DETERMINANTS OF TOTAL FACTOR PRODUCTIVITY OF THE MANUFACTURING INDUSTRY IN NIGERIA

BY

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DECLARATION

I, **BATURE ISA USMAN**, solemnly declare that this report is my original work. Where it is indebted to the work of others, due acknowledgement has been made.

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05-10-2018

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APPROVAL

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DEDICATION

The study is dedicated to my humble and lovely wife Haj. Sa'adatu Sani mai Goro and the entire children in the family; Usman, Amina, Maryam, Khadija, Moh'd Ameen and Moh'd Sani. May Almighty Allah Bless them all, Ameen.

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LIST OF ACRONYMS AND ABBREVIATIONS

AIC	Akaike Information Criterion
ARMA	Autoregressive Moving Average
ADF	Augmented Dickey-Fuller
CBN	Central Bank of Nigeria
CPI	Consumer Price Index
DWT	Durbin Watson Statistic
ECM	Error Correction Model
EP	Export Production
Expo	Exports
FDI	Foreign Direct Investment
FPE	Final Prediction Error
GDP	Gross Domestic Product
GVA	Gross Value Added
HQC	Hannan Quinn Criterion
IMFs	International Monetary Fund
Imp	Imports
IS	Import Substitution
ITT	International Technology Transfer
LDCs	Low Developed Countries
MAN	Manufacturers' Association of Nigeria
MNC's	Multinational Corporations
NBS	National Bureau of Statistics
OLS	Ordinary Least Square
PENRM	Primary Enrollment
PP	Phillips Perron
PGR	Population Growth Rate
R& D	Research & Development
VAR	Vector Autoregressive
SFPF	Stochastic Frontier Production Function
SIC	Schwarz Information Criterion
SAP	Structural Adjustment Programme
TFP	Total Factor Productivity

TOPEN	Trade Openness
TTRADE	Total Trade
UNCTAD	United Nations Conference on Trade and Development
UNIDO	United Nation Industrial Development Organization
WBDB	World Bank Data Base

ABSTRACT

Manufacturing sector in Nigeria had been developing positively as a result of foreign direct investment, foreign companies had introduced new manufacturing technology that saved time, cost and improved the quality of the manufactured goods, despite this initial flourishing growth phase, the sector was not able to successfully meet up domestic demand and the cost for imported manufactured goods were high. This study looked at the determinants of total factor productivity of the manufacturing industry in Nigeria. The objectives of the study were; to examine the short run determinants of total factor productivity; to determine the long run determinants of total factor productivity; to investigate Granger Casualty between determinants and total factor productivity. The study used yearly time series data from the World Bank Data Base, Nigeria National Bureau of Statistics (NBS) and the Central Bank of Nigeria (CBN) from the year 1970-2016. To confirm that the variables were stationary, Unit root test such as Augmented Dickey-Fuller and Phillips Perron were employed. A Vector Autoregressive structure with 2 lags was confirmed using the lag order selection criteria base on the Likelihood Ratio, Akaike Information Criterion (AIC), Schwartz Information Criterion (SIC) and Hannan-Quinn Information Criterion (HQC). Further analysis was carried out in order to examine the short run and long run relationship between the variables, Johansen Cointegration test based on Maximum Eigen test and Trace test confirmed 1 cointegrating equation indicating; total factor productivity was explained by trade openness, foreign direct investment & consumer price index in the short run model as explained by the adjusted R-square about 51.3% of the variation, there exist in the long run model relationship between foreign direct investment, Population growth rate and Total factor productivity. Granger Casualty Test was used to test the relationship between the variables; which showed that foreing direct Investments and population growth rate granger cause total factor productivity of the Manufacturing industry at one (1) and five (5) percent level of significance (0.0882) and (0.037), respectively. There exist uni-directional casualty from total factor productivity to trade openness from foreign direct investment to consumer price index and human capital. In conclusion, most remittance inflows into the economy were not recorded by most financial institutions in the short run; long run equilibrium relationship exist between total factor productivity and foreign direct investment & population growth rate; there was uni-directional casual relationship between total factor productivity to trade openness and from foreign direct investment to consumer price index & human capital. The study recommends that long run development plan should be geared towards improving Nigeria manufacturing sector's total factor productivity in respect to trade openness, consumer price index and human capital Development; there should be effort to strengthen and sustained Foreign Direct Investment at all time by the successive governments; more trade liberalization policies should be formulated, so that the sector will be fortified to satisfy domestic demands and bring about transfer of technology among others; lastly, the study model was able to explained 68% of the total variables, therefore, study recommends the remaining 32% other variables that could as well explain which were not captured by the study model should be investigated by further study.

CHAPTER ONE
INTRODUCTION

1.0 Introduction

The manufacturing industry is often the main thrust of policy makers in less developed and developing countries including Nigeria. It is viewed as leading edge of modernization and job creation (skilled and unskilled direct and indirect) as well as a fundamental source of various positive spillovers. Although many less developed and developing countries have scaled back trade barriers over the past years, the industrial sector remains relatively protected in the typical country (Francis, 2002).

Governments promote manufacturing industry with special tax concessions and relatively low tariff rate for importers of manufacturing machinery and equipment. At the same time, many observers believe that the maze of business regulations is usually dense and unpredictable in less developed and developing countries (Brunette et al., 1997).

Manufacturing industry plays important role in a modern economy and has many dynamics benefits that are crucial for economic transformation. In advanced countries the manufacturing sector is a leading sector in many respects. It is an avenue for creating productivity in relation to import substitution and export expansion, creating foreign exchange earning capacity, raising employment, promoting the growth of investment at a faster rate more than any other sector of the economy as well as extensive and more efficient connection among various sectors (Fakiyesi, 2005). But its capacity utilization was also low, this is in malice of the fact that industrial sector is the fastest growing sector back 1973. The sector has became more and more dependent on the external sector for import of non labour input, inability to import, thus, can impact negatively on the industrial production (NBS, 2012).

The collapse of the global oil market from the early 1980s and the severe decline in the foreign exchange earning capacity have adversely affected the economic growth and development in Nigeria together with the world financial crisis that rocked the global economies in the year 2008 as well as early 2012.

Other problems of the Nigerian economy include over dependence on imports for consumption and capital goods, non functional social & economic infrastructure, unprecedented fall in capital utilization rate in industry and neglect of the agricultural sector among others. These have resulted in fallen incomes as well as devaluation of standards of living among Nigerians (Anyanwu, 2004).

The structural adjustment programme (SAP) was introduced in the year 1986 to address these problems, no remarkable improvement has achieved. Therefore, putting the Nigeria back on the path of economic recovery and growth will require straightway rebuilding depreciated infrastructure and making more goods and services accessible to Nigerians at affordable prices, this could be achieved only by reviving the manufacturing sector of the economy (Usman, 2017).

However, the uncertainty in the world oil market and the tendency of agricultural commodity prices to come down had drawn the Nigerian government that adequate attention should be paid to the manufacturing sector as it is the only sector that is independent of the vagaries that afflict a single economy like Nigeria's economy.
The structure of manufacturing production has been a derivative of the various development plans. The first national development plan (1962 – 1968) emphasized light industry and assessbling activities. The second plan (1970 – 1975) had a some what 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. But several of the grandiose plans were short changed 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, 2009).

1.1 Background of the Study

Globally, it is reported that middle income countries such as: Hong Kong, South Korea, Singapore, the Philippines, India, Mexico as well as Brazil took similar steps and embraced boosting of total factor productivity among manufacturing industries as an integrals part of their national planning scheme have made a very significant roads into the world manufacturer's market (Graig, & Harris, 1973).

Also, Japan from the end of the World War II and the United States of America from the 1970's have made high productivity the center point of their economic development plans and results have been resounding (Anyanwu, 2004).
Productivity variation among smallholder maize farmers in Tanzania East Africa using SFPF Martin, (2014) discovered that the major determinants of productivity were low level of education of farmers, lack of extension services, limited capital and fragmentation and unavailability of inputs among others.

In Nigeria Nto and Mbansor, (2011) observed that enhanced total factor productivity will equally contribute to the competitiveness of manufacturing industry in both domestic and foreign market which is what is required to put Nigeria back on the path of economic recovery and growth. This is imperative following the prolonged economic recession occasioned by the collapse of the world oil market from the early 1980's as well as global financial crisis that rocked all the manufacturing industries since 2007 (Oyeranti, 2012). However, many economic measures have been introduced by the Nigerian government to address problems associated with total factor productivity decline but evidence about that they have not yielded the desired results. For example, contribution of manufacturing industries to the Nigeria's Gross Domestic Product (GDP) have been on the declining trend, ranging from 9.2% in 1981 – 1985 to 6.3% in 1996-1998 (Anyawu, 2004).

