



Effect of Manufacturing Sub-Sector Performance on Productivity in Nigeria

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

Kaldor's theory of growth is one theory that advocates for the manufacturing sector as a channel of increasing productivity and increasing employment. However, many developing countries like Nigeria seem to be bypassing the dynamism of the manufacturing sector. This study looked at the role of manufacturing sector to the productivity of the economy for the period 1986 to 2018, bearing in mind that productivity growth reflects in the GDP (gross domestic product) of a country. The study applied the Autoregressive Distributed Lag model (ARDL) and the Granger Causality technique. The major finding of this study is that manufacturing export, manufacturing capacity utilization, credit to manufacturing, manufacturing output were positively related while manufacturing value added and unemployment were negatively related to labour productivity. Negative relationship that exists in manufacturing value added which shows that there is no actual value addition in this sector even when manufacturers output increases. MCU (Manufacturing capacity utilization) was seen to cause Labour productivity while Labour productivity in turn brought about increase in manufacturing output and manufacturing export. This implies that there is room for achieving more in this sector by increasing value addition and increasing manufacturers utilization capacity, which will support more output, export, job opportunities and growth in the economy. The study therefore suggests that the advantage in this sector be harnessed by increasing manufacturers' value addition and capacity utilization, giving them what it takes to do so which will inadvertently boost the economy.

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1. INTRODUCTION

1.1 Background to the Study

In recent times there has been a raised interest for research and policies in sustainable development and structural transformation. However, one of the ways this sustainable development can become possible is when structural transformation takes place in an economy. This structural transformation if properly charted has a way of improving productivity and reducing unemployment i.e. creating more jobs as the case may be. Productivity has been defined as a way of measuring output per labour that is the ratio of labour input and labour output, Obadan and Odusola [1]. Productivity is the ratio of output to input in production; it is a measure of production. It measures the level of efficiency at which scarce resources are being utilized per unit of input. It is measured as a ratio of output per unit of input overtime. Productivity enables us to see how we have been able to utilize our available labour to produce output. It helps us to assess how effective our labour tools or skills have been, Signe and Johnson [2].

“Many countries have been able to rapidly raise living standards by reallocating resources from traditional activities – such as subsistence agriculture – towards higher-productivity sectors – such as manufacturing and modern services, countries such as Korea China and Japan” [3].

This movement is also supported by Kaldor’s and endogenous growth model. While many developed countries like United States, United Kingdom, France, Japan, and Germany has through manufacturing sector transformed into some of the world’s wealthiest nations with some part of South Asia following strongly like China, most Africa countries seems to be left behind, Signe and Johnson [2] According to Signe and Johnson [2], leaders are increasingly realizing that manufacturing is a major factor in helping to successfully reach the next stage of economic development and the Agenda 2063 which the African Union has put for the sector as a benchmark period. But the worry for us is if Nigeria is really benefitting much from this sector or if they are doing much to ensure that by 2063 they can also boast of experiencing development through manufacturing sector.

One of the keys of increasing economic growth of any economy is by fighting unemployment and increasing productivity, Njoku and Ihugba [4]. Now if jobs are created but they are not the ones that spur productivity it benefit becomes minimal. However if jobs are created in the right sector that will spur productivity, you can be sure that it will bring about an increase in the GDP of that country and then improved development. This goes to suggest why we are opting for the manufacturing sector as a sector that should bring about increased productivity all things being equal. If the reverse is the case then something ought to be done. Manufacturing sector has been the sector most closely associated with the process of structural change. It is a high value added per worker sector into which labor can flow. However, Page [5] has it that changes in the global economy, makes the tendency to associate good jobs with manufacturing potentially misleading in both analytical and policy terms, While countries such as China, Thailand, Brazil and Malaysia seem to be contributing above 30% of manufacturing sector to their countries GDP (gross domestic product) as noted by Ududechinyere, Eze & Nweke [6]. Nigeria manufacturing sector as at 2011 contributed 4% only to GDP, Chete, Adeoti, Adeyinka & Ogundele [7] and as at Quarter 4 2018, its contribution to GDP was 10.11%. Every new government that takes over in many developed and developing countries like Nigeria always have it as one of their major agenda to see that unemployment is reduced, economic growth is enhanced and productivity is increased. No matter how much they wish it or want it, workable plans must be on ground for it to be achieved.

Manufacturing is special because of unconditional convergence, tradability, labor absorption capacity, McMillan [8]. The renewal of industrialization strategies to promote enterprise creation and growth in the agribusiness and manufacturing sectors to raise the rate of labor absorption and productivity levels outside of agriculture cannot be over emphasized. According to Page [5] manufacturing has driven structural change throughout East Asia. If that is the case we assume it can also drive structural change in Nigeria through reducing unemployment and increasing productivity if we pay attention to this sector.

Key drivers such as firm-level productivity, domestic capabilities and export competitiveness seem to remain a great challenge in the renewed interest for industrialization generally across Africa. According to Ayala [9], fastgrowing economies can be said to be connected with highest growth of manufacturing over nonmanufacturing sectors. Productivity has been argued to be a key factor for analysis of economic growth. Productivity growth has been argued to bring about technical progress which can create jobs, improve the economy and thereby bring about increase in GDP. Productivity shocks (growth) ought to lead to a persistent employment which inversely reduces unemployment in the long run. From this, our argument is that if there has been movement from agriculture sector, then there should have been improvement in labour productivity of manufacturing sector. Measuring productivity growth plays an important role in providing the information economists need to put forth better policy recommendations and so will help policy makers to make the right decisions, Whealan [10].

