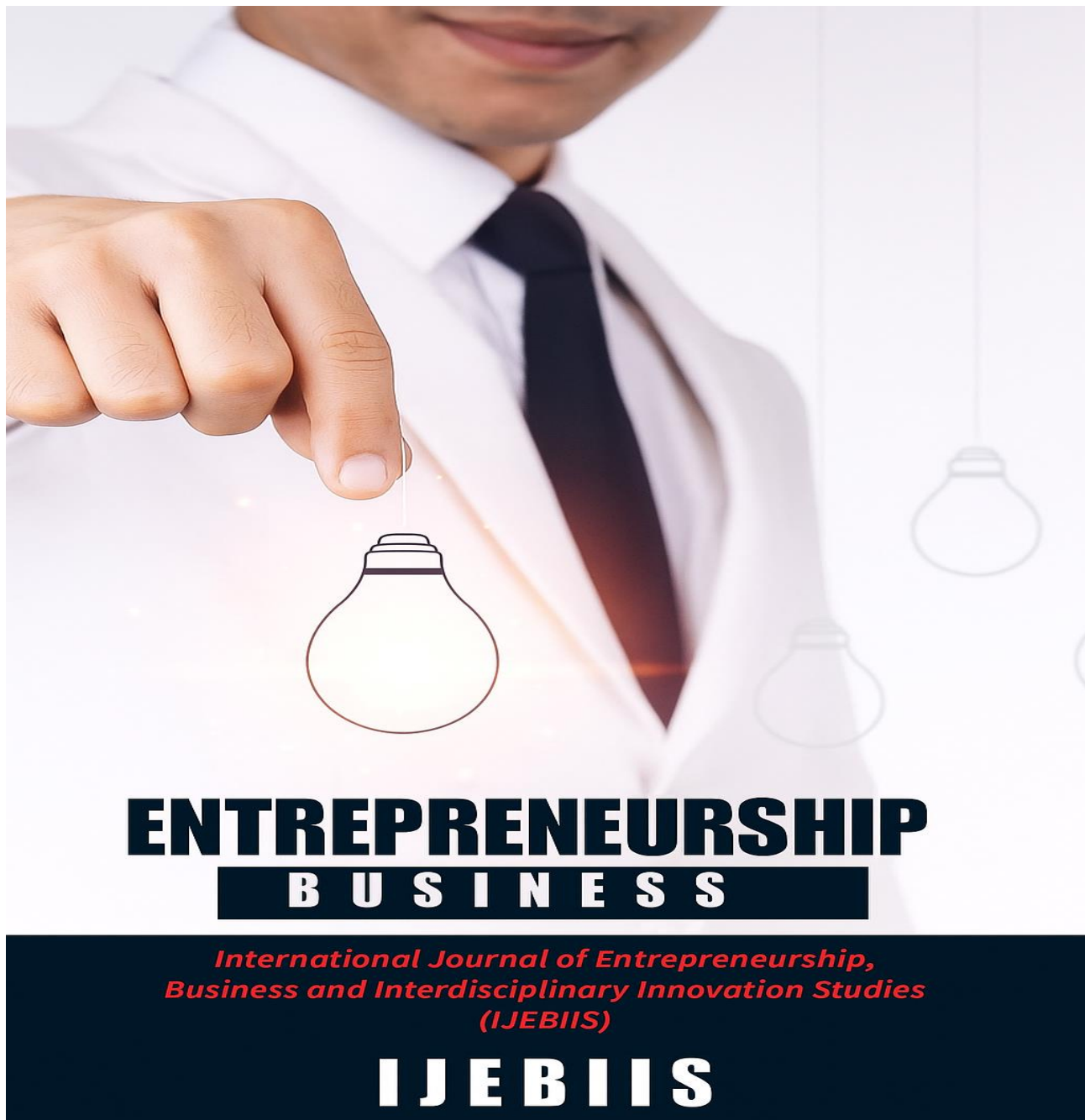




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IMPACT OF MANUFACTURING SECTOR OUTPUTS ON ECONOMIC GROWTH IN NIGERIA

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Abstract

The study examined the impact of manufacturing sector outputs on economic growth in Nigeria for the period 1992 to 2024. Data were generated from the database of World Development Indicator (WDI) and Central Bank of Nigeria (CBN) 2024 Statistical Bulletin. The research design adopted was the ex-post facto. The analysis was carried out using Vector Auto Regressive (VAR) model. Results of the analysis showed that food and beverages manufacturing output (FBMO) has positive and significant impact on economic growth. Rubber and plastic manufacturing output (RPMO) also has a positive and significant impact on the economic growth during the study period under study. While textile manufacturing output (TXMO) and chemical and pharmaceutical output (CPMO) both have a negative impact on economic growth in Nigeria. The study concluded that the performance of the manufacturing sector output is found to be in great need of reforms and improvement because its contribution to the economic growth in Nigeria is low. Consequently, the study recommended Based on the findings, that Nigeria policy makers should use industrial policy measures to control or check high importation of manufactured goods so as to encourage the domestic manufacturers to expand their production and boost the capacity utilization of the sector and productivity. The study also suggests that government should provide infrastructural facilities particularly, power to increase productivity in manufactured goods and reduce cost of productions to enable them compete effectively in the international market.

Keywords: Manufacturing, Manufacturing Sector Output, Economic Growth.

Introduction

Manufacturing as defined by various scholars and sources is a global business that was started during the industrial revolution in the late 19th century to cater for the large scale production of products (Amakom, 2015). Since then, the manufacturing output has changed tremendously through the innovations of technology, processes, materials, communication and transportation. According to Alao, (2019), the major challenge of manufacturing is to produce more products with less material, less energy and less labour involvement. In order to face these challenges, manufacturing companies must have strategy and competitive priority in order for them to compete in a dynamic market (Madu, 2016). According to Mesagan, (2017), a competitive strength of a company is based on the structural and infrastructural readiness. Four structural areas are comprised of capacity, facilities, technology, and sourcing. The infrastructural areas are workforce, quality, production planning, and organization.