A report by Manufacturers Association of Nigeria (MAN), confirmed that the general trend in productivity among manufacturing industries was negative in 1989 (MAN, 2010). According to National Bureau of Statistics (NBS), the situation has not improved, though growth rate of manufacturing industry may have increased imaginary from 7.31% in 2010 to 7.32% in 2011 but an ugly scenario could be drawn when compared with 2008 and 2009, when growth rate was 8.39 and 8.13 percent respectively. With this statistical review of contribution of manufacturing industry to GDP, it is obvious that productivity among the manufacturing industries has not improved, hence the need for an urgent and critical step that will help to identify major drivers of productivity among manufacturing industries in Nigeria. Therefore, Nigeria scholar as well as social and economic researchers must borrow a leaf by bringing total factor productivity to lamp light, if and only if the country is to join the league of economically vibrant states (NBS, 2012).

1.1.1 Historical Perspective

Industrial development in Nigeria involved considerable artisanal crafts firms in the early stages and grew progressively in number over the years to large-scale manufacturing. The pattern of the distribution of manufacturing industries at the city level indicates that there was a marked concentration of manufacturing establishments in the southern part of Nigeria, and especially Lagos and Ibadan in the southwest. Other locations of relative high concentration of industrial establishments were Kano in the norther part and Enugu and Port Harcourt in the south eastern and south south part of Nigeria respectively (Ajayi, 2007).

Kayode, (2009) describes industry in particular, the manufacturing sub-sector as the heart of the economy and has been accepted as the major driving force of the economy world over. In most modern economies, manufacturing industry serves as the driving vehicle for the production of goods and services generate employments and the enhancement of income, which Nigeria is not exceptional.

In light of the above, Nigeria had employed numerous strategies which were aimed at enhancing the productivity in order to bring about economic growth and development. For example, Nigeria adapted the import substitution industrialization strategy during the first National Development Plan (1962–1968) which aimed at reducing the volume of importation of finished goods and encouraging foreign exchange saving by producing locally, some of the imported consumer goods (CBN, 2011).

Since the late 1960s the Nigerian economy has been based mainly on the petroleum industry, in the year 1970s series of increases in the international oil price generated substantial windfall revenues for the government. It soon became apparent that these oil price shocks were at best ‘Dutch desease’ a mixed blessing like many other African countries, Nigerias early independence years had seen an industrial strategy that relied heavily on import substitution, at first this had appeared to work relatively well, with the share of manufacturing to GDP increasing from 2 per cent in 1957 to 7 per cent in 1969 (Utomi, 1998).

The massive oil revenues meant that this strategy could be intensified; consequently, the 1970s witnessed huge investments in state-own enterprises. While this implied rapid expansion of the industrial sector, subsequent return on investment projects were typically much below expectation (MAN, 2010).

Once oil prices fell in the late 1970s and early 1980s the economy went into a period of rapid economic decline, in 1983 the economy came close to a virtual collapse, real per capital income being about 30 per cent lower than at the onset of the oil price boom, ten years earlier (Francis, 2002).

The subsequent couple of years witnessed political instability, with two coups in 19 months during 1983-1985. Towards the end of 1980s the government introduced a number of economic reforms, involving deregulation of the foreign exchange market, abolition of import licenses and devaluation of the nation currency (Naira). However, implementation of the new policies was slow, fiscal discipline remained weak; and substantial budget deficit therefore emerged in the early 1990s. In the year 1993 the then government initiated the Nigerian Economic Submit, seeking to identify policy measures to reverse the poor economic performance, one outcome of the then submit was the Economic Action Agenda, which contained a blueprint for growth engineered by the private sector. Central to this Agenda was the deregulation of one economy (Francis, 2002).

Nigeria consolidated her import substitution industrialization strategy during second national development plan period (1970–75) which actually fell with in oil boom era at the time; manufacturing industries were so organized to depend on imported inputs because of the weak technological base of the economy. However, as a result of the collapse of the world oil market in the early 1980's, there was a severe reduction in the earnings from oil exports consequently, the import development industrial structure that had emerged became unsustainable owing to the paucity of earnings from the oil exports which could not adequately pay for the huge-import bill, several policy measures were employed to ameliorate the above mentioned situation which include;

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 Program (SAP) in the year 1986 by the military government.

One fundamental reason for the introduction of ”SAP” was to reduce the high dependence of the Nigerian economy on crude oil as the major foreign earner, by promoting non- oil export, particularly “manufactured goods” but the contribution of the manufacturing sub-sector to Gross Domestic Product (GDP) has declined steadily, due to a number of factors. As a result of these, government introduced several other economic policies, despite these efforts of the Nigerian government, the performance of the manufacturing industry was still not clear (CBN, 2013).

Using Cobb-Douglas functional form of SFPF to analysed total factor productivity of Brazilian Agri-business, observed that significant variables that influenced it were harvest areas, credit, and limestone with all assuming expected sign (Constanti *et al*., 2009).

A number of research studies have used the stochastic frontier production function to identify and estimate the determinants of productivity in their areas of interest and the results obtained were found adequate for policy formulation. For example, in the study on total factor productivity in agri-business firms and its determinants in Abia state, south–eastern Nigeria observed that the major determinants of productivity are skilled labour and raw materials, while skilled labour exerted positive influence on productivity, cost of raw materials negatively influenced productivity among agri-business firms in the area (Nto and Mbanasor, 2011).

Explored the effects of macroeconomic factors on total factor productivity in 34 Sub-Saharan African countries for the period 1980-2002, the results indicated that external debt influenced productivity while human capital, credit to private industry as percentage of GDP, foreign direct investment as percentage of GDP, manufacturing value added as a share GDP have significant positive effect on productivity (Akinlo, 2006).

1.1.2 Conceptual Perspective

The concept of total factor productivity also known as multi-factor productivity, the portion of output not explained by the traditional measured input of labour and capital used in production, productivity in administration is mostly concerned with the organizational effectiveness as a whole, while the industrial engineer focuses more on those factors which are more operational and quantifiable work measurement and performance standards (Adekoya, 2007). However, the understanding of productivity in administration seems to ignore one core and fundamental aspect of productivity which is efficiency. When considered together with industrial engineering perspective, the administrative perspective has equally down played the critical role that the performance of the individual organization has on organizational Productivity. Business manager on the other hand, sees productivity not only as a measure of efficiency, but also connote effectiveness and performance of individual organization (Anyanwu, 2004).

Productivity is nothing more than the arithmetic ratio between the amount produced and the amount of any resources used in the course of production; this conception of productivity goes to imply that it can indeed be perceived as the output per unit input or the efficiency with which resources are utilized (Samuelson et al., 2005).

Productivity becomes the attainment of the highest level of performance with the lowest possible expenditure of resources. It represents the ratio of quality and quantity of products to the resources utilized (Amadi, 2001).

1.1.3 Theoretical Perspective

The study has been underpinned on two theories, theory of comparative advantage by David Richardo. Has it that, a country has a comparative advantage in producing goods if the opportunity cost of producing the goods is lower at home than in the other country (Sodersten & Reed, 1994). Neoclassical response growth theory, the theory which agrees that technological progress is at least a partial endogenous to the economy. Valuable resources are used up in pursuit of innovation, presumable with some rational hope of financial success.

The patent system is intended to solidify that hope and therefore, attract more resources to search for new products and progress, it would however, be veryodd indeed if all that actually had nothing to do with the actual achievement of technological progress (Solow & Winter, 1994).

Studies consulted may have given insight to the identification and measurement of major determinants of total factor productivity but the methodology used by many of them may have some short comings For example Chad Syversion. Finds that manufacturing industries in the United State, the average difference in logged total factor productivity lies between an industry's 90 & 10 percentile plants was 0.651 (Chad, 2004) thus, may give misleading results and cannot be used for policy formulation.

1.1.4 Contextual Perspective

Manufacturing industries are very critical, sensitive and vital to the economic development of any nation most especially the under developed nations world wide. Economsts and other social scientists have for long time discussed the causes of Economic growth and the mechanisms behind it (MAN, 2013).

Empirical Evidence have shown number of studies have discovered some factors that determine total factor productivity. These factors include among others; trade and trade orientation (Khan, 2006); competition policy (Salgado, 2002); macroeconomic factors, such as inflation (Andres & Hernando, 1997), monetary and financial development. Other factors identified in empiricarical works that affect total factor productivity growth include human capital (Education), research and development, infrustracture, fiscal deficit and population growth rate (Hercowitz et al., 1999).

1.2 Statement of the Problem

In the 1960s and 1970's after the Nigerian independence, the Nigerian manufacturing sector (Industry) had been developing positively as a result of foreign direct investment, foreign companies had introduced new manufacturing technology that saved time, cost and improved the quality of the products manufactured. However, despite this initial flourishing growth phase, the sector was not able to successfully meet up local demand and the costs for imported manufactured goods were high.

From the end of 1980s to date, Nigerian government had invested heavily on industrial projects including fertilizer, cements, sugar, pulp and paper, iron and steel, salt among other, but the poor returns upon these projects could not justify the enormous public funds that had been commited to their execution, many industrial projects in which huge amount had been expended remained uncompleted and abandoned.

