor-intensive textile production with mechanization and use of fuels. Manufacturing sectors are categorized into engineering sector, construction sector, electronics sector, chemical sector, energy sector, textile sector, food and beverage sector, metal-working sector, plastic sector, transport and telecommunication sector (CBN, 2018). In recent times, some manufacturing industries in Nigeria have been characterized by declining productivity rate, by extension

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employment generation, which is caused largely by inadequate electricity supply, smuggling of foreign products into the country, trade liberalization, globalization, high exchange rate, and low government expenditure. Therefore, the slow performance of manufacturing sector in Nigeria is mainly due to massive importation of finished goods, inadequate financial support and other exogenous variables which has resulted in the reduction in capacity utilization and output of the manufacturing sector of the economy (Tomola, Adebisi & Olawale, 2012).

The Concept of Economic Growth

Economic growth is one of the major macroeconomic goals of a developed or developing economy. It is an increase in the production of economic goods and services, compared from one period of time to another. It can be measured in nominal or real (adjusted for inflation) terms. Traditionally, aggregate economic growth is measured in terms of gross national product (GNP) or gross domestic product (GDP), although alternative metrics are sometimes used (Norris, 2018). In simplest terms, economic growth refers to an increase in aggregate production in an economy. Often, but not necessarily, aggregate gains in production correlate with increased average marginal productivity. That leads to an increase in incomes, inspiring consumers to open up their wallets and buy more, which means a higher material quality of life or standard of living (Orville, 2017).

Bale (2016) sees economic growth as an increase in the capacity of an economy to produce goods and services, compared from one period of time to another. It can be measured in nominal or real terms, the latter of which is adjusted for inflation. Traditionally, aggregate economic growth is measured in terms of gross national Product (GNP) or gross domestic product (GDP), although alternative metrics are sometimes used.

Kevin (2012) asserts that economic growth occurs whenever people take resources and rearrange them in ways that are more valuable. A useful metaphor for production in an economy comes from the kitchen. To create valuable final products, we mix inexpensive ingredients together according to a recipe. The cooking one can do is limited by the supply of ingredients, and most cooking in the economy produces undesirable side effects. If economic growth could be achieved only by doing more and more of the same kind of cooking, we would eventually run out of raw materials and suffer from unacceptable levels of pollution and nuisance. Human history teaches us, however, that economic growth springs from better recipes, not just from more cooking. New recipes generally produce fewer unpleasant side effects and generate more economic value per unit of raw material.

Relationship between Manufacturing Sector and Economic Growth

Since the industrial revolution in the eighteenth-century manufacturing has been considered to be the main engine of economic growth and development. In development theory structural change was associated specifically with a shift of resources from the primary sector to the manufacturing sector. In recent years, however, the role of the manufacturing sector has been increasingly questioned. First, it is clear that the advanced economies are now predominantly service economies. Second, economic historians increasingly recognize the importance of service sectors such as trade, transport, and financial intermediation which have contributed to industrialization and development (Bernard, 2017).

The manufacturing sector has many characteristics, making it a key determinant of economic growth. It is the fastest-growing sector, as compared to other economic sectors. Its productivity

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is higher than the agricultural and service sectors. The possibility of specialization is greater in the manufacturing sector. Moreover, it has forward and backward linkages with other sectors. Given industrial products are tradable and access to international markets, the manufacturing sector has better opportunities for increasing demand (Tunali & Boru, 2019).

Unbalanced Growth Theory

The unbalanced growth theory was formulated by Hirschaman in 1990. Though several writers such as Singer, Streeten, Kindle and some others had at various times favored the deliberate unbalanced growth thesis, Hirschman is the greatest advocate of the theory. He opined that the deliberate unbalancing of the economy according to a pre-designed strategy is the best way to achieve economic growth in developing countries. Hirschman points out that the industrialized countries of the world did not achieve their development via the growth of the entire economy at one time but their achievement is the culmination of the economy and then communicated to other sectors. That is, from one industry to another and from one form to another. Through forward and backward linkages, the entire economy will end up being developed and growth will be witnessed.

The unbalanced growth theory as explained by Hirschman states clearly that the economy follows the course of imbalances in the system. Competition, tensions as well as inducements are the inevitable outcomes of unbalanced growth and the more of these are, the greater the prospects of growth. The unbalanced growth emphasizes that investment should be made in selective sectors rather than simultaneously in all sectors.

This theory is relevant to this study largely because it supports investment in key sectors of the economy which when developed will influence and precipitate growth in other sectors through benefits accruing from the developed sector via forward and backward effects. It implies then that if the government can focus on the agricultural sector especially now that there is dwindling oil prices, it will be used to develop other sectors and this will lead to overall economic growth.