According to Ladeinde, (2021) the company that carries out manufacturing activities must have a specific and strategic goal based on individual competitive strength, in order to compete in the marketplace. Furthermore, according to Dogruel, (2016), the global competitiveness of economic manufacturing subsectors requires high quality products and low prices. This is due to dynamic competition among the manufacturers to secure their customers Joseph, and Zdanowicz, (2014). As a result, the demand for high quality, low cost and prompt delivery has increased product variety. Manufacturing subsectors in the twenty-first century remains a key element of economic growth. However, the questions and issues that arise in the twenty-first century are quite different from those at the end of the twentieth. The “who, what, where and how” of manufacturing throughout the world have been transformed over these past decades, UNIDO, (2021). Manufacturing has been fundamentally changed by the decomposition and modularization of production, the emergence of ICT (information and communications technology) enabled services embedded in physical products, the entrance of new competitors, and the continuing development of production technology. The genesis of today’s goods from aircraft to apparel is now an international affair, this report depicts and considers aspects of those changes to highlight some of the choices facing firms and government UNIDO, (2021).

National manufacturing activity, as normally reported within the national accounts, is measured by counting the output of firms whose main industrial activity involves the transformation of materials or components into new products, and/or the assembly of components or subsystems into new products, Oxford Economics, (2018). The sub-sectors designated as manufacturing sub-sectors (e.g. machinery and equipment manufacturing; electrical and optical equipment manufacturing; chemicals manufacturing) are those which have final products which have been fabricated or assembled from materials or components, with these production activities typically taking place within plants or factories. Industrial activity within individual manufacturing sub-sectors is calculated by classifying the manufactured outputs according to categories defined in standardized classification systems, (Oxford Economics, 2018)

The global export of manufactured goods has steadily risen in the past several decades. According to the World Trade Organization (WTO, 2023) Total world exports of manufactured goods almost doubled from US\$ 9.96 trillion in 2010 to US\$ 14.8 trillion in 2021. In 2023, it reached US\$ 28.3 trillion. In a mere decade, exports of manufactured goods grew by nearly an order of magnitude, the geographic relocation of manufacturing in the past several decades is evident in the aggregated regional export data, Nigeria's portion of total world exports decreased from 18 per cent in 1992 to 13.2 per cent in 2010 and to 10.74 per cent in 2022. Manufacturing has been the major panacea to the economic growth of any modern economy, it is the means of production of goods and services, creation of employment opportunities and a major source of national income.

Many African countries have a desire to industrialize, as witnessed in national and regional policy statements. Significant progress is being made in selected countries (e.g. real manufacturing value added grew at around or more than 10% annually over 2010–2020 in Ethiopia, Rwanda and Tanzania). However, without a greater practical focus on implementing a consistent strategy to promote manufacturing, many African countries will miss the significant opportunities presented by their comparative and natural advantages, rising wages in Asia and growing regional markets Balchin, (2020).

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 the several development plans in Nigeria since it is considered as the springboard to economic growth. Africa's experience with manufacturing has been mixed and there are two ways to look at recent trends in the sector on the continent. On the one hand, formal manufacturing activity in Africa remains low compared with in other regions in the world Arjun, (2020). Moreover, the share of manufacturing value added in total gross national income (GNI) (at factor prices, using World Development Indicators (WDI) data) in Sub-Saharan Africa (SSA) has been falling for nearly four decades—declining from 18% in 1992 and 13% in 2010 to 10.6% in 2015 down to 9% in 2022. At the same time, however, Africa's manufacturing production has nearly doubled, rising from nearly \$85 billion in 2000 to approximately \$158 billion in 2016 to \$208 billion in 2020, Balchin, (2020).

Nevertheless, Africa as a whole remains a small player in global exports of manufactures. The continent's share of world manufacturing exports is less than 2%, and has declined marginally since 2010 Balchin, (2016). There are, however, some manufacturing sub-sectors in which Africa holds a larger share of global exports (e.g. more than 5% of global exports of fertilizers and inorganic chemicals; more than 4% of world exports of leather and manufactured leather products; and close to 2% of global exports of articles of apparel and clothing accessories). There are also encouraging signs of growth in African manufacturing exports in many product groups. Exports from Africa grew at an annual rate of 6% or higher between 2015 and 2019 in nearly half of the core manufacturing product groups. Rahul and Boyang (2019)

Nigerian government has made many efforts to improve the manufacturing sector output. For instance, the country adopted the import substitution industrialization strategy during the First National Development Plan (1962-1968) which aimed at reducing the volume of imports of finished goods and encouraging foreign exchange savings by producing domestically, some of the imported consumer goods (CBN, 2016). In addition, the country consolidated her import substitution industrialization strategy during Second National Development Plan

period (1970-1974) had a somewhat similar trust and focus but the emphasis shifted in the third plan (1975 – 1980) towards heavy industries.

Major projects were initiated in the steel and petroleum refinery sector. For the fourth plan (1980 –1985), the broad direction as in consonance with the third it retained the stress on heavy industries. However, several of the expensive plans were shortchanged with the onset of the profound economic crisis in the early 1980's. Therefore, the totality of plans and the effect it had created is ongoing (CBN, 2010). The stabilization measures of 1982, the restrictive monetary policy as well as stringent exchange control measures of the year 1984, all these measures proved abortive. This led to the introduction of the Structural Adjustment Programme (SAP) in 1986 (CBN, 2016). One of the main reasons for the introduction of SAP was to reduce the high dependence of the economy on crude oil revenue, by promoting non-oil exports, particularly manufacturing sector in the area of agricultural production, textile, chemical, pharmaceuticals, telecommunication, and cement production. The Rolling Plan of 1990-1992, which aimed at consolidating the achievements made so far in the implementation of the SAP and address the pressing problems still facing the economy; such as the strengthening of the on-going programmes of the National Directorate of Employment (NDE). Nigeria National Development Plan, (1990).

The Industrial policy of Industrial Clusters Parks introduced in 2009 as part of Vision 20:2020 has a clear vision for the manufacturing sector which is to be 'a technologically driven and globally competitive manufacturing sector, with a high level of local content and contributing a high proportion of the National GDP Ministry of Budget and National Planning, (2009). Since the introduction of the policy, the manufacturing sector contribution to GDP had experienced a slow rise since 2019, (CBN, 2021). The most recent ones were the National Economic Empowerment Development Strategy (NEEDS), of 2007. State Economic Empowerment Development Strategy (SEEDS) amongst others have shown positive aspiration in the right direction. Consequently, the country has not been able to address the issues of manufacturing sector deficit facing the country in order to propel the economy to desirable height like South Africa, Brazil and co. (CBN, 2021).