Also, several efforts have also been undertaken by the Nigerian governments at various points and time to rejuvenate and revive the manufacturing sector such efforts included; formulation of numerous economic policies, reforms, strategies such as import substitution industrialization strategy during National development plans.

First National Development Plan (1962-1968) was prepared and executed with the aid of foreign investments. The strategy was adopted with the aim of encouraging technological development, reduction in the volume of imports and encouraging foreign exchange savings capacity by manufacturing locally some of the imported goods. The period withnessed the establishment of large scale import substituting light industry and assembly activity.

The Second National Development Plan (1970-1974) withnessed the advent of oil boom, with huge oil revenue, there was direct government investment in industrial projects as emphasis shifted to the establishment of import substituting heavy industrial projects such as the steel, petrochemical and petroleum refinaries. This was aimed at development of more diversified and intergrated industrial base, essentially to supply basic intermediate and capital goods to the downstream industries. Also, in the Second National Development Plan period, the promotion of indigenous participation in industrial activities became one of the prominent policy instruments designed to encourage industrial development. The implementation of the Nigeria Enterprises Promotion Decree, otherwise called the Indigenization Degree of 1972 and subsequent amendment in 1977, led to divesture of foreign equity holdings and expansion of domestic private investment in the Manufacturing Sector of the Economy through acquisition of existing industrial equity shares.

Schedule 1 of the 1972 Decree listed enterprises exclusively reserved for Nigerians while schedule II listed enterprises in which Nigerians must acquired at least 40% share. However, the amendment of the 1972 & 1977 Decrees were more liberal to foreign investors (Afangideh, 2007).

The Third National Development Plan (1975-1980) withnessed increased government role in providing infrastructural facility and ensuring conducive investment climate while emphasis on heavy industries was maintained. Government contributed N5.3billion or 72.7% of total investment devoted to industries during the period (Afangideh, 2007).

The Fouth National Development Plan (1981-1985) greater emphasis was on self-sufficiency through increased in domestic resource content of industrial production, considering the crash of crude oil price. The fall in crude oil price resulted in acute shortage of foreign exchange earning to procure required industrial raw materials and spare parts. The outcome was the fall in the Manufacturing Sector, worsened rate of unemployment and deterioration of infrastructural facilities. The consequence of it all was a depressed standard of living of the Nigerian citizens.

1.3.1 Objective of the Study

The main objective of the study was to analyse the determinants of Total factor productivity of the manufacturing industry in Nigeria.

1.3.2 The specific objectives are to:

1. Examine the short run determinants of Total factor productivity.
2. Determine the long run determinants of Total factor productivity.
3. Investigate Granger Casualty between determinants and Total factor productivity.

1.4. Hypotheses of the Study

$H0_1$: Trade openness, foreign direct investment, Consumer price index, Population growth rate and Human capital do not have short run effect on total factor productivity.

$H0_2$: Trade openness, foreign direct investment, Consumer price index, Population growth rate and Human capital do not have long run effect on total factor productivity.

$H0_3$: There is no significant Casual relationship between Trade openness, foreign direct investment, Consumer price index, Population growth rate, Human capital and total factor productivity.

1.5. Scope of the Study

1.5.1 Geographical Scope

The study made use of secondary data from Nigeria (National Bureau of Statistics, Central Bank of Nigeria, United Nation Industrial Development Organization, United Nations Conference on Trade and Development and World Bank Data Base), Data on manufacturing industry total factor productivity.

1.5.2 Content Scope

With respect to Nigeria, the study looked at the determinants of total factor productivity of the manufacturing industry for fourty seven years (1970-2016), to examine and determine the short and the long run effects respectively and Granger casualty test was performed to investigate the relationship between the variables.

1.5.3 Theoretical Scope

David Richardo (1817) Theory of comparative advantage has it that, a country has a comparative advantage in producing goods if the opportunity cost of producing the goods is lower at home than in the other country (Sodersten and Reed, 1994). And neoclassical response growth theory which agrees that technological progress is at least partially endogerous to the economy (Solow & Swan, 1945 – 1955).

1.5.4 Time Scope

Data for this study was collected for the period of fourty seven (47) years, ie from (1970 – 2016). Being the period that withness various policies, reforms, agenda and strategy(s) (development plans) to revive the manufacturing sector of the economy.

1.6. Significance / Justification of the Study

The findings of this study will help government to improve the Manufacturing Sector in particular and for Economic transformation in general, considering the fact that study work on the manufacturing sector in Nigeria was still comparatively scanty.

To accomplish this aim and respond to a recent call for study to looked at the situation of manufacturing industrys' total factor productivity from (1970 – 2016) so that Nigerian government can evaluate some of the instruments that have been implemeneted so as to determine which one should be strengthened to achieve more total factor productivity in the Nigerian manufacturing industry and to meet up international best practices and compete with other manufacturing industries world wide.

The purpose for this study comes from the desire to make an input into the research for Nigerian economic recovery strategy. Clearly external imbalances resulting from dwindling foreign exchange earnings, balance of payments deficits and unfavourable terms trade position confronting Nigeria is due to the reduction in total factor productivity that is not complemented by the manufacturing sector output expection (Njika, 2006).

Akinlo et al., (2016) examined deterninants of total factor productivity growth in Nigeria, 1970-2009).But not on manufacturing industry which this study addressed. The study used; trade openness, foreign direct investment, consumer price index, population growth rate and human capital to Determine total factor productivity of the manufacturing industry in Nigeria which most of the researchers who have done similar work failed or have not yet study on.

Last but not the least, the study is significant in no small measure considering the fact that most if not all studies on determinants of toal factor productivity were centered on Agro-business and other small firms in Nigeria.

1.8. Operational Definitions

Trade Openness (Export & Import)

This is taken to imply that there is minimal or no restrictions to trade and defined as the sum of export and import relative to the gross domestic product.

Trade openness provides significant information about foreign market thereby enabling local firms to serve foreign markets efficiently. (World development indicators)/ UNCTAD

Foreign Direct Investment

An investment in a business by an investor from another country for which the foreign investor has control over investment or company, it includes transfer of technology from one country to another.

Consumer Price Index

Statistics used for identifying periods of inflation or deflation, it is calculated by taking price changes for each item in the predetermined basket of goods and average them.

Population Growth Rate

An increase in the number of people that reside in Nigeria, from one period to another (birth rate + immigration) – (death rate + emigration)

Human Capital (Employee)

This is an individual who works part-time or full time under a contract of employment, whether oral or written, express or implied, and has recognized rights and duties, also called a worker.

Manufacturing Industry

Manufacture and trade based on the fabrication, processing, or preparation of products from raw materials and commodities. This includes all foods, chemicals, textiles, machines and equipment. All refined metals and mineral derived from extracted ores, all lumber wood and pulp products.

Causality

Relationship between dependent variable and independent variable, in other words, cause and effect relationship

Casualty

Not regular or permanent relationship between variables.

Total Factor Productivity

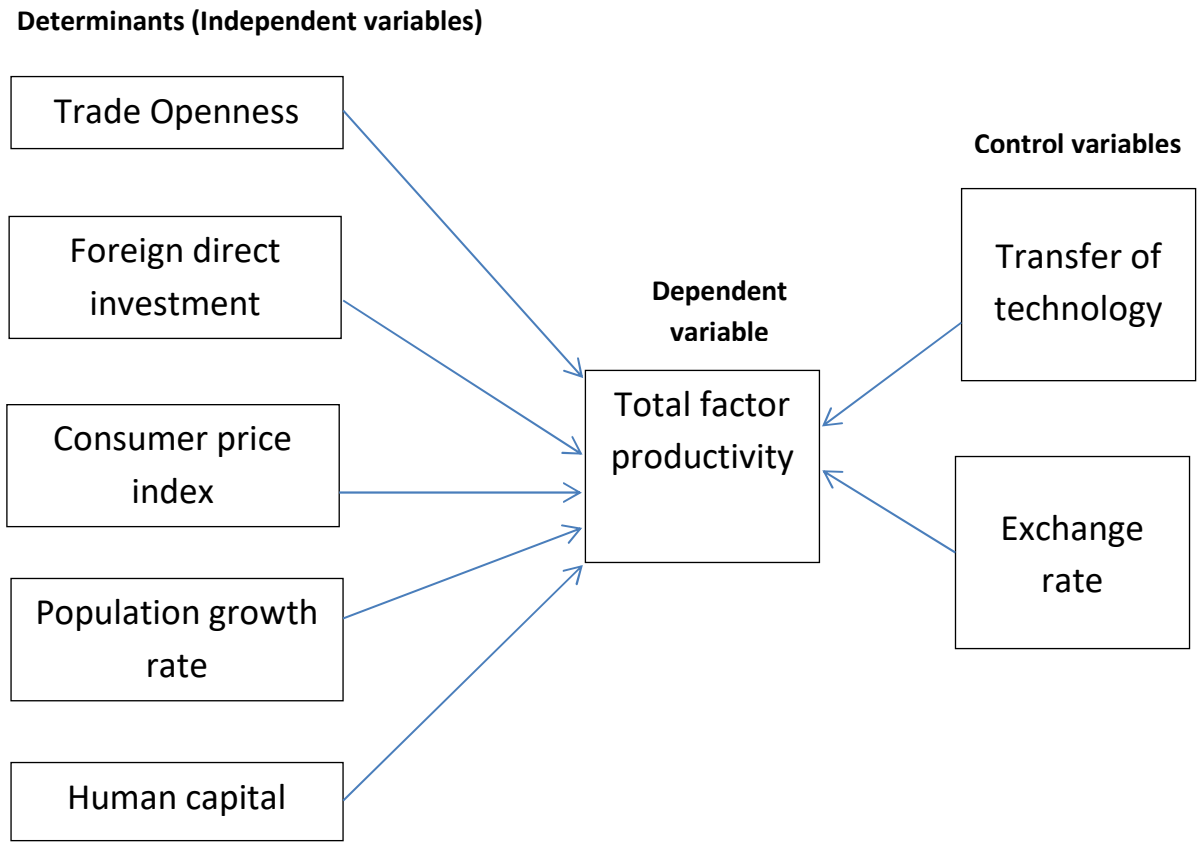
Multi-factor productivity, the portion of output not explained by traditionally measured input of labour and capital used in production