Endogenous Growth Theory

The endogenous growth by Solow (1970) asserts that improvements in productivity can be attributed directly to a faster pace of innovation and extra investment in human capital. They stress the need for government and private sector institutions to encourage innovation and provide incentives for individuals and businesses to be inventive.

This theory is relevant to the research because the manufacturing sector plays a central role of the accumulation of knowledge as a determinant of growth i.e knowledge industries such as telecommunication, electronics, software or biotechnology are becoming increasingly important in developed countries.

Neoclassical Growth

This was first propounded by Solow (1956). The model believes that a sustained increase in capital investments increases the growth rate only temporarily, because the ratio of capital to labor goes up. The marginal product of additional units is assumed to decline and thus an economy eventually moves back to a long term growth-path with the real GDP growing at the same rate as the growth of the workforce plus factor to reflect improving productivity. Neo-

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classical economists who subscribe to the Solow model believe that to raise an economy's long term trend rate of growth requires an increase in labor supply and also a higher level of productivity of labor and capital. Differences in the rate of technological change between countries are said to explain much of the variation in growth rates.

This theory is relevant to the study because the neo-classical model treats productivity improvements as an exogenous variable which means that productivity improvements are assumed to be independent of the amount of capital investment.

Empirical Literature

This section of the study is a compendium of the past and related empirical studies on the relationship between manufacturing sector production and economic growth.

Adofu, Taiga and Tijani (2015) with the application of multiple regression examined the empirical relationship between the manufacturing sector and economic growth in Nigeria for the period 1990 to 2013 using the ordinary least square method to ascertain the relationship between manufacturing, its components, and economic growth. The results show that the output of the manufacturing sector contributed negatively and had an insignificant relationship to real gross domestic product growth, which was indicative of the fact that the manufacturing sector of the Nigerian economy is presently experiencing decay as a result of non-implementation of policies aimed at boosting the sector; the average manufacturing capacity utilization rate contributed positively and had a significant relationship to real gross domestic product growth; the exchange rate and interest rate did not contribute to real gross domestic product growth, which shows a sign of macroeconomic instability; the inflation rate contributed positively to real gross domestic product growth but, the insignificant nature of the inflation rate was indicative of the fact that the inflation in the Nigerian economy is not properly managed; government expenditure was significant indicating that the expenditure made by the government in the Nigerian economy was adequate but not properly managed, but nevertheless, contributed positively to economic growth.

Dogara (2018) investigated the impact of manufacturing on economic growth with particular reference to Nigeria. The research used the Autoregressive Distributed Lag (ARDL) model to examine the impact of manufacturing on economic growth using time series data spanning the period of 1981-2015. The Bounds testing result reveals that manufacturing has a long-run positive impact on economic growth and development.

Tunali and Boru (2019) investigated the causality effects of the manufacturing sector on macroeconomic variables, such as gross fixed capital formation, services sector, savings, and economic growth in Turkey. The methodology adopted is the Granger causality analysis. They provided new evidence regarding the causality relationship between these variables. Their results indicated a one-way causality between manufacturing and savings and manufacturing and gross fixed capital formation. Moreover, causality existed between manufacturing and services and manufacturing and economic growth. Furthermore, no causality existed between the manufacturing and services and manufacturing sector and economic growth.

Gabriel and De Santana (2019) investigated how manufacturing affects economic growth over time by applying panel vector autoregression (PVAR) for the fixed effects approach for 115 countries during the 1990–2011 period, as well as estimated impulse-response functions (IRF) and forecast error variance decomposition (FEVD). Additionally, they applied the Hirschman-

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Rasmussen (HRs) Index for 29 countries for the years 1995, 2000, 2005, and 2010, as well as the field of influence for 1995 and 2010. Their results indicated that the manufacturing industry could work as an "engine of growth" in developing countries. Furthermore, manufacturing was the only strategic key sector for economic growth for most developing countries.

Haraguchi and Benson (2019) investigated the factors that led to increased manufacturing growth rates in a sample of 134 developing countries over the 1970 to 2014 period. The panel data regression was used in the study. Their findings showed that human capital and institutions represent factors that support the growth of manufacturing industries, given macroeconomic policies regarding openness to foreign trade, capital, and investment. They also found that most factors are not alone in promoting industry growth. They contribute as well to a sustained process of industrialization that characterized the process of economic growth of some successful countries over the 1970–2014 period.

Olanrewaju (2018) examined the relationship between manufacturing output and economic growth in Nigeria during 1980–2017 via a cointegration approach and a granger causality test to investigate the long and short run. The results of the study indicated that a long-run relationship exists among the variables employed in the estimation. The causality test suggests a one-way relationship between economic growth and manufacturing output.