According to Obioma, (2015) reiterated that the requirements, among others, for revamping this dying economy are rapid and broad-based growth in the nation's manufacturing sector. Creating the enabling environment for such growth requires a renewed motivation from the government, not minding the failed efforts of past administrations. Thus, the need to enhance the production of Nigerian made goods was emphasized recently when the economy slid into recession following two consecutive quarters Q1 and Q2 of January 2016 (NBS, 2016). The economy only began to recover in June 2017, as announced by National Bureau of Statistics (Fasoye, 2018). This is characterized by reduced commodity prices owing to low productivity caused by the contraction of the economy.

The anchor borrowers programme, (2016) which was aimed at improving the agricultural produce that encourage manufacturing and economic growth (CBN, 2017). The Economic Recovery and Growth Plan (ERGP, 2017) is a medium term all-round developmental initiative that aims to restore economic growth, manufacturing sector in Nigeria and build a globally competitive economy. The manufacturing firm in Nigeria is an economic sector that brings approximately 9 percent of total GDP (Gross Domestic Product) each year, Bot Ropheka and Dyaji Anna (2022). In terms of employment generation, manufacturing sector activities account for about 12 per cent of the labor force in the formal sector of the nation's economy. Manufacturing activity is concentrated in large cities like Lagos, Port Harcourt, and Ibadan, in the south of the country. Millions of people are involved in producing household goods, consumer products, agriculture, cement, chemicals and many more.

Manufacturing industries are very critical, sensitive and vital to the economic growth of any nation most especially the under developed nations worldwide. Economists, industrialists and other social scientists have for long time discussed the causes of Economic growth and the mechanisms which always have to be link to advance domestic manufacturing behind it (MAN, 2022). Based on this background, this study will examine the impact of manufacturing sector output on economic growth in Nigeria, from 1992 to 2024.

Statement of the Research Problem

Since 2015, economic expansion has been modest. Growth was steady at 2.21%, in the 2019 after averaging 1.9% in 2018. 2% increase from 2020 and was 3.25% in 2022. Manufacturing sector output has remained low, which does not commensurate with the population growth compare to other counterpart, Rahul and Adebayo (2016). Various policy measures were adopted to remodel the above situation, such as the stabilization measures of 1982, the restrictive monetary policy and stringent exchange control measures of 1984, all proved abortive. This led to the introduction of the Structural Adjustment Programme (SAP) in 1986 (CBN, 2003). One of the main reasons for the introduction of SAP was to reduce the high dependence of the economy on crude oil as the major foreign earner, by promoting non-oil exports, particularly manufactured goods. However, the contribution of the manufacturing sub-sector to GNP has declined progressively, due to a number of factors. As a result, government introduced many other economic policies.

The National Economic Empowerment Development Strategy (NEEDS), of 2007. State Economic Empowerment Development Strategy (SEEDS) amongst others, have shown positive aspiration in the right direction. Consequently, the country has not been able to address the issues of manufacturing sector output deficit facing the country in order to propel the economy to desirable height like India, Brazil and co. (Enebong, A 2003). The industrial revolution plan (NIRP) of 2014, initiated by president good luck ebele jonathan's administration also proved abortive (Akinsanya, 2016).

In its Medium Term Plan for 2017–2020; President Muhammadu Buhari led government's Economic Recovery and Growth Plan (ERGP) advocate inclusive growth through diversification of production, achieving maximum welfare for the citizens by ensuring food and energy security. This is in spite of all the efforts of the government to kick-start and sustains rapid homemade products in Nigeria. The Nigerian manufacturing sector output is however, currently faced with several challenges. with about 820 manufacturing firms shut

down or temporarily suspended production process across four geo political zones in the country in the last seven years (MAN president)- 2015-2023 Q3 (NBS, 2023).

These problems are exacerbated by the problems of high demand for foreign goods; inadequate power supply, insecurity, high tax rate, low capital formation among others. However, despite the efforts of government, and all the economic policies introduced, the growth of the manufacturing sector remains vague. It is in the light of the above problems, that the study seeks to look into the impact of manufacturing sector output on economic in Nigeria.

Objective of the Study

The study seeks to examine the impact manufacturing sector outputs on economic growth in Nigeria between 1992 and 2024.

Literature Review and Theoretical Framework

Concept of Manufacturing

Manufacturing is a value-adding procedure that converts raw materials, components, or parts into pre-designed goods, products, or merchandise that satisfies a customer's expectations or specifications. In earlier times, the word "manufacturing" connoted that these procedures were predominately carried out by human power, thus the word contains two parts "manu" and "facturing." Today, much of manufacturing is being completed with the use of tools and machines on much larger scales and to much higher precision. (Doytch, 2021).

The basis of manufacturing can be traced back as far as 5000–4000 BC, the word manufacture did not appear until (1567), with manufacturing appearing over 100 years later in 1683 Kalpakjian, (2016). The word was derived from the Latin words manus (meaning 'hand') and facere (meaning 'to make'). In Late Latin, these were combined to form the word manufactus meaning 'made by hand' or 'hand-made'. Indeed, the word factory was derived from the now

obsolete word manufactory. In its broadest and most general sense, manufacturing was defined as the conversion of stuff into things (DeGarmo, 2010).

Manufacturing is the combination of series of input that produces an output within an economy.

At the domestic level of production, the nation is able to provide certain goods and service for the citizens, thus, saving money on imports. The saving derived from producing for one self-increases the country's national income and adds to the country's stock of wealth (Obioma, 2015), Manufacturing, like other industrial pursuits, boosts agriculture, diversifies the economy, and increases the country's gains from foreign exchange, It also makes it possible for local labor to learn new skills. Saliu, (2017).

Manufacturing is the conversion of raw materials into finished consumer goods or producer goods. Kaldor as cited in Obioma, Kalu, and Anyawu, (2015), in his theories that border on manufacturing and economic growth explained that Manufacturing generates employment, boosts agriculture, defined manufacturing as the application of modern technology, equipment and machineries for the production of goods and services, alleviating human suffering and to ensure continuous improvement in their welfare.