Stationarity

A common assumption in any time series technique is that the data are stationary. A process has the property that the mean, variance and autocorrelation structure do not change over time. Ie, are all constant over time. If the time series data are not stationary, we can often transform it to stationarity by; 1- difference the data, 2- If the data contains a trend, fit some type of curve on the data and then model the residual, 3- If non constant variable, taking logarithms or square root of the series.

1.9 Conceptual framework

The conceptual framework shown below illustrated the relationship between the independent variable (indicators) and the dependent variable (total factor productivity) it also recognized the presence of control variables that could determine total factor productivity as well.



Source: Developed by the Researcher based on literature reviewed

1.10 Outline of the thesis

This shows the contents of each chepter of the study:

Chapter one presents the introduction of the study, the background of the study; Historical perspective, Conceptual perspective, Theoretical perspective and Contextual perspective, the statement of the problem, objectives of the study both general and specific, the study hypotheses, scope of the study; Geographical scope, Content scope, Theoritical scope and Time scope, significance of the study, operation definations of the term used in the study and lastly conceptual frame work of the study.

Chapter two presents the review of the related literature; firstly, the introduction of the chapter, theoretical review, empirical evidence and the research gaps both knowledge gap and methodological gap.

Chapter three presents the study methodology; firstly, the introduction of the chapter, research design, data variables and their measurement, description of the research variables, diagnostic test, determination of the optimal lag length, econometric methodology (VAR Model), techniques of data analysis, descriptive statistics, model specification, estimation technique, stability test and lastly, limitations of the study.

Chapter four presents data presentation and analysis of the findings; firstly, the introduction of the chapter, descriptive statistics for the series in levels, unit root test, results of the determinants of total factor productivity of the manufacturing sector in Nigeria, analysis of correlation coefficient results, determination of the optimal length, cointegration test, interpretation of the long run model, test for normality of the long run residuals, interpretation of the short run model, variance decomposition analysis and lastly, interpretation of the var granger casualty test.

Chapter five presents the discussion of the study findiings, summary, conclusion and reommendations; firstly, the introduction of the chapter, discussion of the findings, the summary of the study, the conclusion, the recommendations based on two parts i.e, policy recommendation and general recommendation, contribution to knowledge and suggestion for further study.

CHAPTER TWO
REVIEW OF RELATED LITERATURE

2.0 Introduction

This chapter was concerned with review of theories, concepts and empirical findings on the linkage between total factor productivity and manufacturing industry.

2.1 Theoretical Review

Several studies have identified, theoretically and empirically, various factors that determine total factor productivity in both developed and developing countries. Theoretically, some identified factors include degree of trade openness, investment in knowledge and education, research and development, infrastracture and macroeconomic fundamentals, such as exchange rate, consumer price index, fiscal deficits and population growth rate.

The theoretical literature suggests that human capital affects total factor productivity growth by facilitating the adoption and implementation of new technology exogenously (Nelson & Phelps, 1966; Romer, 1990) and/or by facilitating the domestic production of technological innovations (Aghion & Howitt, 1998; Romer, 1990). However, the ability to adopt (adapt and implement) foreign technology depends not only on the quantity but also on the quality of education. This by implication means that for low-income countries with low government expenditure on education, low school enrolment, poor quality of education and low investment in research and development (R&D) activity, human capital might not have a positive impact on total factor productivity growth.

A number of mechanisms or channels through which trade openness affects total factor productivity growth have been provided in the literature. These include exploitation of comparative advantage, knowledge and technological transfer, exposure to competition and economics of scale. All the same, some have argued that trade openness could hurt productivity growth. For example (Grossman and Helpman, 1991) argue that trade could discourage efforts for invention by lowering expected potentials profitability of a successful innovation.

Moreover, trade openness can make a country with abundant unskilled labour to specialize in traditional low-technology manufacturing and international competition with possible adverse effect on total factor productivity.

In the literature, foreign direct investment is viewed as being critical to total factor productivity growth. Foreign direct investment brings technology and creates employment. It generates positive externalities in the form of knowledge spillovers to the domestic economy, through linkages with local suppliers and clients, learning from nearby foreign firms and employee training programme. However, negative externalities could be generated as barriers to accessing technology and competition are raised. In addition, where foreign direct investment gives rise to substantial reverse flows in the form of remittances of profits and dividends, productivity may be adversely affected.

In general, cosumer price index may adversely affect total factor productivity through several channels. High CPI signals economic instability and possibly a lack of budget control. Economic uncertainty and price variability may reduce excess capacity and hence reduce factor utilization (Fischer, 1993). Moreover, inflation may cause inefficient mix of input resources. It could cause misperception of the relative price level and lead to inefficient investment plans with adverse effect on productivity growth (Clark, 1982). Other channels through which inflation may negatively affect total factor productivity growth include possible reduction in labour supply, reduction in the demand for real money balances and reduction in after tax profits and capital accumulation.

However, as argued in the literature, the nature and extent of the effects of these factors on total factor productivity growth depend on the economic and social conditions or in short, the quality of the environment. The quality of the environment is related to the level of technological advancement, political stability and quality of institutions.

2.2 Empirical Evidence

A large number of studies have unearthed some factors that determine total factor productivity. These factors include trade and trade orientation (Khan, 2006) ; (Miller & Upadhyay, 2000, 2002); (Nachega & Fontaine, 2006; Njika, Binam & Tachi, 2006), competition policy (Salgado, 2002), macroeconomic factors, such as consumer price index (Andres & Hernando, 1997; Fischer 1993), fiscal policy (Hercowitz et al., 1999), monetary and financial development (Bencivenga & Smith, 1991); (Greenwood & Jovanovic, 1990). Other factors identified in empirical works that affect total factor productivity growth include human capital (education), research and development (Cameron, 1998; Griliches, 1992) and capital flows.However; it needs to be pointed out that no consensus has emerged on the nature of the impact of these factors on total factor productivity. While some studies found a positive effect of a few factors on total factor productivity, others have reported a negative effect. Yet, few others have reported no effect.

Many empirical studies on the trade openness–total factor productivity growth nexus using both micro, time series cross analysis provide support for positive linkage between the two (Cameron, Proudman & Redding, 1999; Coe & Helpman, 1995), (Dollar, 1992; Edwards, 1998; Miller & Upadhyay, 2000; Sachs & Warner, 1995). For example (Coe and Helpman, 1995) on Organisation for Economic Co-operation and Development (OECD) countries support the view that trade openness enhances technology transfer and therefore total factor productivity growth.

A similar result was obtained by (Coe, Helpman and Hoffmaister, 1997) on a sample of 77 highly industrialized and developing countries. Isaksson (2001), using data on 73 countries between 1960 and 1994 found that trade could serve as a significant carrier of knowledge or technology but that unless the recipient countries have the necessary level of human capital; this knowledge will bypass potential recipients.

Empirical evidence on the nexus between consumer price index and total factor productivity has provided contradictory results. Some studies have provided evidence in favour of a negative effect of consumer price index on total productivity growth. These studies include (Jarret and Selody, 1982, Selody, 1990, Ram, 1984, Smyth, 1995a, 1995b and Cozier and Selody, 1992).

The negative effect of consumer price index on total factor productivity growth has been attributed to its adverse effect on capital accumulation, demand for real money balances, labour supply and inefficiency in resource allocation. However, little empirical evidence has failed to support the negative effect of consumer price index on total factor productivity growth. Some of these studies include (Sbordone and Kuttner, 1994, Cameron, Hum and Simpson, 1996, Freeman and Yerger; 1997, 1998 and Hondroyiannis and Papapetrou, 1998). They argue that the negative connection between consumer price index and productivity growth is spurious and is due to cyclical co-movements in the two variables.