Mongale and Tafadzwa (2018) tested Kaldor's first law in South Africa and investigated the relationship between the manufacturing sector and economic growth. Thus, to estimate the annual time series data from 1980 to 2016, they employed vector error correction. The findings of the study showed that the manufacturing sector proxied by the manufacturing output has a significant positive coefficient, which confirms that the sector contributes positively to economic growth.

Al Musabbeh and Almoree (2018) examined the long-term relationship between the performance of the manufacturing sector and economic growth in Saudi Arabia by testing Kaldor–Verdoorn and Thirlwall's laws. The findings show that Kaldor's law applies to data on KSA but with decreasing returns to scale. Moreover, Verdoorn's law is applicable at both macro and sectoral levels with decreasing returns to scale. The results of Thirlwall's model have shown that the relationship was negative, contrary to what was expected.

Meyer and McCamel (2017) determined the relationship between the manufacturing sector, economic output, and employment in South Africa during the 1994–2015 period. They employed the Vector Autoregressive (VAR) model with a multivariate cointegration approach. The results indicated a positive long-run relationship between the manufacturing sector, GDP, and employment. There was no short-run between the variables according to the vector error correction model (VECM). The manufacturing sector could create an enabling environment for employment creation. Moreover, an increase in manufacturing led to GDP growth.

Su and Yao (2017) investigated the main role of the manufacturing sector as the key engine of economic growth for middle-income economies using the correlation matrix method. They found that in the middle-income stage, manufacturing influences all the other sectors, including the services sector. Moreover, a positive correlation exists between the manufacturing sector and other sectors in both the short-run and long-run. Furthermore, a larger manufacturing share not only induces the gross private saving ratio but also accelerates the pace of technological accumulation. The empirical findings confirmed that the manufacturing sector is still the key engine of economic growth for middle-income economies.

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Joe (2016) ascertained the effectiveness of the manufacturing sector in promoting economic development in Nigeria. This is very essential in the Nigerian economy is characterized by GDP dependence on manufacturing output. Indices of exchange rate, capacity utilization, electricity supply, and industrial output are hereby studied for the period of 1985-2007 with respect to the effectiveness of the manufacturing sector in promoting economic development in Nigeria. A simple linear and multiple regression model was used for this project and criteria were examined. From the findings of this research work, it was observed that the manufacturing sector constitutes an integral part of the industrial base of any nation. They form the foundation on which the industrial sector of any nation must be built. It is logical, therefore, to say emphatically, that without a properly developed manufacturing sector base, there can be no industrialization of any sound foundation on which sustainable economic growth and development could be based.

Adugna (2014) examined the impact of the manufacturing sector on economic growth in Ethiopia based on the Kaldorian approach. The study used time series data covering 1980 – 2010. The study employed real gross domestic product (RGDP) as the dependent variable and manufacturing sector output (mf); manufacturing number of employment (emp); and labor productivity in the manufacturing sector (lpdrt) as the independent variables. The data obtained were analyzed using both descriptive (ratio and percentage) and econometrics (double log multiple regression analysis) methods. The study found that a unit change in the manufacturing sector increases the economic growth by 42 percent, that is, the higher growth of the manufacturing sector can have multiple impacts on the national economy.

Inakwu (2013) examined the impact of the manufacturing sector on economic growth in Nigeria. The study employed time series data covering the period of 1980 - 2008. The study assessed the effect of Manufacturing output (MANGDP); Investment (INVEST); Government expenditure (GOVEXP); and Money supply (M_2) on log of real Gross Domestic Product (LRGDP). The data obtained were analyzed using the ordinary least squares Method. The results indicate there is a positive and significant relationship between manufacturing and economic growth within the period of investigation.

Obamuyi, Oguniyi and Abel (2012) investigated the link between bank lending, economic growth and manufacturing output in Nigeria. The study utilized a time series data covering the period of 1973 – 2009. The study employed Manufacturing production (MOT) as the dependent variable and Bank Lending (BLD); Lagged Value of Manufacturing (LVM); Inflation Rate (INFL); Maximum Lending Rate (MLR); Capacity Utilization (CAP_U); Financial Deepening (FDP); Exchange Rate (EXR) and Gross Domestic Product (GDP) as the independent variables. The data obtained were analyzed using co-integration and vector error correction model (VECM) techniques. The findings of the study show that manufacturing capacity utilization and bank lending rates significantly affect manufacturing output in Nigeria. However, the relationship between manufacturing output and economic growth could not be established in the country. The study recommended that the government should put concerted effort in reviewing the lending and growth policies of manufacturers and lending institutions and also provide an appropriate macro-economic environment, in order to encourage investment-friendly lending and lending by the financial institutions.