Concept of Manufacturing Sector

The manufacturing sector comprises establishments engaged in the mechanical or chemical transformation of materials substances, or components into new products. Establishments in the manufacturing sector are often described as plants, factories, or mills and characteristically use power-driven machines and materials-handling equipment. Manufacturing establishments may process materials or may contract with other establishments to process their materials for them. Both types of establishments are included in manufacturing. North American Industry Classification Systems Definition (NAICS) (2017).

The manufacturing subsector comprises the Statistical Industry Classification (SIC) code sectors: Food, beverage and tobacco products; textiles and textile products; wood and wood

products; pulp, paper and paper products; publishing and printing; coke, petroleum products and nuclear fuel; chemicals, chemical products and man-made fibres; rubber and plastic products; other non-metallic mineral products; basic metals and fabricated metal products; other machinery and equipment; electrical and optical equipment; transport equipment; other manufacturing. UK Standard Industry Classification Codes (2017).

Manufacturing industry 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 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. (Adofu, Taiga & Tijjani, 2015).

Concept of Manufacturing Sector Output

Manufacturing output is the process of combining various inputs, both material (such as metal, wood, glass, or plastics) and immaterial (such as plans, or knowledge) in order to create output. Ideally this output will be a good or service which has value and contributes to the utility of individuals. The manufacturing process and output directly result from productively utilising the original inputs (or factors of production). Known as primary producer goods or services, land, labour, and capital are deemed the three fundamental production factors. These primary inputs are not significantly altered in the output process, nor do they become a whole component in the product.

Structurally, across the Manufacturers Association of Nigeria (MAN)'s classification of the sector into large, medium and small scales, the following sub-sectors or groups constitute the Nigerian manufacturing sector: Food, Beverages and Tobacco; Chemical and Pharmaceuticals; Plastic and Rubber; Basic Metal, Iron, Steel and Fabricated Metal Products, Pulp, Paper and Paper Products, Printing and Publishing, Electrical and Electronics, Textile, Wearing Apparel, Carpet, Leather and Footwear, Wood and Wood Products Including Furniture, Non-Metallic Mineral Products; Motor Vehicle & Miscellaneous Assembly (Jide, 2010). Although Nigeria had a long history of productive manufacturing sector with Lagos,

Kano, Ibadan, Kaduna, Warri and Port Harcourt being the major hubs of manufacturing activities, however, the fortune of the sector in the last three decades have decreased. It is obvious that the growth, performance and productivity of Nigeria's manufacturing sector at present has taken the turn for the worse and the sector no longer plays the key role it played to propel the economy about three decades ago (Ku, Mustapha & Goh, 2010).

According to the Manufacturers Association of Nigeria (MAN) in 2019, about 2,950 manufacturing firms either permanently closed shop or temporarily halted production in the last two decades, rendering thousands jobless and causing serious multiple ripples across several sectors of the economy (Aza, 2019). The conditions of the sector can only be said to have deteriorated given the fact that the much-needed enabling environment of economic and social infrastructures have all gotten worse. Capacity utilization in the sector over the last five years has been anything but encouraging averaging at about 37% just as demand for home manufactured goods has flattened as imported goods which are cheaper and of slightly higher quality are more patronized (Corporate Nigeria, 2012). According to Ladeinde (2011), the fact that most Nigerians still prefer imported goods is partly because of status symbol perception but the truth remains that most locally-made goods do not measure up to minimum acceptable quality standards. Still some other people believe that poor quality of our manufactured goods is not really the problem but the lack of funding.

Concept of Economic Growth

The concept of economic growth has been used synonymously with economic development and is associated with such things as growth in population, development of resources, technological advancement and increasing capital formation. Economic growth means growth in the level of output produced by a country over a certain period of time. It is a useful measure of economic performance of a country. Performance here means the degree of correspondence between actual output and the maximum output that could be realized if, given the pattern of demand, all the resources and the most advanced technology available were used to full advantage. According to Olamide (1999), economic growth is defined as long-term change in an economy's productive capacity. The productive capacity of the economy is the output that

could be produced if all of the economy's resources were fully and efficiently employed. The definition links economic growth to rate of growth of potential output which is related to the rate of growth of labour force and of productivity.

Jhingan (1997) asserted that economic growth refers to the process whereby the real per capita income of a country increase over a long period of time.

Economic growth is measured by the increase in the amount of goods and services produced in a country. He emphasized that a growing economy produces more goods and services in each successive time period, thus, growth occurs when an economy productive capacity increase which in turn is used to produce more goods and services. In its wider aspects, economic growth implies raising the standard of living of the people and reducing inequalities in income distributions, this is in alignment with the fact that economic growth is a desirable goal for all countries. Generally, economist believes that economic growth is often defined in terms of a sustained increase in the real per capita income of a country.

Kimberly (2019) defined economic growth as an increase in the productive capacity of a state in terms of production of goods and services over a specific period of time. The economic growth of a nation or state can be measured using gross domestic product. This measure takes into account the country's productive capacity and output. The gross domestic product uses all goods and services that are produced in the country.

Empirical Literature

Dimas, (2022) examined the impact of manufacturing sector For the UK and EU countries, using panel data. Employed GMM model to carry out the analysis. The study noted that imported intangibles and patents are keys to the growth rate of the manufacturing sector. The study highlighted the role of economic growth as a key factor in driving industrialization. The study recommended higher allocation of national budgets to the sector.

Pulicherla, (2022) examined the role of the manufacturing sector output in transiting the Indian economy from a self-reliant-based economy to an export-oriented “Make-in-India” economy. Using time series data 1998 to 2020. The study employed ARDL estimation technique and noted that macroeconomic variables, research and development (R&D), and technology are key to achieving the objectives of the transition policy. Therefore, the study recommended that federal government should increase funding to the manufacturing sector of India to be able to impact positively on the economic growth.

Doytch and Narayan, (2021) studied the role of renewable energy and the nexus between the manufacturing sector and economic growth on the one hand, and between the service sector and economic growth on the other hand. The study employed time series data spanning from 1990 to 2019. Using the OLS approach for the data analysis and noted that renewable energy facilitates growth in the high growth sector with great effects driven by industrial energy consumption, rather than residential. The recommendations favour the continuation and strengthening of the industrialization projects and the encouragement of the relevant development and private sectors by government and the Central Bank of Nigeria to increase lending to the manufacturing sector.