Literature has it that for structural transformation to take place it has to pass through the manufacturing sector as stipulated by Kaldors law. Manufacturing can play a more important role if employment and labour productivity are simultaneously increased, Martins (n.d). However Lavopa [11], is of the view that it's no longer manufacturing as the engine for economic growth but a shift in technological innovation as is the experience of India, where the explosive growth of ICT related services has been the main driver of rapid economic growth thereby actualizing structural transformation. In recent comparisons of the comparative performance of India and China it is argued that China by far outperforms India, especially because its growth is driven by manufacturing, while services play a more important role in India. Some East Asian countries like China have pursued a manufacturing-led growth, while several South Asian economies such as India exhibit a service-led growth Ayala [9].

Manufacturing led structural transformation is expected to result in employment growth as characterized by the creation of good, high productivity and good pay jobs, Steenkamp and Rooney [12]. Is this really the case for Nigeria? Could there be constraints in manufacturing sector in Nigeria from achieving structural transformation? This has led us to inquire if

manufacturing has driven growth in Nigeria, if 'yes' how and if 'no' why and what can be done to harness the opportunity this sector has to offer in helping Nigeria obtain the expected transformation. How has it helped to bring about economic growth and increased productivity? It is also expected that as manufacturing sector output or manufacturing value added to GDP is increasing that the GDP will be increasing, more jobs will be provided thereby growing the economy. Firms in low income countries increase their productivity by exporting Page [2]. So we will want to also know if there has been any improvement in the quantity of goods exported out of this country since it is expected that increased manufacturing will automatically lead to increase in exports and export competitiveness.

1.2 Statement of the Problem

The industrial sector is necessary for economic development, and manufacturing sector, which is a sister to it is vital to long-term structural change, formal job creation, and the technology and innovation needed for productivity, World Bank [13]. According to [14] Nigeria's Labour Productivity dropped by 1.14 % Year on Year in Sep 2018, while a growth of 3.25% was experienced in the previous quarter. This is just a sample of what is obtainable in the Nigeria economy. For us the worry is why is productivity in Nigeria the way it is? Is one of the key sectors - manufacturing sector, which has been proposed in the literature as a growth driving sector being fully harnessed in the Nigeria situation? Are we really growing when it comes to our export contribution?

Various administrations have tried to see that this sector is boosted in Nigeria. Right from the first national development plan, one of the goals has been to industrialize Nigeria thereby developing the economy. In July 2018, P&G shuts \$300 million consumer goods plant in Agbara. Before now it was the biggest US non-oil investment in Nigeria. Studies show that Nigeria loses N80 billion annually from the non performance of the paper mills that were closed which includes Nigeria paper mill, Nigerian Newsprint manufacturing company and Nigerian National Paper Manufacturing Company. Within 6 years over 50 companies have closed down, Anudu [15]. There was a time when we used to have more manufacturing companies than we are having today especially in this sector. For instance, Nigeria used to have over 100 textile companies, but today they are now history.

In Steenkamp & Rooney [12] they tried to group some African countries into those with established manufacturing base and those with emerging manufacturing base. While South Africa, Tunisia, Morocco and Egypt came under established manufacturing, Mauritius, Kenya and Uganda came under emerging manufacturing nations with Nigeria not showing anywhere in the picture. For us this is worrisome and so something needs to be done.

With all the above issues pointed out we want to see what has actually happened in the manufacturing sector and the economy as a whole, these losses of jobs what about them, how has all this helped to impact on productivity in Nigeria as a whole? Has manufacturing sector continued to be an engine of growth in Nigeria situation? How has the various growth components of manufacturing sector contributed to economic performance? If it worked for some other countries like China, Thailand, Brazil, Malaysia, according to Ududechinyere, Eze and Nweke [6] then it has the potential of working for Nigeria. Some works, like Udabah [16] that would have helped on this matter is not recent since it stopped in 1999 and so may not help much in present situation and policy making.

1.3 Research objectives

The general objective of this study is to see how manufacturing sector performance has affected productivity and the economy. To achieve this we will be focusing on the following specific objectives:

1. To see how the manufacturing value added, manufacturing export, manufacturing output and manufacturing capacity utilization affect productivity in Nigeria.
2. To ascertain how credit to the manufacturing sub - sector and unemployment affected productivity in Nigeria
3. To determine the causal relationship between productivity and growth components of the manufacturing sub-sector in Nigeria.

1.4 Research Hypotheses

1.4.1 Hypothesis one

H₀: there is no significant effect of manufacturing value added, manufacturing export,

manufacturing output and manufacturing capacity utilization on productivity in Nigeria.

H₁: there is a significant effect of manufacturing value added, manufacturing export, manufacturing output and manufacturing capacity utilization on productivity in Nigeria.

1.4.2 Hypothesis two

H₀: there is no significant effect of credit to manufacturing sub-sector and unemployment on productivity in Nigeria

H₁: there is a significant effect of credit to manufacturing sub-sector and unemployment on productivity in Nigeria

1.4.3 Hypothesis three

H₀: there is no causal relationship between productivity and growth components of the manufacturing sub-sector in Nigeria.

H₁: there is a causal relationship between productivity and growth components of the manufacturing sub-sector in Nigeria.

Scope of the Study: The focus of this paper is on manufacturing sector, productivity as it regards to Nigeria. This will help us to achieve the objective of our study. It will be based on the period 1986 to 2018. While some authors like Amassoma & Nwosa [17] looked at Nigeria as a whole and Udabah [16] stopped at 1999, this paper focused on the manufacturing sector because it has been pointed out as a key sector in achieving structural transformation and sustainable development and extended the work to 2018.