Dan (2011) examined the impact of industrialization on economic growth 0f Nigeria. The study utilized time series data covering the period of 1980 – 2010. The study employed per capita output (Per capita GDP) as the dependent variable and Per capita output of the previous year

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(Per capita GDP$_{-1}$); Capital/industrial output (KAP/INQ); capital/industrial out of the previous year (KAP/INQ$_{-1}$); Labour/industrial output (Labour/INQ) as the independent variables. The data obtained were analyzed using co-integration and Vector Error correction model. The study found that the capital-industrial output ratio decreases per capita GDP; the labor /industrial output ratio also contributes negatively to per capita GDP which means that industrialisation has a negative impact on economic growth in Nigeria. The study recommended that policy measures should be put in place to improve human capital development so as to make people capable of using modern technology and to diffuse it in the society.

Obasan and Chris (2010) examined the role of the industrial sector in the economic development of Nigeria. The study used time series data covering the period of 1980 – 2008. The study employed Real Gross Domestic Product (RGDP) as the dependent variable and Manufacturing output (MOT); Exchange rate (EXR); Inflation Rate (INFR); Interest Rate (IR); Government Expenditure (GEXP) as independent variables. The data obtained were analyzed using the Ordinary Least Square Method. The study found that there is an empirical correction between the degree of industrialisation and economic growth in Nigeria. If one plots the share of the industrial sector in commodity production against per capita incomes, there is a positive relationship between the two. The study investigated the Nigeria economy as one that is developing and changing due to rapid changes in the world economy. Also the study found that the country exhibits a high level of economic openness that is not the industrial sector, increase in exchange rate movement, particularly foreign direct investment do not seem to provide the necessary stimuli for industrialisation in the country. The study recommended that economic openness and interest rate must be combined with other vital factors to give the desired boost to industrial development and if Nigeria industrial sector is to benefit maximally from globalization, emphasis should first be placed on deregulation at the sub-sector level to form a formidable block for effective and efficient linkage with the economic growth.

Elhiraika (2018) examined the key determinant of manufacturing share in aggregate output and its relationship with real GDP growth and growth volatility of 36 African countries. The study used cross-section with panel data covering 1980 – 2017. The study employed GDP growth (g) as the dependent variable and investment rate (GDI GDP); labor force (LF); official development assistance relative to GDP (ODA GDP); the share of manufacturing value added in GDP (MFGGDP); and public expenditure as percentage of GDP (GDP) as the independent variables. The data obtained were analyzed using ordinary least square and two-stage least squares. The study found a positive relationship between share of manufacturing in aggregate output and real GDP and a negative relationship between share of manufacturing in aggregate output and growth volatility. This is so, because an increase in the share of manufacturing in total output has the potential to raise GDP growth and reduce growth volatility.

METHODOLOGY

Research Design

This study adopted the *ex-post facto* design. This is a quasi-experimental design examining how an independent variable affects a dependent variable. The design also creates a framework whereby the researcher has no direct control over the variables but will estimate them as they are objectively.

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Model Specification

The guiding econometric model for this research is specified thus:

Implicitly: $GDPr_t = f(CP_t, BTP_t, CHP_t, PPP_t\, GFCFt)$ …….. (3.1)

The explicit panel econometric model is specified thus:

$$GDPr_t = \beta_{0t} + \beta_1 CP_t + \beta_2 BTP_t + \beta_3 CHP_t + \beta_4 PPP_t + \beta_5 GFCF_t + \mu_{it} \ldots\ldots\ldots (3.2)$$

Where:

GDPr = Rate of Gross Domestic Product (Measure of Economic Growth)

CP = Cement Production

BTP = Beverages and Tobacco Production

CHP = Chemical and Pharmaceuticals Production

PPP = Pulp paper and paper products

GFCF = Gross Fixed Capital Formation (Measuring Investment)

t = Time Period

β's = structural Parameters to be estimated

μ = Stochastic Error Term

Techniques and Procedure

Unit Root/Stationarity Test

This was used to test whether a variable's mean value and variance varies over time. It is necessary in time series variables in order to avoid the problem of spurious regression. The Augmented Dickey Fuller (ADF) and Phillips-Perron (PP) test was used for the analysis. Augmented Dickey-Fuller (ADF) test is used to test existence of unit root when there is autocorrelation in the series and lagged terms of the dependent variable are included in the equation. The following three models represent pure random walk, random walk with drift and random walk with drift and trend used in Augmented Dickey-Fuller tests:

$$\Delta\psi_t = \Omega\psi_{t-1} + \sum_{i=1}^{p} \beta_i \Delta\psi_{t-1} + \varepsilon_t$$

$$\Delta\psi_t = \alpha_0 + \Omega\psi_{t-1} + \sum_{i=1}^{p} \beta_i \Delta\psi_{t-i} + \varepsilon_t$$

$$\Delta\psi_t = \alpha_0 + \Omega\Psi + \beta_2 t + \sum_{i=1}^{p} \beta_i \Delta\psi_{t-1} + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 3.3$$