Abubakar, (2021) examined the nexus between manufacturing sector and other sectors on economic growth of Malaysia. Using the ARDL model. From 1989 to 2020. And noted that economic growth responds to both positive and negative oil rent asymmetrically in the long run across all sectors of Malaysia. The study further noted that while the agriculture and transportation sectors respond positively to shocks, the response of manufacturing sector and wholesale was negative. The results of the non-linear autoregressive distributed lag suggest that understanding sectorial variation induced by the role of oil rent shocks on each of the sectors is key to formulating an effective diversification policy.

Michael Ogundupe (2020) examined the impact of manufacturing sector on economic growth in Nigeria. The study used time series data covering the period of 1990 – 2019. The study employed Real Gross Domestic Product (RGDP) as the dependent variable and Manufacturing output (MOT); Exchange rate (EXR); capacity utilization (CPU); food and beverages

production (FBP); as independent variables. The data obtained were analysed using Ordinary Least Square Method. The study found that there is a flow of causality between the dependent and independent variables in Nigeria. In one plots the share of industrial sector in commodity production against per capita incomes, there is a positive relationship between the two. The study investigates the Nigeria economy as one that is developing and changing due to rapid changes in the world economy. The study recommends that policies should be made to diversify the Nigerian economy and investment in the manufacturing sector should be prioritized by the government by ensuring that certain per cent of total loans and advances of commercial banks are directed to the manufacturing sector.

Theoretical Framework

Cobb- Douglass production theory of Economic Growth

The study was anchored on the Cobb- Douglass (1927) production theory which relates output (Y) as a linear function of capital (K) and labor (L) which was further extended by Campa and Goldberg (1999). The theory states that material inputs determine the firm's output and investment behavior. The model is being extended by decomposing firms output. The firm's production function is given as:

$$Y=AL^{\beta}K^{\alpha}$$

(3.1)

Where:

Y = total production

L = labor input (the total number of person-hours worked in a year)

K = capital input (the monetary worth of all machinery, equipment, and buildings)

A = total factor productivity

α and β are the output elasticity of capital and labor, respectively. These values are constants determined by available technology.

(Cobb and Douglas, 1927) production function is a mathematical expression that describes a systematic relationship between inputs and output in an economy and the Cobb-Douglas is a

function that has been used extensively. Research about the production function has a long history. The economist Paul H. Douglas and mathematician Charles W. Cobb created it in an effort to fit Douglas's empirical results for production, employment, and capital stock in U.S. manufacturing into a simple function (Cobb and Douglas, 1928). Since that time "many studies have tended to support the hypothesis that production processes are well described by a linear homogeneous function with an elasticity of substitution of one between factors."

Methodology

The study adopts ex-post facto research design to empirically examine the impact of manufacturing sector on economic growth in Nigeria during 1992-2024, which will provide a platform for the study to respond the raised research questions. Annual time-series data on key variables were sourced from the Central Bank of Nigeria annual statistics bulletin, and Nigeria Export Promotion Council (NEPC) database 2024, ensuring reliability and consistency.

To provide robust estimations, the study utilized Vector Autoregression Model (VAR) to estimate long run impact of manufacturing sector output on economic growth. VAR is a type of stochastic process model that generalize the single-variable (univariate) autoregressive model by allowing for multivariate time series. VAR models are often used in economics and the natural sciences. Like the autoregressive model, each variable has an equation modeling its evolution over time. This equation includes the variable's lagged (past) values, the lagged values of the other variables in the model, and an error term. VAR models do not require as much knowledge about the forces influencing a variable as do structural models with simultaneous equations.

In line with the Vector Autoregression Model (VAR), this study adopts the model from the works of Michael Ogundipe (2020) who investigated the impact of manufacturing sector on economic growth in Nigeria.

His model stated thus:

$$\log \text{GDPT} = \alpha_0 + \alpha \log \text{CPUt} + \alpha \log \text{MSOt} + \alpha \log \text{FBPt} + \alpha \log \text{EXRt} + \text{Ut} \quad (3.1)$$

Where:

GDPT = Gross Domestic Product (proxy for economic growth) at time t;

FBPt = food and beverages production at time t;

CPUt = capacity utilization at time t;

MSOt = manufacturing sector output at time t;

EXRt = exchange rate at time t;

Ut = Error term at time t.

The VAR model is specified as follows;

$$X_t = \sum_{i=1}^n \beta_i X_{t-i} + u_t \quad (3.2)$$

The model has been explicitly stated below with 5×5 vector variables matrices.

$$\begin{aligned} \text{GNP}_t = & \alpha_{10} + \sum_{i=1}^n \alpha_{11i} \text{GNP}_{t-i} + \sum_{i=1}^n \alpha_{12i} \text{FBMO}_{t-i} + \sum_{i=1}^n \alpha_{13i} \text{TXMO}_{t-i} \\ & \sum_{i=1}^n \alpha_{14i} \text{RPMO}_{t-i} - \sum_{i=1}^n \alpha_{15i} \text{CPMO} + u_{1t} \end{aligned} \quad (3.3)$$

$$\begin{aligned} \text{FBMO}_t = & \alpha_{20} + \sum_{i=1}^n \alpha_{21i} \text{GNP}_{t-i} + \sum_{i=1}^n \alpha_{22i} \text{FBMO}_{t-i} + \sum_{i=1}^n \alpha_{23i} \text{TXMO}_{t-i} + \\ & \sum_{i=1}^n \alpha_{24i} \text{RPMO}_{t-i} - \sum_{i=1}^n \alpha_{25i} \text{CPMO} + u_{2t} \end{aligned} \quad (3.6)$$

$$\begin{aligned} \text{TXMO}_t = & \alpha_{30} + \sum_{i=1}^n \alpha_{31i} \text{GNP}_{t-i} + \sum_{i=1}^n \alpha_{32i} \text{FBMO}_{t-i} + \sum_{i=1}^n \alpha_{33i} \text{TXMO}_{t-i} - \\ & \sum_{i=1}^n \alpha_{34i} \text{RPMO}_{t-i} - \sum_{i=1}^n \alpha_{35i} \text{CPMO}_{t-i} + u_{3t} \end{aligned} \quad (3.7)$$