2. REVIEW OF RELATED LITERATURE

2.1 Conceptual Literature

Labour Productivity: Labour productivity provides a measure of the efficiency with which one unit of labor input can produce goods and services and can be measured in various ways. It is calculated by dividing output by total employment (head count), giving 'output per worker,' and is also calculated by the total number of hours worked, giving 'output per hour worked', Nakumura, Kaihatsu & Yagi [18]. An increase in productivity is said to occur when output is produced either with the same amount of input, or with less input or with little increment

in input. For this paper we maintain the definition that it is the ratio of GDP (gross domestic product) to labour force. Labour productivity enables us to see what our input has been able to bring out and so helps us to also see if our input corresponds with our output. For this study we use:

$$\text{Labour Productivity} = \frac{\text{GDP at constant prices}}{\text{Number of employed persons.}}$$

Unemployment: Unemployment and rising inflation are some of the major problems currently being faced in the 21st century and the Nigerian government is not an exemption. Unemployment is a situation whereby people who are physically fit, capable, qualified and ready to work at any time are without jobs. The issue of unemployment is one of the macro economic problems of a nation, Omitogun & Longe [19]. For us we go with this definition that unemployment is a job challenge that is experienced when people that are ready and available to work do not see work or are temporarily kept out of job for a period due to the unavailability of jobs for them. Unemployment is that part of active population that is without work and is actively seeking work but cannot find work.

Manufacturing: This is one of the major sectors in the economy that is important to economic growth. In developed economies, for instance, they account for a substantial proportion of total economic activities. In Nigeria, the subsector is responsible for about 10% of total GDP annually. In terms of employment generation, manufacturing activities account for about 12 per cent of the labour force in the formal sector of the nation's economy. This is why manufacturing statistics are relevant indices of the economic performance of a nation as has been agreed by authors, Signé & Johnson [2].

2.2 Review of Basic Theories

Balanced and Unbalanced Growth theory: Roseinstein-Rodan and Nurkse, advocated the 'Balanced growth'. A balanced growth model assumes a coordinated expansion of several sectors simultaneously. They are of the view that the pattern of investment should be so designed as to ensure a balanced development of the various sectors of the economy. Balanced growth explains that the expansion of one industry helps in the expansion of others which results in all round growth. However this has been criticized

as not being obtainable in developing countries because the means to mobilise resources in all sectors in such large quantities is not there for them. Expanding the whole sector at the same time in a developing country that is not yet financially stable is not feasible. Balanced growth theory has been criticized based on the fact that it is unrealistic, it ignores scarcity of resources, ignores the need of planning and it assumes same policy for developed and underdeveloped countries.

Hirschman Hirschman, Rostow, Fleming, Singer sided with the 'Unbalanced growth theories. The unbalanced growth believes that deliberate distortions and disequilibrium in the economy is the only way to sustain economic growth and development. They have propounded the concept of unbalanced growth as a strategy of development for the underdeveloped nations. According to them, balanced growth cannot solve the problem of the under-developed countries, nor do they have sufficient resources to achieve balanced growth but that if economic growth is to be accelerated, it will have to be brought about by unbalanced growth. Hirschman contends that deliberate unbalancing of economy, in accordance with a pre-determined strategy, is the best way to achieve economic growth. He prescribes big push in strategically selected industries or sectors of the economy. Unbalanced growth theory has been criticized based on that it breeds inflation, wastage of resources, and increase in uncertainty, also the fact that unbalance is not necessary and they neglect to talk about the degree of unbalance

Kaldors Growth Theory: Nicholas Kaldor (1966) as cited in Thirwall [20] came up with his famous law of economic growth in 1961. According to Thirwall [20], Kaldor attributed slow growth to what he called 'premature maturity' by which he meant the exhaustion of the supplies of labour from agriculture to provide labour for manufacturing industry before a high level of productivity in industry had been reached. According to Kaldor's first law, "Manufacturing industry is the engine of economic growth". Reason being that it induces productivity growth both within manufacturing itself, and also outside the manufacturing sector. This in essence states that the faster the rate of growth of the manufacturing sector, the faster will be the rate of growth of GDP. Kaldor purports that what actually drives manufacturing output growth in the first place is agricultural growth in the early stages of development and then export growth in

the later stages. This theory supports the link between manufacturing and productivity based on its postulations.

This model however has been criticized based on the fact that the deterministic nature of the model doesn't allow for the possibility of growth 'reversals' or 'catch-up' and its therefore inconsistent with Kaldor's historical view of the growth and development process.

Kaldor came up with three laws which are:

- i. The faster the growth rate of manufacturing output, the faster the growth rate of GDP;
- ii. The faster the growth rate of manufacturing output, the faster the growth rate of manufacturing labour productivity (due to increasing returns);
- iii. The faster the growth rate of manufacturing output, the faster the growth rate of nonmanufacturing labour productivity (due to reallocation of labour).

The Linear specification of Kaldor's first law is as follow:

$$gGDP = a_0 + a_1 gMANU;$$

Where:

gGDP is the growth of total output; and
gMANU is the manufacturing output's growth.

2.3 Overview of Nigeria Manufacturing Sector

Ever since Nigeria gained its independence it has always tried to see that the economy grows and is transformed by carrying out various policies. One of the sectors that have received attention over the years as a sector that will boost growth is the manufacturing sector, Page [5], Szirmai [21]. However in the case of Nigeria, the attention given to oil sector and may be other sectors like services and ICT seem to be distracting the government from giving the necessary attention to this very sector that has brought about development in many other countries like South Korea, Brazil, China. Efforts to industrialise Nigeria began during the first national development plan Of 1962-1968 which emphasized import substitution as a means through which Nigerian manufacturing sector can be strengthened while Nigerians were

encouraged to participate and be in charge of the sector, Olusoji and Oderinde [3]. Surprisingly we are still yet to achieve this among other plans of the government as regards to this sector.