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where: $\Omega = (\lambda - 1)$ The null hypothesis is $H_0 : \Omega = 0$ and the alternative hypothesis is $H_a : \Omega < 0$

Decision Rule

If ADF test statistic (t-statistic of lagged dependent variable) is absolutely greater than the critical value, we reject the null hypothesis and conclude that the series is stationary (there is no unit root) but if otherwise, we accept the null hypothesis and conclude that the series is not stationary (there is unit root)

The Phillips-Perron (PP) test on the other hand uses nonparametric statistical methods to take care of the serial correlation in the error terms without adding lagged difference terms. The asymptotic distribution of the PP test is the same as the ADF test statistic.

Co-integration Test

This will be used to test if there exists a long-run relationship between the variables under investigation. The Johansen or Engel-Granger methodology will be used. The long-run equilibrium relationship is estimated with the following equation:

$$X_t = \alpha_0 + \alpha_1 Z_t + \varepsilon_t$$

If there is cointegration, α_0 and α_1 estimates reveal "super-consistent" estimators in the OLS regression. In this estimation fitted values of ε_t The series is tested for stationarity. In this analysis DF or ADF may be used. However, in hypothesis testing, critical values constructed by McKinnon (1991) are used. If this series is stationary, we can conclude that there is cointegration between X_t and Z_t. The fitted values of ε_t may be used as an error correction term of the model.

Decision Rule

If the ADF statistics of residual series is absolutely greater than the critical values at 5% level of significance, then there exists a long-run relationship between the variables and if otherwise, there exists no long-run relationship among the variables.

Error Correction Model (ECM)

The error correction analysis is an econometric analysis carried out if the variables under investigation are seen to be cointegrated. The Error Correction Mechanism (ECM) was used to estimate the speed of adjustment of the short-run dynamics of the variables and timing to long run convergence. The ECM is given by the equation: $\Delta GDPr_t = \beta_0 + \Delta\beta_1 CP_t + \Delta\beta_2 BTP_t + \Delta\beta_3 CHP_t + \Delta\beta_4 PPP_t + ECM_{t-1} + \mu_t \ldots .3.4$

Where Δ = First Difference Operator

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Decision Rule

If the ECM coefficient is > 0.50, then we conclude that the speed of adjustment is high but if the ECM coefficient is less than 0.50, we conclude that the speed of adjustment is low.

Granger Causality Mechanism

The Granger causality model is a statistical technique that will be carried out to the direction of causality existing between the dependent variables and the specified independent variables. The model is specified thus:

$$GDPr = \eta_i + \sum_{i}^{n} \eta_i \, GDPr_{t-i} + \sum_{i=1}^{n} \eta_i \, CP_{t-i} + \sum_{i=1}^{n} \eta_i \, BTP_{t-i} + \sum_{i=1}^{n} \eta_i \, CHP_{t-i} + \sum_{i=1}^{n} \eta_i \, PPP_{t-i} + \sum_{i=1}^{n} \eta_i \, GFCF_{t-i} + \Omega.$$

$$CP = \phi + \sum_{i}^{n} \phi_i \, CP_{t-i} + \sum_{i}^{n} \phi_i \, GDPr_{t-i} + \sum_{i=1}^{n} \phi_i \, BTP_{t-i} + \sum_{i}^{n} \phi_i \, CHP_{t-i} + \sum_{i=1}^{n} \phi_i \, PPP_{t-i} + \sum_{i=1}^{n} \phi_i \, GFCF_{t-i} + \psi$$

$$BTP = \beta + \sum_{i=1}^{n} \beta_i \, BTP_{t-i} + \sum_{i}^{n} \beta_i \, GDPr_{t-i} + \sum_{i}^{n} \beta_i \, CP_{t-i} + \sum_{i}^{n} \beta_i \, CHP_{t-i} + \sum_{i}^{n} \beta_i \, PPP_{t-i} + \sum_{i}^{n} \beta_i \, GFCF_{t-i} + \mu$$