$$\begin{aligned} \text{RPMO}_t = & \alpha_{40} + \sum_{i=1}^n \alpha_{41i} \text{GNP}_{t-i} + \sum_{i=1}^n \alpha_{42i} \text{FBMO}_{t-i} + \sum_{i=1}^n \alpha_{43i} \text{TXMO}_{t-i} - \sum_{i=1}^n \alpha_{44i} \text{RPMO}_{t-i} - \\ & \sum_{i=1}^n \alpha_{45i} \text{CPMO}_{t-i} + u_{4t} \end{aligned} \quad (3.4)$$

$$\begin{aligned} \text{CPMO}_t = & \alpha_{50} + \sum_{i=1}^n \alpha_{51i} \text{GNP}_{t-i} - \sum_{i=1}^n \alpha_{52i} \text{FBMO}_{t-i} + \sum_{i=1}^n \alpha_{53i} \text{TXMO}_{t-i} - \sum_{i=1}^n \alpha_{54i} \text{RPMO}_{t-i} - \\ & \sum_{i=1}^n \alpha_{55i} \text{CPMO}_{t-i} + u_{5t} \end{aligned} \quad (3.5)$$

In this study, equation 3.3 was modified to suit this study to have the following functional equation:

$$\text{LGNP} = f(\text{LFBMO}, \text{LRPMO}, \text{LTXMO}, \text{LCPMO},) \quad (3.6)$$

Where;

GNP = Gross National Product at time t ;

FBMO = Food and beverages manufacturing output at time t ;

TXMO = Textile manufacturing output at time t ;

PRMO = Plastic and Rubber manufacturing output time t ;

CPMO = Chemical and pharmaceutical manufacturing output at time t ;

β_0 = Constant term

Parameters = $\beta_1, \beta_2, \beta_3$, & β_4 .

U_t = Error term

The *a priori* expectation of manufacturing sector output such as FBMO, TXMO, RPMO and CPMO are expected to be positive and greater than zero. This is stated thus: $\beta_1 > \beta_2 > \beta_3 > \beta_4 > 0$

Empirical Results and Discussion

The data collected were annual time series on the Food and beverages manufacturing output (FBMO), Textile manufacturing output (TXMO), Plastic and Rubber manufacturing output (PRMO), Chemical and pharmaceutical manufacturing output (CPMO), and economic growth proxy by Gross National Product (GNP) in Nigeria for the period 1992 to 2024.

Table 1: Augmented Dickey-Fuller (ADF) Test Results

Variables	Critical Value	ADF-Statistics	P-Values	Unit root at First Diff			Remark
				Order of Integration	Decision		
GNP	-2.971853	-3.206602	0.0302	I(1)	Reject H_0		Stationary
FBMO	-3.574244	-5.418521	0.007	I(1)	Reject H_0		Stationary
TXMO	-3.012363	-4.032215	0.0059	I(1)	Reject H_0		Stationary
RPMO	-1.952910	-1.997668	0.0057	I(1)	Reject H_0		Stationary
CPMO	-1.953858	-2.219133	0.0280	I(1)	Reject H_0		Stationary

Source: Author's Computation 2025, using E-view 12.0 version

NOTE: Test was conducted at 5% Level of Significance

The unit root test results in table 1 above shows that all the variables (GNP, TXMO, RPMO and CPMO) when tested at level or $I(0)$, have unit root or are not stationary This is evident by their having p-values which are greater than 0.05 level of significance except FBMO that is otherwise. However, when the variables were tested at first difference or $I(1)$, they (GNP, FBMO, TXMO, and CPMO) all have no unit roots or became stationary. This is evident by their having p-values which are less than 0.05 levels of significance. In general, the unit root test results shows that the variables under study have a stochastic trend and are good for inclusion in the chosen model for their parameter estimation. This shows that the variables have the same order of integration which makes it suitable for the application of VAR.

Table 2: Johansen's cointegration test (Trace) results

Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.836181	118.7682	76.97277	0.0000
At most 1 *	0.570972	68.11650	54.07904	0.0017
At most 2 *	0.558582	44.42201	35.19275	0.0039
At most 3*	0.472217	21.52466	20.26184	0.0333
At most 4	0.121613	3.630717	9.164546	0.4699

Trace test indicates 4 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 2025, using E-view 12.0 version

Table 2 above represents Trace Statistic Test, the table indicates three (4) cointegrating eqn(s) at the 0.05 level and this shows the presence of cointegration among the variables. Specifically, the Eigen value is less than 5% critical value at all levels except (column 4). Since there is at least one cointegration equation found in the model, the study concludes that there is a significant long-run relationship that exist among the variables.

Table 3 Pairwise Granger Causality Tests

Pairwise Granger Causality Tests					
Lags: 4					
Null Hypothesis:	Obs	F-Statistic	Prob.	Decision	Remark
CPMO does not Granger Cause GNP	29	0.99541	0.6079	Accept H_0	No Causality
GNP does not Granger Cause CPMO		0.04856	0.9760	Accept H_0	
FBMO does not Granger Cause GNP	29	0.10740	0.0477	Reject H_0	Unidirectional
GNP does not Granger Cause FBMO		3.87538	0.1440	Accept H_0	
RPMO does not Granger Cause GNP	29	2.20008	0.0329	Reject H_0	Unidirectional
GNP does not Granger Cause RPMO		0.90836	0.6350	Accept H_0	
TXMO does not Granger Cause GNP	29	3.13132	0.0290	Reject H_0	Unidirectional
GNP does not Granger Cause TXMO		4.32601	0.1150	Accept H_0	

Source: Author's Computation 2025, using E-view 12.0 version

The results of granger causality test presented on table 3 reveals that there is no causality from chemical and pharmaceutical manufacturing output (CPMO) to gross national product (GNP) since the p-value of CPMO is greater than 0.05% we accept H_0 and conclude that there is no causality from CPMO to GNP.

The p-value of GNP is greater than 0.05% we accept the H_0 and conclude that there is no causality from GNP to CPMO. This implies that there is absent of relationship between chemical and pharmaceutical manufacturing output (CPMO) and gross national product (GNP) in Nigeria. This suggests that, to a large extent chemical and pharmaceutical manufacturing output (CPMO) tends to exhibit no influence on gross national product in Nigeria during the period of the study and vice versa.