Nigeria has adopted various strategies to boost the manufacturing sector, strategies such as: Import Substitution Strategy (ISI), Export Promotion Strategy (EPS), Balanced Development Strategy and Local Resource-based Strategy. ISI tried to reduce high dependence on foreign trade thereby increasing foreign exchange. However this was not achieved as they ended up providing assemblage points of those imported goods and so negated the benefit that should have sprung out from that strategy, the present Buhari's administration is doing something to see that this is corrected like putting a ban on milk and rice importation. The EPS on its own side did not go down well because of poor technical know-how, poor international standards of goods produced, poor infrastructure etc. The government is however not silent on this as various measures are being carried out to support this strategy.

Obi [22] pointed out that the government has been able to do things to see that the manufacturing sector thrives like the establishment of Export Expansion Grant (EEG). Also we see that banks have been mandated to set aside 10% of their profit after tax for SME financing which is the brain behind the entrepreneurship loans (AGMEIS) loan program that so many banks have embarked upon to complement the loans and other lending programs that are available to manufacturers especially up-coming ones in other to provide business, reduce unemployment and then boost the economy.

2.4 Empirical Literature Review

Udabah [16] using "a descriptive analysis looked at the relationship between productivity and economic growth. The study discussed the importance of productivity and its contributions to economic growth and development of Nigeria in recent years, measurement of productivity and strategies to improve it in Nigeria. Their findings show that productivity determines the living standard of the people and the degree of economic growth and development. They also found that productivity is low in Nigeria especially in the two major sub sectors-agriculture and industry. For them this supports the reason for the high rate of poverty, low standard of living,

low growth rate and underdevelopment of the nation”.

Chen, Rezai & Semmler [23] looked “at the relationship between unemployment and productivity growth by disaggregating data on productivity growth into its short and long run component. They used maximum likelihood estimation (MLE), structural vector autoregression (SVAR) and non-parametric time-varying estimation to show that in the short run productivity growth affects unemployment positively but in the long run, however, the productivity growth reduces unemployment”.

Njoku and Ihugba [4] looked “at the relationship between unemployment and growth in Nigeria for the period of 1985-2009. One major findings of the study is that the economy grew by 55.5 percent between 1991 and 2006; and the population increased by 36.4 percent. All things been equal, this should have resulted to a decrease in the rate of unemployment but rather, unemployment increased by 74.8 percent. The study also found out that the average contribution of the oil sector to the GDP between 1991 and 2006 is 30.5 percent while agriculture that is the main source of gainful employment in the country contributed 36.7 percent just a difference of 6.1 percent from that of oil that employs less than 10 percent of the labour force. However there was no statistical analysis to back up their findings it was basically a descriptive work”.

Sodipe and Ogunrinola [24] examined “the employment and economic growth relationships in the Nigerian economy by estimating the elasticity of economic growth using the OLS econometric approach. A simple model of employment and its basic determinants was employed using a non-linear model that was log-linearised for econometric estimation purposes. They found the employment elasticity of economic growth to be positive and significant at the end of the two estimations carried out. Their finding showed that a positive and statistically significant relationship exists between employment level and economic growth in Nigeria while a negative relationship was observed between employment growth rate and the GDP growth rate in the economy. They also found a negative relationship between the level of employment and foreign private investment, this point to the fact that the private investors are using the ‘wrong’ technology of production in terms of using capital-intensive, rather than

labour intensive method of production in a labour-surplus economy like Nigeria”.

Mehta [25] covered “the period from 1980-81 to 2005-06. Their analysis is based on Annual Survey of Industries (ASI) published by Central Statistical Organization (CSO), Government of India which is the original data source for the organised industrial statistics in the country. With the aim of exploring the actual stage of industrial development in India, the descriptive analysis and the panel regression analysis are applied for the period 1980-81 to 2005-06. Further to analyse the impact of 1991 reforms in transforming the structure of the manufacturing in India, a comparative analysis was done by dividing the whole period between pre (1980-81 to 1991-92) and post-reform period (1992-93 to 2005-06). Their result showed the effect of fixed capital and employment being the strongest in determining the pattern of industrial growth over the period of time. The overall results show that the Indian manufacturing sector is dominated by the low technology industries”.

Berhane [26] analyzed “the long run effect of improved productivity of the manufacturing industry on the economy of Ethiopia. It assessed the macroeconomic, factor income, household income and welfare effects of changes in the productivity growth of agro processing, non agro processing industries and overall manufacturing industries. The study utilized the recursive dynamic computable general equilibrium (CGE) model. Using the 2005/06 SAM (social accounting matrix) for Ethiopia the scenarios of increasing activity specific TFP showed that, macro variables such as real GDP, private consumption, imports and exports all showed increasing trend in the high, medium and low scenario. It observed that the manufacturing sector has a positive impact on the Ethiopian economy and this impact was observed from TFP improvement hence, efforts should be made to increase TFP through research and development and technological innovation and infusion”.

Amassoma and Nwosa [17] examined “the relationship between unemployment rate and productivity growth in Nigeria for the period 1986 to 2010. The study utilized co-integration and error correction model approach. Although the unit root tests showed that the variables were integrated of different orders, the Johansen co-integration result showed that the variables were co-integrated. The regression estimate based on

the short run and long run models showed that unemployment rate has an insignificant influence on productivity growth in Nigeria over the study period”.