$$CHP = \gamma + \sum_{i=1}^{n} \gamma_i \, CHP_{t-i} + \sum_{i}^{n} \gamma_i \, GDPr_{t-i} + \sum_{i}^{n} \gamma_i \, CP_{t-i} + \sum_{i=1}^{n} \gamma_i \, BTP_{t-i} + \sum_{i=1}^{n} \gamma_i \, PPP_{t-i} + \sum_{i=1}^{n} \gamma_i \, GFCF_{t-i} + \mu$$

$$PPP = \vartheta + \sum_{i=1}^{n} \vartheta_i \, PPP_{t-i} + \sum_{i}^{n} \vartheta_i \, CP_{t-i} + \sum_{i}^{n} \vartheta_i \, BTP_{t-i} + \sum_{i=1}^{n} \vartheta_i \, CHP_{t-i} + \sum_{i=1}^{n} \vartheta_i \, GDPr_{t-i} + \sum_{i=1}^{n} \vartheta_i \, GFCF_{t-i} + \mu$$

$$GFCF = \Theta + \sum_{i=1}^{n} \Theta_i \, GFCF_{t-i} + \sum_{i}^{n} \Theta_i \, CP_{t-i} + \sum_{i}^{n} \Theta_i \, BTP_{t-i} + \sum_{i=1}^{n} \Theta_i \, CHP_{t-i} + \sum_{i=1}^{n} \Theta_i \, GDPr_{t-i} + \sum_{i=1}^{n} \Theta_i \, PPP_{t-i} + \mu$$

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Decision Rule

If the probability value of an estimated Granger causality is less than 0.05, we reject the null hypothesis and conclude that a Granger causality exists while if the probability value is greater than 0.05, we accept the null hypothesis and conclude that there exists no causality relationship among the variables.

Data and Sources

Variables	Description	Sources
GDP	Gross Domestic Product	Central Bank of Nigeria (CBN) Statistical Bulletin, 2020.
CP	Cement Production	Central Bank of Nigeria (CBN) Statistical Bulletin, 2020.
CHP	Chemical and Pharmaceuticals Production	Central Bank of Nigeria (CBN) Statistical Bulletin, 2020.
BTP	Beverages and Tobacco Production	Central Bank of Nigeria (CBN) Statistical Bulletin, 2020.
PPP	Pulp paper and paper products	Central Bank of Nigeria (CBN) Statistical Bulletin, 2020.
GFCF	Gross Fixed Capital Formation	Central Bank of Nigeria (CBN) Statistical Bulletin, 2020.

Econometric Software for the Work

The software used in this research is the Eviews version 10. The primary purpose of using this software is because the data for the study is secondary in nature.

RESULTS AND DISCUSSION

Empirical Results

Time series data are often assumed to be non-stationary and thus, it is necessary to perform unit root tests to ensure that the data are stationary. The test was employed to avoid the problem of spurious regression. Therefore, the Augmented Dickey-Fuller (ADF) unit root test was used to determine the stationarity of the data to complement each other. The decision rule based on the ADF test is that its statistic must be greater than Mackinnon Critical Value at 5% level of significance and in absolute terms. The results of the unit-root test are reported in table 4.1 below.

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Unit-Root Test Result

Table 4.1: *Unit Root Test Result*

VARIABLE	ADF STAT.	CRITICAL VAL.	ORDER
GDPr	-1.996653	-1.949856	I(1)
CP	-5.359729	-1.949856	I(1)
BTP	-6.429749	-1.949856	I(1)
CHP	-2.601809	-1.950117	I(1)
PPP	-3.680368	-1.949856	I(1)
GFCF	-5.106289	-2.943427	I(1)

Source: *Author's Computation Using Eviews 10.*

Table 4.1 clearly shows that all the variables are stationary at first difference (I(1)). This means that the variables have unit-root until differences in the first order

Cointegration Analysis (Johansen Methodology)

Table 4.2: Cointegration Test Result

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.841317	163.3506	95.75366	0.0000
At most 1 *	0.735158	93.39850	69.81889	0.0002
At most 2	0.404430	42.91085	47.85613	0.1347
At most 3	0.330490	23.21789	29.79707	0.2355
At most 4	0.183336	7.971966	15.49471	0.4684
At most 5	0.007235	0.275917	3.841466	0.5994

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Source: *Author's Computation Using Eviews 10.*

In the course of the study, all the variables were seen to be stationary at first difference. Hence; the Johansen method of cointegration test was used for the study. The Johansen result as displayed in table 4.2 clearly shows evidence of cointegration as trace statistics test indicates 2 cointegrating equations as the trace statistic value is greater than that of 5% critical value (163.3506 > 95.75366) & (93.39850 > 69.81889)