Similarly, it was revealed that there is causality from food and beverages manufacturing output (FBMO) to gross national product (GNP) since the p-value of FBMO is less than 0.05% we reject H_0 and conclude that there is causality from FBMO to GNP. The p-value of GNP is greater than 0.05% we accept the H_0 and conclude that there is no causality from GNP to FBMO. This implies that there is a unidirectional relationship between food and beverages manufacturing output (FBMO) and gross national product (GNP) in Nigeria. This suggests that, to a large extent food and beverages manufacturing output (FBMO) tend to exhibit strong

influence on gross national product in Nigeria during the period of the study and not vice versa.

Furthermore, it was revealed that there is causality from rubber and manufacturing output (RPMO) to gross national product (GNP) since the p-value of RPMO is less than 0.05% we reject H_0 and conclude that there is causality from RPMO to GNP. The p-value of GNP is greater than 0.05% we accept the H_0 and conclude that there is no causality from GNP to RPMO. This implies that there is a unidirectional relationship rubber and manufacturing output (RPMO) and gross national product (GNP) in Nigeria. This suggests that, to a large extent rubber and manufacturing output (RPMO) tend to exhibit strong influence on gross national product in Nigeria during the period of the study and not vice versa.

Finally, it was revealed also that there is causality from textile manufacturing output (TXMO) and gross national product since the p-value (TXMO) is less than 0.05% we reject H_0 and conclude that there is causality from (TXMO) to (GNP). The p-value of (GNP) is greater than 0.05% we accept the H_0 and conclude that there is no causality from GNP to (TXMO).

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	LGNP	LCPMO	LFBMO	LRPMO	LTXMO
LGNP(-1)	0.548686 (0.21379) [2.56641]	-0.122052 (0.23971) [-0.50917]	0.038453 (0.18020) [0.21339]	0.522643 (0.40368) [1.29469]	0.378054 (0.25095) [1.50652]
LCPMO(-1)	-0.04512 (0.19447) [-0.02320]	-0.313669 (0.21803) [-1.43862]	-0.08865 (0.16391) [-0.05409]	-0.429836 (0.36719) [-1.17062]	-0.714418 (0.22826) [-3.12988]
LFBMO(-1)	0.547207 (0.27797) [1.96856]	0.246323 (0.31166) [0.79035]	0.181348 (0.23430) [0.77401]	0.023728 (0.52487) [0.04521]	0.245152 (0.32628) [0.75136]
LRPMO(-1)	0.183311 (0.26483) [0.69218]	0.546456 (0.29693) [1.84036]	0.331108 (0.22322) [1.48334]	0.780965 (0.50005) [1.56177]	0.665438 (0.31085) [2.14070]
LTXMO(-1)	-0.315442 (0.25321) [-1.24576]	-0.494938 (0.28390) [-1.74334]	-0.351293 (0.21343) [-1.64598]	-0.743117 (0.47811) [-1.55428]	-0.660555 (0.29721) [-2.22250]
C	0.445217 (1.84107) [0.24183]	-1.168660 (2.06421) [-0.56615]	4.056544 (1.55178) [2.61413]	0.307391 (3.47627) [0.08843]	3.612666 (2.16098) [1.67177]
Cointegrating Eq:	LGNP(-1)	LCPMO(-1)	LFBMO(-1)	LRPMO(1)	LTXMO(1)
	1.000000	-77.05045 (19.7239) [-3.90646]	102.8058 (13.4008) [7.67164]	8.869231 (16.5631) [0.53548]	75.93402 (11.7191) [6.47951]
Error Correction:	D(LGNP)	D(CPMO)	D(FBMO)	D(RPMO)	D(TXMO)
CointEq1	0.04446 (0.0219) [2.02943]	0.01566 (0.0351) [0.44659]	-0.06853 (0.0199) [-3.45102]	-0.01807 (0.0595) [-0.30381]	-0.04039 (0.0387) [-1.04370]
R-squared	0.996008	0.993974	0.907339	0.985556	0.985254
Adj. R-squared	0.993790	0.990627	0.855860	0.977531	0.977062
Sum sq. resids	0.107201	0.134762	0.076159	0.382197	0.147694
S.E. equation	0.077173	0.086526	0.065046	0.145716	0.090583
F-statistic	449.0701	296.9287	17.62557	122.8156	120.2673
Log likelihood	40.05576	36.73817	45.01314	21.62295	35.40948
Akaike AIC	-2.003846	-1.775046	-2.345733	-0.732617	-1.683412
Schwarz SC	-1.485216	-1.256417	-1.827104	-0.213988	-1.164783
Mean dependent	5.190590	3.833045	7.795630	4.098821	6.435050
S.D. dependent	0.979288	0.893730	0.171329	0.972108	0.598089

Determinant resid covariance (dof
adj.) 1.78E-12
Determinant resid covariance 1.64E-13
Log likelihood 221.0952
Akaike information criterion -11.45484

Table 4: VAR Lag Order Selection Results

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-610.4227	NA	30054714	34.24571	34.50963	34.33782
1	-487.8809	197.4285*	252877.1*	29.43783*	31.28527*	30.08263*
2	-78.33113	46.09988	6.71e-05	9.909791	14.48131	11.52147

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

It can be observed from the VAR lag selection criteria presented in Table 4 that there are asterisks attached to some statistics of the five lag selection criteria (AIC, LR, SC, FPE and HQ). Tracing these statistics against the first column labelled 'lag' shows that they coincide with lag 1. This implies that the appropriate lag length chosen is 1.

Table 5: VAR Regression Results

Standard errors in () & t-statistics in []

Source: Author's Computation 2025, using E-view 12.0 version

NOTE: Standard errors in () & t-statistics in []

The equation of the lower part of the table is a cointegrating equation and short run model and it is stated thus;

$$ECT_{t-1} = Y_{t-1} - \eta_j X_{t-1} - \xi_m R_{t-1} - \mu_t$$

$$ECT - 0.04446_{t-1} = 1.000DLGNP_{t-1} + 0.01566DLCPMO_{t-1} - 0.06853DLFBMO_{t-1} - 0.01807DLRPMO_{t-1} - 0.04039DLTXMO_{t-1}$$

The economic theory are expressed and the sign of the cointegrating parameter and its proper economic interpretation, thus a GNP_t to rise in periods t Gross National Product coefficient sign will be thus 1% change in chemical and pharmaceutical manufacturing output will result to 1.5% increase in GNP, a percentage change in food and beverages manufacturing output

will decrease GNP by 6.8%, also a percentage change in rubber and plastic manufacturing output will decrease GNP by 1.8%. Finally, 1% change in textile manufacturing output will result in 4.0% decrease in GNP. The ECT results in the estimation demonstrate that the previous period departure from the long run deviation equilibrium is corrected in the present period as a 4.4% equivalent adjustment speed.