Szirmai, Gebreyesus, Guadagno and Verspagen [21] provided “a brief overview of current research and knowledge on employment trends and policies in sub-Saharan Africa. Their emphasis is on the productive and sustainable nature of employment, rather than on the numbers of persons engaged in work, or the rates of unemployment, this is because of the specific situation in Sub-Saharan Africa (SSA), where the employment problem does not primarily manifest itself as open unemployment, but as underemployment, vulnerable employment or low quality of employment. They listed out Causes and solutions to the slow growth of productive employment in Africa from existing literature to include structural change, skill mismatch, the role of SME’s, (particularly the high rate of informal sector that dominate the African economy), the role of innovation, policies for productive employment”.

Ayala [9] provided “current evidence for the manufacturing as an engine of growth hypothesis by using an econometric technique (system GMM) that treats endogeneity bias for a sample of 119 countries over the period 1990-2011. By extending the same approach to the services sector, the thesis analysed if it can also be considered a growth escalator and finds strong confirmation for this. They derive results for countries by income levels and show that manufacturing is the only engine of growth for low income economies, while for middle income countries both sectors can be consider a source of growth. In the case of high income nations manufacturing does not explain overall growth anymore, but services play the major role”.

Ighosewe and Akpokerere [27] examined “the effects of economic reforms (NEEDS) on the performance of Nigeria Manufacturing Sector and also determined how the manufacturing sector supports employment generation in Nigeria. The research covered the period of 30 years which was divided into two, namely before the reform era between 1981and 1998 and during the reform era (1999-2012). The study utilized ordinary Least Square (OLS) method of analysis. They concluded that output of RMSO (real manufacturing sector output) which increased after reform can be tagged as improvement in the sector as a result of NEEDS reform but that the increase in both poverty level

and unemployment rate implies that the reform did not meet the target of mass reduction in poverty level of the populace, as well as, reduction in unemployment rate”.

Ngutsav and Ijirshar [28] examined “the relationship between labour productivity and economic growth in Nigeria covering the period of 1980 to 2015. They used Auto-regressive Distributed Lag (ARDL) model for the analysis. The study found that there is significant relationship between labour productivity and agricultural sector growth and between labour productivity and the growth in the service sector but there was no significant relationship between labour productivity and manufacturing sector growth and between labour productivity and the growth in the oil and gas sector. The study found no long-run relationship between labour productivity and manufacturing sector growth likewise the oil and gas sector growth. However, there was also a weak influence of labour productivity on agricultural and service sectors in the long-run in Nigeria”.

Nakumura, Kaihatsu and Yagi [17] showed “recent discussion on labor productivity which is the source of medium- to long-term economic growth and observes the characteristics of recent productivity developments using relevant statistical data. They examined the background of recent Japan's low labor productivity growth and analyzed issues regarding Japan's sustainable growth. Their paper summarized recent discussion on labor productivity and examined the challenges of its sustainable improvement for medium- to long-term growth in Japan based on empirical analysis. They opined that Labor productivity in major advanced countries has decelerated over recent years as result of slowdown in TFP. One reason for the slowdown in TFP is explained by the technological stagnation hypothesis which attributes the slowdown to a lack of innovative technology creation as a source of economic growth. When it is taken into consideration that technological innovation as a source of economic growth has not petered out, the main reason that it has not led to productivity growth can be attributed to issues related to intangible assets and resource reallocation”.

The need to get Nigeria to be structurally transformed is real; the need to boost productivity is real, also the need to really do more with the manufacturing sector is real in order to boost the economy. Available works have

tried to say that unemployment, GDP growth and other variables are the issue of productivity while some have also said that it's the issue of sectoral based transformation especially the manufacturing subsector in developing countries like ours. So it becomes necessary for us to see if we should continue to channel our energy on the manufacturing subsector as a means of increasing productivity and at the same time as a means of transforming the economy.

Korgbeelo and Deekor [29] analysed the impact of industrial section performance on economic growth which they proxied by per capital real gross domestic product in Nigeria. Using the Phillips-Perron unit root test, Johansen cointegration test and error correction mechanism (ECM) on annual time-series data for the period 1981 to 2019, they found that there exists a long-run relationship between industrial sector performance and economic growth. Specifically, while the long-run regression result showed that manufacturing, and mining and quarrying subsectors made significant contribution to economic growth, utility and construction subsectors showed insignificant positive impact on economic growth in Nigeria. Also in the short run, their findings showed that the outputs of the manufacturing, mining and quarrying, construction and utility sectors all have insignificant positive impact on economic growth.

Ogundipe [30] examined the effects of Nigeria's manufacturing sector on economic growth for the period 1981 to 2018. The study employed the OLS regression methodology. Their findings show that the manufacturing sector's output has a positive and significant link with the increase of the gross domestic product, indicating that it has a favorable impact on that growth. The finding implies that Nigeria's manufacturing industry is currently one of the country's main economic drivers and can be said to contribute to productivity too which has been associated with economic growth in the literature.

3. RESEARCH METHODS

3.1 Estimation Techniques and Procedures

The estimation technique used for analysis was the Auto Regressive Distributed Lag in conjunction with the primary tests that were carried out for the purpose of this study. They include the unit root test, co-integration and granger causality test.