Acemoglu et al., (2003) who shows that even the impact of desease on economic development is not a result of the direct effect of health on income, but of its indirect effect via institutions, when isolated populations came into contact during the period of European colonisation, differences on desease environments had a major impact on the path of institutional development and consequently on economic growth.

With respect to human capital, some empirical evidence show that human capital, measured in the form of level of education, has an important positive effect on total factor productivity growth because of its role as a determinant of an economy's capacity to carry out technological innovation (Romer, 1990).

The study by Bartel, (1992) shows that human capital, in the form of employee training, increases productivity significantly in the United States. The importance of training for productivity growth is corroborated by Barrett and O'Connell (1999) for Ireland; (Baldwin, Diverty and Sabourin, 1995) for Canada; (Hall and Kramarz, 1998) for other 12 countries.

However, Miller and Upadhyay, (2000 & 2002) could not find evidence in support of human capital (education/knowledge). As a matter of fact, when human capital interacts with trade to account for threshold effects, human capital exerts a negative effect on total factor productivity growth. Their results show that at low-income levels, human capital is negatively associated with total factor productivity growth, while the effect is positive for middle income countries.

Several studies have provided empirical support for the positive effect of foreign direct investment on total factor productivity growth. These include; Keller and Yeaple, (2003) Griffith, Redding and Simpson, (2003) Keller, (2004) and Graner and Isaksson, (2002). For example Keller and Yeaple, (2003) results show that 14 per cent of productivity growth among plants in the US over the period 1987–1996 was as a result of foreing direct investment spillovers. A similar result was obtained for UK by (Griffith et al., 2003) and (Haskel, Pereira and Slaughter, 2002). All the same, some studies are skeptical of the foreing direct investment–total factor productivity growth nexus. Indeed, studies, such as Aitken and Harrison, (1999) show a negative effect from foreign direct investment on productivity among Venezuelan plants. They attribute this to the fact that foreign-owned firms recruit most of the workers and hence deprive domestic plants of their services. Hanson, (2001) reports on three case studies that spillovers are non-existent or limited. A similar conclusion was reported by Gorg and Greenaway, (2002) based on a survey of articles on foreing derect investment.

Okoh, (2004) argues that free trade is couched on the law of absolute advantage developed by Adam Smith later fine-tuned by David Ricardo (in the 19th century) into the law of comparative advantage. According to Adam Smith, (1776) each country should specialize in those goods or services in which it has absolute advantage. David Ricardo further argue that even when one country has absolute advantage in the production of two goods and against another country, it may still be more beneficial to both countries if each of them specialize the production of only one of the goods.

With this, both countries can enjoy the benefit of comparative advantage and enhance the process of exchange between the two. Thus, the underlining tenets of the Classical theory is that a country will tend to export the commodity whose comparative cost is lower in autarky and import the goods of which the comparative cost is higher in pre-trade isolation (Lyoha, 1995). The classical theory assumes, among others, constant costs, only one factor of production and perfect competition in both factor and product market.

The neoclassical theory of external trade was developed out of the need to modify some of the assumptions of the classical theory to provide more realistic existence of differences in comparative costs between countries, introduce capital as a second factor of production, and allowed for international differences in the pattern of demand. According to Agiebenebo, (1995) the policy conclusion of the modern theory of trade is exactly the same as that of classical trade theory. Free trade internationally and in the domestic economy will maximize national and world production efficiency output, consumption and hence, welfare. The interferences with trade such as tariffs, quotas or subsides will lower world and national output and keep the nations of the World on lower indifference curves.

Iyoha, (1995) also opined that a number of theories have been propounded to modify some aspect of the modern theory of trade. These includes the Linder theory of external trade, the size and distance theory of external trade postulated by Lineman and Adam Smith but it was modified and applied to third world markets to remove agrarian societies, creates opportunities not to reallocate fully employed resources as in the traditional modes but rather to make use of formally underemployed land and labour resources to produce greater output for export to foreign markets.

Oyelabi, (1993) in his article titled tariffs, domestic prices and industrial growth in Nigeria posited that tariff will cause a shift in relative factor prices in favour of the tariff-imposing country's scarce factor of production which is used intensively in the import-competing sector. He was also of the opinion that most of the developing countries, will have to redistribute their income in favour of urban industrial capitalists, a good percentage of whom are likely to be foreigners. Furthermore, an unfailing by-product of high tariffs is the encouragement of smuggling and parallel marketing (Black Market).

Afangideh, (2007) on the impact of WTO on Nigerian manufacture performance make use of three different theories vis-a-vis the classical theories of trade, absolute advantage theory and the theory of comparative advantage.

In the absolute advantage theory, Adam Smith submit that countries should specialize in and export those commodities in which they have an absolute advantage and should import those commodities in which the trading partner has an absolute advantage. Also, the David Ricardo, (1817) theory of comparative advantage has it that, a country has a comparative advantage in producing a good if the opportunity cost of producing the good is lower at home than in the other country (Sodersten, 1994).

The factor proportion theory by Heckscher, (2009) Bertil and Ohlin, (2003) and Samuelson, (2008) concluded that if a country that has labour in abundance but lack capital, labour will relatively cheap, and they will have relative cost advantage over other countries in the production of goods and services that require abundant labour, Such countries should therefore concentrate on the production of labour intensive products, which will give them surpluses of export to pay for import from other countries (Akinlo, 2006). In the same way countries that have capital in abundant will have a relative cost advantage in the production of goods and services that require abundant capital. Such country should therefore concentrate on the production of capital- intensive goods and services that will give them surpluses to export. Like Ricardo's comparative advantage, this theory shows that both countries will benefit from specialization through increased output while free trade will help to spread these benefits.

Subhayn and Roy, (2008) on the effect of political Asymmetry and common external tariff of customs union, custom union was considered with two members labeled a and b while the rest of world is labeled c. They assume a good situation custom union (CU) - importable that is imported from C by A and B is subject to a CET, which decided by the CU jointly. This decision is influenced by lobbying from the producers of this good A and B. It was first assumed that the producer in the two countries co-operate with each other and lobby government in both A and B jointly. They also concluded in their theory that since the lobbying is socially unproductive, it entails a social welfare loss of the amount in country (i=A, B). Consumers' surplus, domestic profits plus tariff revenue, in country is denoted by Si (t) with Si<0.It is also assumed that country is what government cares about not social welfare, given bu Si (t) - hi, but also the net total income of the lobby group.

Adewuyi, (2006) examines the impact of trade openess policy reform on technical efficiency in Nigeria's manufacturing sector, specifically quantifies and analyses levels of pure-technical and scale efficiency in the sector. It also examines the impact of trade openess policy reform on the two forms of technical efficiency. The study utilizes panel data for ten manufacturing sub-sectors over some selected trade policy liberalization episodes and years covering the period before, during and after the implementation of (SAP) in Nigeria. It employs a non-parametric technique - Data Envelopment Analysis (DEA) to obtain the technical efficiency measures which were used in panel regression analysis. Findings show that lower nominal protection rate promotes pure-technical efficiency in the sector. Both nominal protection rate and import penetration ratio foster scale efficiency in the sector, the study concluded that trade policy reform produced positive impact on technical efficiency in Nigeria's manufacturing sector.

Empirical results revealed, however, that other policies (particularly exchange and interest rates deregulation policies) implemented alongside with trade policy reform produced negative effects on factor efficiency. Thus, they might have worked to nullify the positive effect of trade policy during these periods.

Therefore, these policies have to be designed to work in complementary with one another so that efficiency and total factor productivity (TFP) can be promoted in Nigeria's manufacturing sector. Olorunfemi et al., (2013) found out that there is a positive relationship between manufacturing and each of capacity utilization and import as 1 % increase in capacity utilization and import lead to 43081 and 3.8 % change in manufacturing respectively. They concluded that, there is a negative relationship between manufacturing and each of investment, exchange rate, and export lead to 0.04 and 0.3 percentage reductions in manufacturing respectively.

Rahul and Boyang, (2016) investigated South Africa's exports performance using panel autoregressive distributed lag (panel ARDL) model and found out that electric bottlenecks, limited products market competition and labour market constraints have reduced the responsiveness of firm's exports to the rand depreciation. Also a firm ability to diversify its exports has helped benefit more from currency movement.

Romanus and Nyaba, (2011) examined trade openess policy and domestic manufacturing in Ghana, uses input and output model with enterprise growth theory in a research report found out that reforms have contributed positively to export performance and have enhanced technology transfer, also exposure of local firms to international competition have improved their efficiency and the quality of their products all to the benefit of the consumer and to a large degree trade policy reforms have been successful in placing Ghana and its firms on a path to global competitiveness.

Dogruel et al., (2010) also made use of input output model with production cost theory found out that the share of imported inputs and the profits gained from dollar – euro parity changes are important determinants of the Turkish manufacturing sector/industry.