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Regression Results

Table 4.3: ECM Result

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1337.357	180.6378	7.403529	0.0000
D(CP)	2.622724	3.364708	0.779480	0.4414
D(BTP)	2.040513	0.597555	3.414770	0.0018
D(CHP)	-17.39120	26.65533	-0.652447	0.5188
D(PPP)	56.85029	84.55823	0.672321	0.5062
D(GFCF)	0.199513	0.145047	1.375510	0.1785
ECM(-1)	-0.091239	0.020307	-4.493075	0.0001
R-squared	0.653573			
F-Statistics	10.066193			
Prob (F-Statistics)	0.000003			

Source: *Author's Computation Using Eviews 10.*

The regression result in table 4.3 clearly shows that cement production (CP) yielded a positive numerical coefficient at the magnitude of 2.622724. This entails a 1% increase in cement production that contributed to economic growth by 2.622724 percent. It also shows that CP has an insignificant contribution to economic growth (p-value = 0.4414 > 0.05) This conforms to economic a priori expectation.

It can also be seen from the result that Beverages and Tobacco Production (BTP) yielded a positive and significant numerical coefficient at the magnitude of 2.040513 with a corresponding p-value of 0.0018 < 0.05. This entails that their BTP contributes positively and significantly to economic growth in Nigeria. This conforms to economic a priori expectation.

Chemical and Pharmaceuticals Production (CHP) yielded a negative and insignificant numerical coefficient at the magnitude of -17.39120 with a corresponding p-value of 0.5188. This entails that there is a negative and insignificant relationship between CHP and economic growth in Nigeria.

It can also be seen from the regression output that Pulp paper and paper products (PPP) yielded a positive numerical coefficient at the magnitude of 56.85029 with a corresponding p-value of 0.5062 > 0.05. This entails that PPP has a positive but insignificant relationship with economic growth in Nigeria for the period under analysis.

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Finally, Gross Fixed Capital Formation (GFCF) yielded a positive numerical coefficient at the magnitude of 0.199513 with an insignificant p-value of 0.1785 > 0.05. This entails that GFCF contributes positively to economic growth in Nigeria but not significantly.

The F-statistics which is employed to test for the statistical significance of the entire regression plane yielded 10.06193 with a corresponding probability value of 0.000003 < 0.05. This entails that the test is statistically significant at the entire regression plane.

The coefficient of determination (R^2) which measures the explanatory power of the independent variables yielded 0.653573. This implies that approximately 65% of the variations in economic growth is explained by changes in the selected manufacturing subsector and gross fixed capital formation as used in this study. This is however relatively high and significant.

The error correction mechanism (ECM) which measures the speed of the adjustment of the variables at which equilibrium is restored yielded -0.091239. This is correctly signed (negative) at 5 percent level, and therefore confirms our earlier proposition that the variables are cointegrated. The speed suggests that economic growth in Nigeria adjusts relatively slowly to the long-run equilibrium changes in the explanatory variables and it gives the proportion of the disequilibrium error accumulated in the previous period that is corrected in the current period. The speed of adjustment is specifically at 9.12% annually.

Serial Correlation LM Test Result

Table 4.4: Serial Correlation Test Result

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.704474	Prob. F(2,30)	0.1990
Obs*R-squared	3.979441	Prob. Chi-Square(2)	0.1367

Source: *Author's Computation Using Eviews 10.*

The Breusch-Godfrey Serial Correlation LM Test was used to carry out the test of autocorrelation. It is clearly seen that the Obs*R-squared which follows the computed Chi-Square distribution yielded 3.979441 and it is clearly less than the Chi-Square probability which yielded 0.1367. This compels us to accept the null hypothesis that there is no serial correlation of any order. Hence; there is no presence of autocorrelation problems in the model.

Granger Causality Test Result

Null Hypothesis:	Obs	F-Statistic	Prob.
CP does not Granger Cause GDP	40	6.40202	0.0045
GDP does not Granger Cause CP		3.46846	0.0429

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BTP does not Granger Cause GDP	40	5.21506	0.0108
GDP does not Granger Cause BTP		3.30621	0.0491
CHP does not Granger Cause GDP	40	6.45777	0.0043
GDP does not Granger Cause CHP		6.43714	0.0044
PPP does not Granger Cause GDP	40	6.32177	0.0047
GDP does not Granger Cause PPP		4.60199	0.0173
GFCF does not Granger Cause GDP	40	1.42927	0.2539
GDP does not Granger Cause GFCF		10.2395	0.0003

Source: *Author's Computation Using Eviews 10.*

The granger result reveals that there is a bi-directional causality relationship between CP and GDP (p-value = 0.0045 < 0.05 & 0.0429 < 0.05). It also shows that there is a bi-directional relationship between BTP and GDP (p-value = 0.0108 < 0.05 and 0.0491 < 0.05). It can also be seen that there is a bi-directional relationship between CHP and GDP (p-value = 0.0043 < 0.05 & 0.0044 < 0.05). There is a bi-directional relationship between PPP and GDP (p-value = 0.0047 < 0.05 & 0.0173 < 0.05. The conclusion is that there is a causality relationship between the manufacturing sub-sectors and economic growth in Nigeria for the years under analysis.