ARDL model is illustrated as:

$$\Delta y_t = \beta_0 + \sum \beta_i \Delta y_{t-i} + \sum \gamma_j \Delta x_{1t-j} + \sum \delta_k \Delta x_{2t-k} + \theta_0 y_{t-1} + \theta_1 x_{1t-1} + \theta_2 x_{2t-1} + e_t$$

The quantitative analysis involves the use of unit root test to guard against spurious regression results. Co-integration test is also applied to know if there exists equilibrium long run relationship between exchange rates and the manufacturing sector's output.

The Granger causality test was used for causality test to determine the causal relationship between productivity and manufacturing sector. The standard Granger causality test examines whether past changes in one variable, X (say, productivity) helps to explain the current changes in another variable Y (e.g. employment/unemployment), over and above the explanation provided by past changes in Y. If, otherwise, then one concludes that X (productivity) does not Granger cause Y (employment/unemployment). To determine whether causality runs in the other direction, from Y to X (employment/unemployment to productivity), one simply repeats the experiment, but with X and Y interchanged.

The use of Granger causality test is an important scientific way of determining the direction of causation.

Data Source: The data for this study are time series data sourced from CBN (Central Bank of Nigeria) statistical bulletin and World Development Indicators (WDI) for the period 1986-2018.

3.2 Theoretical Framework

This study is anchored on Kaldor's theory of growth. This theory supports that manufacturing sector is the engine of growth as such if manufacturing sector is fully harnessed it is expected that the economy will grow which will be evident in its productivity. It also flows from the unbalanced growth theory that says we don't have to choose the whole sectors but if we select one important one its linkage effect will also produce effect on the other sectors of the economy as a whole.

3.3 Empirical Model Specification

Adopting Ngutsav & Ijirshar [28], $GDP_t = f(GDPL_t, FDI_t, INFL_t, EXR_t)$ we transform it to have our model as:

LABPR = (MVA, MCU, MANEXP, UN, MANO, CRMAN)

Specifying the above in its linear form we have

$$LABPR = b_0 + b_1MVA + b_2MCU + b_3MANEXP + b_4UN + b_5MANO + b_6CRMAN + e_t$$

Where

LABPR=productivity,
 MVA=Manufacturing value added,
 MCU=Manufacturing capacity utilization,
 MANEXP=Manufacturing Export,
 UN=Unemployment,
 MANO= Manufacturing output, C
 RMAN=Credit to manufacturing sector
 b₀ to b₆ represents the slope or parameters of coefficient of the model while e_t represents the error term.

4. RESULTS AND DISCUSSION OF FINDINGS

4.1 Results

We present the unit root results as follows:

The unit root table in Table 1 shows that MANEXP and MVA are stationary at levels while the rest (LABPR, MANO, CRMAN, UN, and

MCU) are stationary in their first differences. This implies that more of the variables are stationary at order one 1(1).

From the result obtained in Table 2, the F-statistics value calculated at 6.024127 is greater than the upper bound critical value of (3.61, 3.23) and the lower bound critical value of (2.45, 2.12) at both 5% and 10% levels respectively. This then suggests to us that there is a long run relationship among the variables. Having established this we now estimate the long run coefficient and short run coefficient based on our estimating model in Table 3.

Table 3 shows that MANEXP and MCU have positive and significant relationship with labour productivity. It also supports the a priori expectation too. This implies that a percentage change in MANEXP and MCU will change LABPR by 13% and 61% respectively in the long run. Conversely, MVA, MANO, CRMAN and UN have non-significant relationship with LABPR. This implies that they do not contribute to the changes noticed in LABPR within the period under review.

The results of the Error Correction Model (ECM) show that the coefficient of the ECM is negative and significant. The coefficient of the ECM is -0.559083, which shows that about 56% of the deviation from equilibrium is being corrected in the long run.

Table 1. Unit root results

Variable	ADF critical values			PP critical values		
	Level	Difference	Conclusion	Level	Difference	Conclusion
LABPR	0.278118	-5.571680	1(1)	0.209687	-5.532236	1(1)
MANEXP	-4.554258	—	1(0)	-4.520349	—	1(0)
MCU	-0.778204	-3.983592	1(1)	-0.778270	-4.047024	1(1)
MVA	-3.002826*	—	1(0)	-3.002826*	—	1(0)
CRMAN	-0.605912	-5.222480	1(1)	-0.607014	-5.221596	1(1)
UN	-0.966592	-5.194919	1(1)	-0.795717	-5.450950	1(1)
MANO	-0.056823	-3.091618	1(1)	0.383546	-3.170916	1(1)

* Shows it's significant at 5%

Table 2. Results of the ARDL bounds test

Unrestricted intercept	Critical Value
F-Statistic	6.024127
5% critical bound value	
Lower	2.45%
Upper	3.61%
10% critical bound value	
Lower	2.12%
Upper	3.23%

Source: Researchers computation using E-view

Table 3. Long run coefficients using ARDL APPROACH

Variable	Coefficient	T-Statistic	Probability
MANEXP	0.132372	2.269659*	0.0384
MCU	0.616789	3.076729*	0.0077
MVA	-0.006055	-1.509189	0.1520
CRMAN	0.021746	0.754067	0.4625
MANO	0.033442	0.352095	0.7297
UN	0.000006	0.000619	0.9995
C	10.736924	15.375421	0.0000