Nazli and Yalcin, (2016) investigated exports in manufacturing, exchange rates and external exposure: firm level evidence from Turkey, using heterogeneous firm model and regression analysis discovered that a real depreciation of the Turkish lira has a positive impact on exports firms. This positive impact in mutted for manufacturing firms operating in sectors that use imported inputs intensively.

Saliu, (2017) examined the performance of manufacturing sector and utilization capacity in Nigeria used ordinary least square method of multiple regression models found out that capacity utilization is been influenced by inflation, exchange rate, interest rate, loan and advances, per capital income and electricity.

Wong, (2016) investigated the productivity and trade openness: micro-level evidence from manufacturing industries in Ecuador make use of production function dynamic model and ordinary least square with GMM estimation conclude that there is a positive and significant effect of trade openness on the productivity of manufacturing industries in export oriented industries in the years after trade reforms were implemented but decreasing productivity after 2010.

Afolabi, (2015) examined the effect of trade liberalization on manufacturing sector performance in Nigeria, published in journal of international development using granger causality, VAR and IRF (impulse responsive function) found out that Granger cause trade openness affect capacity utilization of manufacturing sector performance, total domestic demand granger cause manufacturing output while trade openness affect total domestic demand all in one way causality relationship. Vector autoregressive (VAR) and Impulse response function (IRF) approach shows that the country's manufacturing sector performance growth rate is affected by the past values of the GDP.

Jenkins, (2012) analysed the effect of trade liberalization on manufacturing industry in Bolivia, institute of Latin American studies research papers, uses multiple regression found concluded that trade policy changes which formed a key part of the new economy policy have significantly altered the conditions facing Bolivia manufacturing industry.

Shameek and Shahana, (2014) studied trends and drivers of India manufacturing industrys' performance using graphical approach and simple percentages found out that gem and jewelry industry constitutes a significant share of the country's aggregate exports and have also performed well internationally thereby making Indian an indispensable in this market. There is also decline in cotton industry which uses to be India major export in the past. There is evidence of better performance in India manufacturing industry since introduction of trade liberalization policies.

Kankesu, (2012) examined the impact of trade liberalization on manufacturing sector performance in developing countries by surveying the literature and using descriptive method, found out that evidence from least developed country based indicates that trade liberalization is a necessary but not a sufficient condition for rapid total factor productivity. These countries need to address deficiencies such as shortage of human capital, physical infrastructure and institutions to strengthen the case for trade liberalisation.

Ebenyi, (2015) studied the impact of trade liberalization on manufacturing industry value added in Nigeria using General Methods of Moment (GMM) and ordinary least square method found out that Nigerian economy has not changed its manufacturing export structure over the 1970 – 1990 period, also the inability of the Nigerian manufacturing sector to respond positively to the export potential inherent in trade liberalization was due to high cost of production.

Karamuriro, (2015) used gravity model to estimate the regional economic integration and manufacturing industry performance in the COMESA region and found out that COMESA trading bloc has promoted intra – regional exports, implying intra – COMESA exports have grown by approximately 35 percent since COMESA was formed. It was also suggested that in order to enhance export flows in the region, the process of economic integration should be deepened. Thus, there is need for increased investment in transport infrastructure that will reduce long distance cost of doing business.

2.2. Theoretical Review of Productivity and Manufacturing Industry

A theory is a set of statements or principles devised to explain a group of facts or phenomenon especially one that has been repeatedly tested or is widely accepted and can be used to make predictions about natural phenomena (Popper, 1993). However, according to this study, the guiding theories are;

Human capital theory was proposed by Schultz, (1991) develops extensively by Becker, (1994). Schultz, (1991) in an article entitled investment in human capital". Schultz argues that both knowledge and skills are a form of capital and that this capital is a product of deliberate enterprises growth. The concept of human capital implies an investment in people through education and training. Schultz compares the acquisition of knowledge and skills to acquiring the means of production. The difference in earnings between people relates to the differences in access to education and health. Schultz argues that investment in education and training leads to increase in human productivity, which in turn leads to a positive rate of return and hence growth of businesses.

Moreover, the human capital theory states that there is a large and growing body of evidence that demonstrate a positive linkage between the development of human capital and organizational performance. The emphasis on human capital in organization reflects the view that market value depends less on tangible resources, but rather on intangible resources, particularly human resources.

The organization also has to leverage the skills and capabilities of its employees by encouraging individual or organizational learning and creating a supportive environment where knowledge can be created, shared and applied (Fitz-Enz, 2002). In view of this therefore, it was observe that the accumulation of exceptionally talented individual is not enough for the organization, there must be a desire on the part of individual to invest their skills and expertise in the organization and their position. In other words, individual must commit or engage with the organization, if the effective utilization of human capital is to happen.

The theory of growth of conventional economy began with the neoclassical preposition of Solow which basically highlights issues such as "constant returns to scale, diminishing marginal productivity of capital, exogenously determined technological progress and substitutability between capital and labor. Consequently, Solow's initiative foregrounds the elements of saving and investment as important factors responsible for immediate growth in economy (Solow, 1994). Theory on economic development is worth emphasizing that due to the lack of a unifying, a substantial volume of empirical research has multi-theoretical bases (Adebiyi, 2001).

The implication of this is that many studies have several theoretical underpinning and consider factors that are gotten from many sources given this, the outcomes are most of the times confusing and making it difficult to have conclusion. The results from the various studies have so far yielded mixed results that are inclusive and contradictory in nature. Research also shows that most of the studies on manufacturing performance that have been reported were carried out on developed nations. The fallout from this is that there is a major gap in the relevant literature on developing countries including Nigeria which we need to cover by research (Adebiyi, 2004).

Monetary policy has been justified for reasons of financial stability but the mentioned effects could imply that these polcies are partly misguided (Svensson, 2013). In many countries inflation has been exceptionally low during the last few years meaning the weight of the debt burden could be added to the economic leadership experienced partly due to austerity policies.

Philips, (1998) found that there was an inverse relationship between inflation rate and unemployment. The implication was that government could combat unemployment by allowing for higher money growth and higher inflation while Friedman, (1998) asserted that the relationship would only hold in the short run.

2.3 Empirical work on Human Capital

Hughes and Rog, (2008) and the Gallup organization researchers look at employee development as one of the critical drivers of engagement (Czarnowsky, 2008). They claim that development includes support offered by other workers to further the employees development through challenging and meaning work (Buckingham and Coffman, 2009); (Tower Perrin Talent Report, 2003).

Development may include supervisor endorsement of the training and development (Baldwin & Ford, as well as coaching Deal, 2007). Work settings in which employees have ample opportunities for development provide an important job resource because opportunities for growth increase employee motivation and engagement (Hackman & Oldham, Ryan & Deci, 2000).

Employees are challenged when they can bring in ideas and learn new skills. Such a challenge results in more intrinsic motivation and increased vigor, absorption and dedication to the job (Bakker *et al.,* 2007). Harter *et al.*, (2002) mentions development as positively related to engagement.

According to Deal, (2007) coaching is one of the 5 delivery methods for learning both “soft” and “hard” skills. Coaching is an excellent way to help employees learn and grow due to the individualized and targeted nature of the instruction.

Coaches and mentors, present opportunities and challenges for growth, supports goal setting, encourages, listens and honest appraisals and feedback (Delong, Gabarro & Lees, 2008).

Giannini, (2000) attempts at providing an overall theoretical framework investigating the accumulation of human capital by a dynamic interplay, or complementarities, between the individual behavior and human capital distribution In the light of the macroeconomic context, the author postulates that the individual decision about investment in education depends on unemployment among unskilled workers; the higher this is, the lower the return to work as unskilled worker and the higher the incentive to invest in education.

Huang, Ray and Ahmed, (2002) explored the role of human capital strategies in the survival and growth of Promising Local Enterprises (PLEs). The analysis draws on empirical data survey from 218 PLEs and 261 MNCs through an extensive discussion on the issues of value of human capital, recruitment and selection, training and development, career management, corporate culture and government role.

The results show substantial contrasts in the philosophical and practical applications of human resource strategies. More especially, the conclusion of the study entails the fact that PLEs could learn from benchmarking the human capital strategies of the MNCs in the following arenas; modify philosophical understanding with regard to the importance of human capital in creating a competitive advantage; develop different approaches to enhance the value of human capital, broaden the focus of selection and training methods to include critical thinking, teamwork and leadership; and expanding a reward scheme, apart from extrinsic incentives, to help align organizational culture with new values of teamwork leadership and learning.

The term “Human Capital” has traditionally been applied to educational attainment and includes the knowledge and skills that the labour force accumulates through formal instruction, training and experience Becker, (1994) it has also been referred to in terms of the time, experience, knowledge and abilities of an individual household or a generation, which can be used in the production process (Heckman, 2000). Human capital is multi-face in its nature.

2.4. Empirical work on Manufacturing Industry

Manufacturing firms are very critical, sensitive and vital to the economic development of any nation most especially the under developed ones world over. Economists and other social scientists have for alongtime discussed the causes of economic growth and the mechanisms behind it (MAN, 2013).