DISCUSSION OF RESULTS

The main aim of this study is to ascertain the impact of the manufacturing sub sector on economic growth in Nigeria covering the period 1981-2020. The regression analysis carried out revealed that the manufacturing subsector aside chemical and pharmaceuticals production (CHP) contributes positively to economic growth in Nigeria. This is in line with the findings of Meyer and McCamel (2017) who determined the relationship between the manufacturing sector, economic output, and employment in South Africa during the 1994–2015 period. They employed the Vector Autoregressive (VAR) model with a multivariate cointegration approach. The results indicated a positive long-run relationship between the manufacturing sector, GDP, and employment. It was also in tandem with the findings of Dogara (2018) who investigated the impact of manufacturing on economic growth with particular reference to Nigeria. The research used the Autoregressive Distributed Lag (ARDL) model to examine the impact of manufacturing on economic growth using time series data spanning the period of 1981-2015. The Bounds testing result reveals that manufacturing has a long-run positive impact on economic growth and development. The result was also seen to be in correlation with the findings of Olanrewaju (2018) who examined the relationship between manufacturing output and economic growth in Nigeria during 1980–2017 via a cointegration approach and a granger

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causality test to investigate the long and short-run. The results of the study indicated that a long-run relationship exists among the variables employed in the estimation.

SUMMARY, CONCLUSION, AND RECOMMENDATION

Summary of Findings

This study ascertained the impact of manufacturing sub-sectors on economic growth in Nigeria. Data for the study were extracted from the Central Bank of Nigeria (CBN) Statistical bulletin. The econometric analysis used in the study is linear regression with the application of Ordinary Least Squares (OLS) technique. The major findings extracted from the analysis shows thus:

1. Cement production (CP) contributes positively but insignificantly to economic growth in Nigeria ($\beta = 2.622724$ and p-value = 0.4414 > 0.05).

2. Beverages and Tobacco Production (BTP) contributes positively but insignificantly to economic growth in Nigeria ($\beta = 2.040513$ and p-value = 0.0018 > 0.05).

3. Chemical and Pharmaceuticals Production (CHP) contributes negatively but insignificantly to economic growth in Nigeria ($\beta = -17.39120$ and p-value = 0.5188 > 0.05).

4. Pulp paper and paper products (PPP) contribute positively but insignificantly to economic growth in Nigeria ($\beta = 56.85029$ and p-value = 0.5062 > 0.05).

Conclusion

The result of the empirical tests provides useful insight into policy formulation and implementation. It indicates that the contribution of the manufacturing sector to economic growth was positive and insignificant and was above the expected threshold given the gamut of industrial policies put in place since independence. This insignificant relationship from the estimated result could be attributed to poor infrastructure especially electricity supply and non-implementation of policies. This assertion agrees with the submission of Ajanaku (2017), who argued that poor electricity supply and other factors have contributed to the dismal performance of the nation's industrial sector. The study revealed that the output of the manufacturing sector is insignificantly related to growth.

Recommendations

The following recommendations following the findings of the research were suggested:

1. From the results, it was discovered that cement production contributes positively but insignificantly to economic growth in Nigeria. Based on this, it is therefore recommended that the government should put in place incentives (e.g. reduced taxes, reduced duties on equipment imports, etc.) for Nigerian cement companies who invest in switching from fossil fuels to bioenergy fuels.

2. The results also reveal that beverages and tobacco production contribute positively but insignificantly to economic growth in Nigeria. In the light of this finding, it is recommended that the government should create an enabling environment and adjust its taxation rate on these companies which is currently at 24% to around 18%.

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3. From the analysis conducted, it was discovered that chemical and pharmaceuticals production contribute negatively but insignificantly to economic growth in Nigeria. Based on this, the study recommends that full benefit of any intervention by the government can be realized if there is corresponding economic investment in infrastructures particularly electricity and the stabilization of naira.

4. The study also discovered that for the years under analysis, pulp paper and paper products contribute positively but insignificantly to economic growth in Nigeria. This therefore entails that the federal and state governments should take extraordinary steps to protect forests from illegal loggers who are indiscriminately felling trees.

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