Note: * denotes significance at 5%

Table 4. Estimated coefficient of the Short-run dynamic error correction model

Dependent variable: LABPR

Variable	Coefficient	T-Statistic	Probability
D(LABPR(-1))	-0.254487	-1.697933	0.1102
D(MANEXP)	0.033941	2.156665	0.0477
D(MANEXP(-1))	-0.030342	-3.146950	0.0066
D(MCU)	0.071672	0.567681	0.5787
D(MCU(-1))	-0.244138	-1.933940	0.0722
D(MVA)	-0.003385	-1.647752	0.1202
D(CRMAN)	0.012158	0.727585	0.4781
D(MANO)	0.334298	2.266331	0.0387
D(UN)	-0.002101	-0.685811	0.5033
D(UN(-1))	0.003548	1.000090	0.3331
ECM(-1)	-0.559083	-4.271447	0.0007

Table 4 shows that MANEXP and MANO have positive and significant relationship with labour productivity. This implies that a percentage change in MANEXP and MANO will change LABPR by 3% respectively in the short run. Conversely, LABPR (-1) does not affect LABPR of the current year. Also MVA, MCU, CRMAN and UN have non-significant relationship with LABPR in the current period. This implies that they do not contribute to the changes noticed in LABPR within the period under review in the short run.

The result of the diagnostic test in Table 5 shows that the parameter estimates are robust. The normality test shows it is normally distributed, the serial correlation shows that it is not serially

correlated, the homoscedastic test shows that it is homoscedastic in nature while the misspecification test shows that there is no misspecification problem.

From Table 6 we see while LABPR does not cause MCU, MCU will cause LABPR. Also LABPR does not cause CRMAN, MVA and UN but will cause MANO and MANEXP.

4.2 Evaluation of the Research Hypothesis

Here we evaluate the estimates based on economic, statistical and econometric criteria (Table 7).

Table 5. Diagnostic tests

S/N	Test	F-Statistic	Probability
1	Normality Jarque Bera Statistic	1.546174	0.4616
2	Serial Correlation Breusch- Godfrey Serial LM Test	0.252731	0.7804
3	Heteroscedasticity White Heteroscedasticity Test	0.398125	0.9577
4	Specification Error Ramsey Reset Test	2.175058	0.1624

Table 6. Granger causality result

LABPR does not cause MCU but MCU causes LABPR
 LABPR does not cause CRMAN
 LABPR does not cause MVA
 LABPR does not cause UN
 LABPR causes MANO
 LABPR causes MANEXP

Table 7. Economic, statistical and econometric criteria

Regrassand	Regressors	Expected sign	Obtained sign
LABPR	Manufacturing value added	+	-
LABPR	Manufacturing capacity utilization	+	+
LABPR	Export rate	+	+
LABPR	Unemployment	-	-
LABPR	Manufacturing output	+	+
LABPR	Credit to manufacturing sector	+	+

The results show us that MVA did not conform to the expectation. This means that increase in LABPR will not increase MVA. The reason for this may not be farfetched owing to the fact that in Nigeria no commensurate new idea or technology is brought in to increase the output and so the input does not bring about a commensurate output.

The statistical criteria also tells us that we have a good fitness of fit which is shown by R^2 0.994911 and adjusted R^2 of 0.989827. it shows us we have a robust model as 98% of the changes in the variables are captured.

4.3 Discussion of Findings

From the estimated coefficient of the short run dynamic error correction model, we find that manufacturing export, manufacturing capacity utilization, credit to manufacturing, manufacturing output were positively related while Manufacturing value added and unemployment were negatively related to labour productivity.

The variables with the positive relationship satisfied the a priori expectation. Unemployment also satisfies the a priori expectation meaning that as labour productivity increases unemployment will decrease. So, more jobs should be provided in this sector to help bring down unemployment and thereby increase the GDP of the economy. However, the one that worries us is the fact that MVA has a negative relationship with labour productivity. The reason for this may not be farfetched. This supports findings from Ogundipe [30] and suggests that no new technology is brought into the sector even

when new manufacturers gets in; they join to do what others are doing, no creativity and so no increase in productivity. This also points out to the need for advanced technology, expertise and skills that match the particular industries because they are the things that will add up to bring about value addition in the manufacturing sector which will indirectly impact on the growth of the economy.

Our finding also supports that more money should be made available to this sector to increase credit that is available to them as observed by Obadan and Odusola [1], which will also lead to increased manufacturing output and therefore increase in manufacturing export.

5. CONCLUSION AND RECOMMENDATION

5.1 Conclusions

The estimated variables result showed that the variables MANEXP and MCU have positive and significant relationship with labour productivity. Also that while MVA has a negative relationship, MANO, CRMAN and UN has non-significant relationship with LABPR in Nigeria for the period under review. This result shows us that they all met their apriori expectation except for MVA which gave a negative relationship. This implies that MVA is not contributing to manufacturing sector as it ought to.

The summary statistics displayed by the adjusted R^2 shows us that the explanatory variables used in the study explained over 90% of the changes in productivity in Nigeria. It means that the entire

manufacturing growth component we looked at have all played a role in the level of productivity we are experiencing in the country and so if more attention is given to these variables they will contribute more than they are doing now. The diagnostic tests of normality, serial correlation, heteroscedasticity and specification error that were carried out shows that the empirical models and residuals are normally distributed, homoscedastic and serially uncorrelated.

5.2 Recommendations

1. Value should be added to the manufacturing sector in order to bring about more productivity in the Nigerian economy. This includes more technology, new ideas, the right expertise and skills that will bring about this value addition.
2. Manufacturers in Nigeria ought to be encouraged more with finance and technical knowhow as this will in no small way increase productivity, increase manufacturing export and thereby increase the GDP of the economy.
3. Manufacturers should be encouraged to produce more as this will increase our exports thereby increasing our GDP
4. Manufacturing sector should be given more attention as a means of reducing unemployment.