The upper part of the table highlights the long run relationship. The regression equation as depicted thus;

$$LGNP_t = 0.445217\beta_{0t-1} + 0.548686GNP_{t-1} - 0.122052LCPMO_{t-1} + 0.038453LFBMO_{t-1} + 0.522643LRPMO_{t-1} + 0.378054LTXMO_{t-1}$$

The economic interpretations of the long run on the main variable thus as follow; for the gross national product lag (-1) shows that GNP exhibit strong endogenous which implies strong influence from own variable evidence from coefficient of GNP (0.548686).

$$LCPMO_t = -1.68660\beta_{0t-1} - 0.04512LGNP_{t-1} - 0.313669LCPMO_{t-1} - 0.08865LFBMO_{t-1} - 0.429836LRPMO_{t-1} - 0.714418LTXMO_{t-1}$$

The economic interpretations of the long run on the other variable (CPMO) thus as follow; for the chemical and pharmaceutical manufacturing output lag (-1) shows that CPMO exhibit strong endogenous which implies strong influence from own variable evidence from coefficient of CPMO (0.313669). A percentage change in the chemical and pharmaceutical manufacturing output is associated with 0.4% decrease in the lags of GNP on average ceterus paribus in the long run.

$$LFBMO_t = 4.056544\beta_{0t-1} + 0.547207LGNP_{t-1} + 0.246323CPMO_{t-1} + 0.181348LFBMO_{t-1} + 0.023728LRPMO_{t-1} + 0.245152LTXMO_{t-1}$$

The economic interpretations of the long run on the other variable (FBMO). Food and beverages manufacturing output lag (-1) shows that FBMO exhibit weak endogenous which implies strong influence from own variable evidence from coefficient of FBMO (0.181348). A percentage change in the food and beverages manufacturing output is associated with 5.4% increase in the lags of GNP on average ceterus paribus in the long run.

$$LRPMO_t = 0.307391\beta_{0t-1} + 0.183311LGNP_{t-1} + 0.546456LCPMO_{t-1} + 0.331108LFBMO_{t-1} + 0.780965LRPMO_{t-1} + 0.665438LTXMO_{t-1}$$

The economic interpretations of the long run on the other variable (RPMO). Rubber and plastic manufacturing output lag (-1) shows that RPMO exhibit strong endogenous which implies strong influence from own variable evidence from coefficient of AET (0.780965).

A percentage change in the Rubber and plastic manufacturing output is associated with 1.8% increase in the lags of GNP on average ceterus paribus in the long run.

$$LTXMO_t = 3.612666\beta_{0t-1} - 0.315442LGNP_{t-1} - 0.494938LCPMO_{t-1} - 0.351293FBMO_{t-1} - 0.743117LRPMO_{t-1} - 0.660555LTXMO$$

The economic interpretations of the long run on the other variable (TXMO). Textile manufacturing output lag (-1) shows that TXMO exhibit strong endogenous which implies strong negative influence from own variable evidence from coefficient of TXMO (-0.660555).

A percentage change in the Textile manufacturing output is associated with 3.1% increase in the lags of GNP on average ceteris paribus in the long run.

The 0.996008 coefficient of multiple determinations (R^2) shows that up to 99% of the variations (changes) in the GNP were explained by the explanatory variables (FBMO, CPMO, RPMO and TXMO). The remaining 1% variations are unexplained due to other factors, which are affecting GNP but not captured in the model or due to the error of measurement (U_i). This is a good fit of the model and shows that the data collected is suitable for manufacturing sector output analysis in Nigeria.

Post-estimation Results

Table 6: VAR Serial correlation Result

Null hypothesis: No serial correlation at lag h						
Lag	LRE* stat	Df	Prob.	Rao F-stat	Df	Prob.
1	31.51604	25	0.1725	31.51604	25	0.1725
2	16.33908	25	0.9044	16.33908	25	0.9044

Source: Author's Computation 2025, using E-view 12.0 version

Table 6 presents the serial correlation test result. The P-value is greater than 5% (0.1725) thus, the study rejects the null hypothesis and concludes that the data is free from serial correlation. This generally suggests that the data has not collide significantly.

Conclusion, Recommendations and Policy Implications of Findings

The study examined the impact of manufacturing sector output on economic growth in Nigeria For the period spanning from 1992 to 2024. Given the result of the unit root test, co-integration, and the VAR model results, it was revealed that the variables are co-integrated at order (1) which justifies the application of VAR model. Consequent to the co-integration result, the model was analysed using the VAR method of analysis. Based on the analysis, the short run and long run regression estimate revealed that food and beverages manufacturing output, rubber and plastic manufacturing output, and textile manufacturing output had significant impact on economic growth in Nigeria in the long run.

Based on the empirical results of this study, the following recommendations were proffered, that will lead to achievement of improved and desired output on economic growth in Nigeria;

- i. Nigeria policy makers should use industrial policy measures to control or check high importation of manufactured goods so as to encourage the domestic manufacturers to expand their production and boost the capacity utilization of the sector and productivity.
- ii. Since the food manufacturing sector output and rubber manufacturing output have positive statistically significant impact on the economic growth of Nigeria with the highest magnitude, government should give food and plastic manufacturing firms tax holiday, subsidy and other incentives to help the growth of the sector, which invariably will increase the self-reliance of the Nigerian economy.
- iii. The Nigerian research institutions should be well supported by government and other public sector and private companies in order to conduct the researches needed to capture the declining trend in Nigeria manufacturing sector output. Funds should be made easier to the manufacturing sector to invest in up to date machineries, information and communication technology and human capital improvement, which is critical to reducing manufacturing costs, and raising output.

- iv. Finally government should provide infrastructural facilities particularly, power to increase productivity in manufactured goods and reduce cost of productions to enable them compete effectively in the international market.

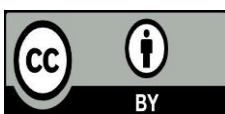


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