Nwakoby, (1988) defines manufacturing enterprise as "any enterprise employing between five and one hundred workers with an annual turnover of about four hundred thousand naira.

For the long time experience, progress and sophistication in technology is identified to be core, even though the foregoing is seen as exogenous to the economy concerned (Archibugi and Coco, 2005).

Suffice to submit that even though the neoclassical growth approach favors labor and capital as indices of growth in the economy other alternatives such as growth in technology which is considered exogenous, have remained unexplored. This omission, as well as inconsistent practical evidence, has necessitated the Quest for alternatives by researchers, specifically the contribution of progress in technology (Babatunde *et al.,* 2012).

Auerbach and Olhier, (1994) asserts that economic growth has been continuously adopted when regular and progressive returns to capital are emphasized. These approaches, called endogenous growth theories posit that the application of novel accumulative indices will engender self-sustaining economic growth (Solow, 1994).These indices include knowledge; innovation, etc. have made reliable inputs along the line being pursued.

Romer presents a formal model that yields positive, long run growth rates on the basis of technological progress driven by the role of externalities arising from learning by doing and knowledge spillover (Barro, 1990).

Lucas suggests a model where human capital is believed to be highly supportive of economic growth that is void of redundant physical capital accumulation. The works of the Duo; Romer and Lucas have signaled the impact of technological advancement on economic growth (Romer and Lucas, 2008).

Base on the above, new knowledge Romer, (1990); Grossman and Helpsman, (2001) innovation Aghion and Howitt, (2002) and public infrastructure Barro, (1990) and are recognized as important sources of growth. As a result, and in contrast to the neo classic counterpart, polices are deemed to pay a substantial role in advancing growth on a long run basis. Dueling on the polemic of convergence/divergence, the endogenous growth approach offers that notwithstanding in the appreciable returns to scale, convergence would not take place the adaption of endogenous growth theory has gone beyond the National sphere to regional sphere/space (Magrini, 2007).

According to Andreoni, (2010) one thing that is central to neoclassical and endogenous growth models is investment. However, while the former influence period of transition, the latter produce more enduring results. The emphasis placed on investment by these approaches has resulted into huge practical enquiries targeted at unpackaging the connection of investment and economic growth. However we have interwoven result. Examining 47 countries in the period 1950-1977 and have found that investment to income ratio is critical for economic growth (Kormendi and Meguire, 2005).

De-long and Summers, (2001) provided cross-country evidence that high level of equipments investment for the period 1960-1985 are linked to high level of GDP per worker growth over this period while non-equipment investment does not seem to relate to economic growth. In order to handle the problem, of causality, the above researchers have used instrumental variables suggesting that investment drives growth (Levine and Renelt, 2002).

Investment is one of the new robust factors affecting growth. The robustness of investment in cross-country regression has also been shown by Sala-i-Martin (Sala-i-Martin, 2007).

This positive and significant relationship has been found in a wide range of studies using both, cross-section and panel analysis example (Mankiw *et al*., 2002); (Barro and Sala-i-Martin, 2007). However, such findings have been criticized for several Reasons. Dubarch *et al*., (2004) criticize De-long and Sumamr work on the ground of empirical robustness problems, while (Blomstron et al., 2006) suggest that the causality link runs in the opposite direction for a sample of 101 countries.

Podrecca and Carmeci, (2001) asserts that using panel data show that causality between investment and growth runs in both directions, while (Easterly and Levine, 2007) found an ambiguous role for investment using panel data analysis. Macroeconomic variables and economic policies have been seen as determinants of economic performance since they can set the frame work within which economic growth takes place.

Economic policies can influence several aspects of an economy through adequate capacity utilization, appropriate exchange rate, trade policies for export and import and improvement of political and legal institutions and so on (Easterly and Levine, 2007). Although there is disagreement in terms of which policies are more conducive to growth macro-economic variables are taken to be important but not the only cause of economic growth (Fischer, 1993). However, in general terms, a stable Macro-economic environment may favor growth, especially through reduction of uncertainty.

Many macroeconomics variables that influenced growth have been mentioned in the literature. Much attention has been place on inflation since it is considered that it may have important adverse effects on long run economic performance. Government fiscal policy is another macroeconomic factor that has been acknowledged in the literature (Barro, 1990). Large budget deficits or heavy tax burdens are capable of retarding growth by decreasing the private capital accumulation. In addition, macro-economic instability may have a negative impact on growth through its effects on productivity and investment (Higher-Risk, Podecca and Carmeli, 2001).

Akinlo, (2006) financial systems may have strong impact on growth through different channels, for instance, a well-functioning and efficient financial system may promote economic growth influencing the efficiency with which savings are transformed into investment and leading to increased productivity and faster growth. Some of he most frequently used measures in empirical analysis are government size, price in stability, cyclical volatility of GDP, external imbalance and risk of balance of payment crises (Levine and Zervos, 2003).

Several studies have sought to quantify the effect of governmental policies and macro-economic factors on economic growth using data from 47 countries in the period 1950-1977 found a negative effect of both inflation growth and of the monetary variance on economic growth, and no evidence that growth in the ratio of government consumption to output adversely affects economic growth (Kormendi and Meguire, 2005). There is a significant negative correlation between growth of government consumption and GDP growth (Grier and Tullock, 2009).

Similarly, found that price distribution and the share of government spending (Excluding Defense and education) in total GDP are negatively related to growth Barro, (2001) while government investment has no statistically significant effect on it. Applying cross-sectional and panel regressions showed that growth is negatively associated with inflation, a pararel Market premium on foreign exchange and government deficits. He also concluded that a stable and sustainable fiscal policy is crucial for the development of a robust macro-economic frame work (Fischer, 1993).

Furthermore, a negative relationship exists between government consumption to GDP and growth though it is insignificant Levine and Zervos (2003). Employing both cross-section data for 100 countries in the period 1970-1988 and historical data for 28 counties in the period from 1870-1988, made evident that investment in transport and communication and the government's budget surplus are consistently correlated with growth, while the effects of taxation are difficult to isolate empirically (Easterly and Rebelled, 2003). Educational expenditures by governments have a very strong positive impact on growth (Barro and Sala-i-Martin, 2005).

2.5. Empirical work on Technology and Productivity

Technology has been described as the currently known ways of converting resources into output desired by the economy" and appears either in its disembodies form (such as new blue prints, scientific results , new organizational techniques) or embodied in new products (Advances in the design and quality of new vintages of capital goods and intermediate inputs) (Griliches, 2007).

In the views of Babatunde and Adebi, (2012) technological factors include technological aspects such as research and development activity, automation, technology incentives and the rate of technological change. They can determine barriers to entity, minimum efficient production level and influence out sourcing decisions furthermore, technological shifts can affect cost, quality, and lead to innovation (Archibugi and Filippetti, 2009).

Specifically, this study investigates how technological invasion, advancement in technology, availability of the state of the art technology, nature of the technological changes and diversity of technology affect strategic decisions of manufacturing firms. Technological innovation can have sudden dramatic effect on the environment of a firm. Firstly, technological development can significant alter the demand for an organization's on industry's products or service (Barnat, 2005),

Technological change can decimate existing businesses and even entire industries, since it shifts demand from one product to another Barnat, (2005). Moreover, changes in technology can affect a firm's operation as well as its products and services. He further said these changes might affect processing methods, raw material and services delivery. Therefore, marketers should keep track of advancement and invention in technology, nature of changes in technological environment as well as diversity in technology in their operating environment (Babatunde, 2012).

It is this aspect of physical/business environment, that is, external or uncontrollable environment which is one of interest to this study. Indeed, the study, specifically investigated how the technological environment influence the choice of operational strategy of manufacturing industry in Nigeria.

In line with this Osuagwu, (2009) argues that firms that stand their vulnerability to these external environmental factors must possess many uncommon characteristics including adaptive and flexible managerial style, a balanced portfolio of products and a well-developed intelligence and information system designed to monitor and anticipate environmental changes. Furthermore, Ansoff, (2010) suggests that the more turbulent the environment is, the more aggressive the firm must be in terms of competitive strategies and entrepreneurialism or change orientation if it is to succeed.

2.6 Empirical work on Manufacturing industry now Nigeria's major Economic Driver

The manufacturing industry is now the major driver of economic growth in Nigeria Barro, (1990) According to the Report, with Nigeria's re-based Gross Domestic Product, (GDP) the manufacturing industryis currently growing faster than the telecommunications, oil and gas and agricultural industrys. The report titled 'Nigeria's GDP. Bigger but slower manufacturing is the Engine of growth," the report further strengthens recent figures by the manufacturing association of Nigeria, which showed that there was an increase in manufacturing capacity utilization from 46.3 percent recorded in the first half of 2013 to 52.7 percent in the 2nd half of 2013 (Renaissance Capital, 2004).