5.4 Contribution to Knowledge

No doubt, various works have been done around this area of research. However for us we have tried to use productivity where some works like Sodipe & Ogunnriola [24], Omitogun & Longe [19] and Ngutsar & Ijirshar [28] focused on GDP, also we have looked at various variables that differ from those in the existing works.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Obadan MI, Odusola FA. Productivity and unemployment in Nigeria. National Centre for Economic Management and Administration (NCEMA), Ibadan; 2010.
2. Signé L, Johnson C. The potential of manufacturing and industrialization in Africa: Trends, opportunities, and strategies, Africa Growth Initiatives at Brookings; 2018.
3. Olusoji OM, Oderinde OL. Industrialisation, growth and employment generation in Nigeria in Imperatives of Industrialisation in Nigeria, Nigerian Economic Society, Ibadan; 2017.
4. Njoku A, Ihugba OA. Unemployment and Nigerian economic growth (1985-2009) International Association for Teaching and Learning (IATEL); 2011.
5. Page J. Youth, jobs, and structural change: Confronting Africa's Employment problem Working Paper Series No 155 African Development Bank, Tunis, Tunisia; 2012.
6. Ududechinyere C, Eze OM, Nweke AM. An analysis of the effect of manufacturing sector on the growth of the Nigerian economy IOSR Journal of Business and Management (IOSR-JBM) e-ISSN: 2278-487X, p-ISSN: 2319-7668. 2018;4(20):34-46.
7. Chete LN, Adeoti JO, Adeyinka FM, Ogundele O. Industrial development and growth in Nigeria: Lessons and challenges. Nigerian Institute of Social and Economic Research (NISER), Ibadan, Working Paper No. 8; 2016.
8. McMillan M. Structural change and labor productivity growth, Africa International Food and Policy Research Institute; 2019.
9. Ayala M. Manufacturing the only engine of growth? An extension of Kaldor's first law of economic growth – Master Thesis. University of Vienna; 2014.
10. Whelan K. Growth Accounting, University College Dublin, Advanced Macroeconomics Notes; 2015.
11. Lavopa AM. Structural transformation and economic development: Can development traps be avoided? Dissertation; 2015.
12. Steenkamp F, Rooney C. Can Africa grow its manufacturing sector and create jobs. World Bank Blog; 2017.
13. World Bank. World Development Indicators Highlights: Featuring the Sustainable Development Goals Extracted from the full version of WDI; 2016.
14. Available: www.ceicdata.com/en/indicator/nigeria/labour-productivity-growth Retrieved on 28 June 2019.
15. Anudu O. Nigeria manufacturing sector and emerging realities; 2019. Available: Businessday.ng Retrieved on 19th August.
16. Udabah SI. Productivity and economic growth, Paper presented at the

- 9th Annual Conference of Zonal Research Units, held at Abeokuta; June 12-16th 2000.
17. Amassoma D, Nwosa PI. The impact of unemployment rate on productivity growth in Nigeria: An Error Correction Modeling Approach, *International Journal of Economics and Management Sciences*. 201;32(8):01-13.
 18. Nakamura K, Kaihatsu S, Yagi T. Productivity improvement and economic growth. No.18-E-10 Bank of Japan Working Paper Series; 2018.
 19. Omitogun O, Longe EA. Unemployment and economic growth in Nigeria in the 21st century: VAR approach. *Economica, AUDOE*. 2017;5(13):155-168.
 20. Thirlwall AP. Nicholas Kaldor's life and his insights into the applied economics of growth. *Acta Oeconomica*. 2017;67(s1): ISSN 0001-6373.
 21. Szirmai A, Gebreyesus M, Guadagno F, Verspagen B. Promoting productive employment in Sub-Saharan Africa: A Review of the literature; 2013.
 22. Obi KO. Economic Reforms in Nigeria. In Ezenekwe, Metu, Nwokoye & Maduka (Eds), *Structure and Problems of the Nigerian Economy (98-193)*, Department of Economics, Nnamdi Azikiwe University, Awka; 2019.
 23. Chen P, Rezai A, Semmler W. Productivity and unemployment in the short and long run Schwartz Center for Economic Policy Analysis (SCEPA) Working Paper Series; 2007.
 24. Sodipe OA, Ogunrinola OI. Employment and economic growth nexus in Nigeria *International Journal of Business and Social Science*. 2011;2(11).
 25. Mehta S. Structural Transformation and Industrialization: A Panel Analyses of Indian Manufacturing Industries, *Journal of Comparative Asian Development*; 2012.
 26. Berhane B. The Effect of improved productivity of the manufacturing industries, *Ethiopian Journal of Economics*. 2013;XXII(1).
 27. Ighosewe EF, Akpokerere OE. Economic reforms and the performance of Nigeria's manufacturing sector from (1981-2012), *International Business Research*; ISSN 1913-9004 E-ISSN 1913-9012 Published by Canadian Center of Science and Education. 2015;8(4).
 28. Ngutsav SA, Ijirshar VU. Labour productivity and economic growth in Nigeria: A disaggregated sector analysis, *Lafia Journal of Economics and Management Sciences*. 2018;3(1):256-276.
 29. Korgbeelo C, Deekor LN. Time-Series Analysis of Industrial Sector Performance and Economic Growth in Nigeria: A Disaggregated Approach. *Cross Current Int J Econ Manag Media Stud*. 2021;3(4):35-46.
 30. Ogundipe M. The Impact of Manufacturing Sector on Economic Growth in Nigeria, *Research Square (Preprint)*; 2022. DOI: <https://doi.org/10.21203/rs.3.rs-2203096/v1>

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