Notably, the RENCAP report stated that the manufacturing industry recorded 22 percent growth in 2013 as against the 14 percent it recorded in 2012, noting that the growth was largely driven by the textile, cement and food sub-industries, among others (Barro and McLeary, 2002). The growth recorded by the manufacturing industry within the period under review, it said accounted for one third of the total growth in the economy (Baltagi, 2008). The Report said manufacturing is growing strongly, despite power deficit. The manufacturing industry is a much bigger faster growing industry under the new series (nine percent of GDP as against the 4 percent previously).

In 2013, it recorded substantial growth of 22 percent (as against 14 percent in 2012). Comprising one-third of total growth, food beverages and tobacco producers account for half of the manufacturing industry. The sub-industries growth accelerated to 12 percent in 2013, against 7 percent in 2012.

2.7 Emprirical work on Productivity as Economic Activity

It is most advisable to examine any phenomenon whatsoever only after defining the entity the phenomenon under review forms part of. Then it will be possible to analyse the phenomenon as part of such an entity. Hence, productivity cannot be examined as a phenomenon independently but it is necessary to identify the entity it belongs to. Such an entity is defined as economic activity.

It goes with saying that productivity is a critical success factor of economy in one way or another. To define it this way is the object of this study.

2.8 Research Gaps

This study considered the theory of comparative advantage (Richard, 1817), and neoclassical response growth theory (Solow, 1945 – 1955) on total factor productivity of the manufacturing industry in Nigeria.

Most of the literature came across by the researcher, looked at determinants of total factor productivity in terms of agri-business and model used to measure productivity was cobb-douglas form of stochastic frontier production function (SFPF). As well as used small firms for the study.

Knowledge Gap

For example, using Cobb Douglas functional form of SFPF to analyse productivity (TFP) of Brazilian agri-Business observed that significant variables that influenced it were harvest areas, credit facility and linestone (Constant et al., 2009).

Explaining productivity (TFP) variation among smallholder maize farmers in Tanzania East Africa using SFPF, discovered that the major determinants of productivity (TFP) were low level of education of farmers, lack of extension services, limited capital and unavailability of input among others (Martin, 2004).

In the study of productivity (TFP) in agri-business firms and its determinants in Abia State South-eastern part of Nigeria observed that the major determinants of productivity (TFP) were skilled labour and raw materials (Nto and Mbanasor, 2011).

Methodological Gap

Determinants of total factor productivity growth in Nigeria, 1970-2009 Using error correction model (ECM), impulse-response function and Varience decompositions and adopted Cobb-Douglas production approach.

Akinlo et al., (2016) determined total factor productivity growth in Nigeria, which was different from this study. Ie methodology differs with this study.

CHAPTER THREE
METHODOLOGY

3.0 Introduction

This chapter gives the methodology employed in the course of the study. It focuses on the study variables & their measurement and the various analysis techniques carried out.

3.1 Research Design

This study aims at analysing the determinants of Total Factor Productivity (TFP) of the manufacturing industry in Nigeria from 1970- 2016. Retrospective research design was adopted as guide in this investigation and analysis. Retrospective research design (Ex post facto design), according to Asika (2006: 35) is a form of an experimental design where an existing case is observed for some time in order to study or evaluate. It is a research design that attempts to explore cause and effect relationships (causality) where causes already exist and cannot be manipulated. Given that this study aims at establishing the determinants of total factor productivity of the manufacturing sector in Nigeria using observations from the indicators that already exist, retrospective research design was considered most appropriate. The events that produced the observations had already taken place, so the data were already observed and cannot be manipulated.

3.2 Data variables and their measurement

Annual time series data for the period 1970-2016 was used. The variables under consideration were trade openness, foreing direct investment, consumer price index, population growth rate human capital and total factor productivity. Data on all variables was gotten from the World Bank data base and thus the definations are described below:

Description of the Study Variables

Trade Openness; Trade openness refers to the outward or inward orientation of a given country's economy. Outward orientation refers to economies that take significant advantage of the opportunities to trade with other countries.

Inward orientation refers to economies that overlook taking or are unable to take advantage of the trade policy decisions made by countries that empower outward or inward orientation are trade barriers, import-export, infrastructure, scale economies and market competitiveness. It is calculated as the ratio of country total trade, the sum of export plus imports to the country's gross domestic product.

Foreign Direct Investments; These constituted of net inflows of investment to acquire a lasting management interest (10% or more of voting stock) in an enterprise operating in an economy other than that of the investor. FDI is measured as the sum of equity capital, reinvestment of earnings, other long term capital and short term capital as shown in the balance of payments. This series shows net inflows (new investment inflows less disinvestment) in the Nigerian economy from foreign investors. FDIs are measured in current USD and for economic analysis the variables were transformed into lags to stabilize their variance.

Consumer Price Index: It was calucated by taking price changes for each item in the predetermined basket of goods and averaging them. I.e. changes in the consumer price index were used to assess price changes associated with the cost of living.

Population Growth Rate: The population of a country referred to the number of people living within its geographical boundaries. The population figures were relevant for economic and social planning, and were important in the determination of countries' Gross Domestic Product per capital (nominal or real), which was one of the key measures of economic growth and development. The population growth rate referred to the percentage increase in the number of people living in a given area usually a country over a period of time, usually a year.

Human Capital: the human capital in this study refered to the education capacity of individuals who works part-time or full time under a contract of employment i.e, it was proxy as primary enrolment (**PENRM).**

Technology Transfer: Technology has been described in the study as known ways of converting resources into output desired by the economy and appears either in its disembodies form such as New Blueprints, Scientific Results, New Organisation Techniqes or embodied in New products Design.

Exchange Rate: The exchange rate of a currency referred to the number of units of the currency that was required to obtain a unit of another currency, that is, the rate at which a currecy exchanged for another currency.The exchange rate was important as it fed into the general price level, especially for import dependent economies of most African countries including Nigeria. The exchange rates affected factor costs which invariably reflected in the prices at which the outputs were sold, and eventually on the value of the Gross domestic product (GDP) of the country.

3.3 Diagnostic Test

3.3.1 Unit Root Test for Macro Economic indicators and Economic Performance

The starting point of the unit root (stochastic) process is to start with a Random Walk Model

$$y_t = \rho y_{t-1} + u_t \qquad \textbf{3.1}$$

Where y_t is a vector, ρ is a unit root and u_t is the white noise error term, subtracting y_{t-1} on both sides of equation 3.1 to obtain.

$$\begin{aligned} y_t - y_{t-1} &= \rho y_{t-1} - y_{t-1} + u_t \\ &= (\rho - 1) y_{t-1} + u_t \end{aligned} \qquad 3.2$$

Equation (3.2) can alternatively be written as;

$$\Delta y_t = \delta y_{t-1} + u_t \qquad 3.3$$

Where $\delta = (\rho - 1)$ and Δ is the first difference operator. Taking the first differences of y_t and regress them on y_{t-1} and if the estimated slope coefficient in regression 3.3 is zero or not, we make a conclusion that Z_t is stationary.

The question is which test should be used to find out if the estimated coefficient of y_{t-1} in 3.3 is zero or not if the null hypothesis δ=0 is accepted (meaning the series are stationary). The alternative is to use the t-test but the t-value of the estimated coefficient of y_{t-1} does not follow the t distribution even in large samples. The alternative is to use the Dickey and Fuller (1979) test which uses the t(tau) statistic based on Monte Carlo simulation. In practice, the Dickey Fuller (DF) is estimated in three different forms, assuming that the error term u_t, is uncorrelated.

y_t is a random walk: $\Delta y_t = \delta y_{t-1} + u_t$ 3.4

y_t is a random walk with a drift; $\Delta y_t = \beta_1 + \delta y_{t-1} + u_t$ 3.5

y_t is a random walk with a drift around a stochastic trend $\Delta y_t = \beta_1 + \beta_2 + \delta y_{t-1} + u_t$

3.6

The actual estimation procedure is to estimate (3.4) or (3.5) or (3.6) by ordinary least squares (OLS), divide the estimate coefficient of y_{t-1} in each case by its standard error to compute the t tau statistic; and refer to the DF tables if the computed absolute value of the tau statistic $|t|$ exceeds the DF or Mackinnon critical tau values, then we reject the hypothesis that $\delta = 0$, in which case the time services is stationary. On the other hand, if the computed $|t|$ does not exceed the critical tau value, we do not reject the null hypothesis in which case the time series is non- stationary.

Supposing the error term in equation (3.4), (3.5) and (3.6) are correlated then the Dickey Fuller (DF) test wouldn't be applicable instead we would use the Augmented Dickey Fuller test (ADF) test which is conducted by "augmenting" the equations (3.4), (3.5) and (3.6) by adding the lagged values of the dependent variable. Δy_t. The ADF test starts with the estimation of the equation (3.7).

$$\Delta y_t = \alpha_0 + \alpha_2 t + \rho y_{t-1} + \sum_{i=1}^{\rho} \phi_i \Delta y_{t-1} + \varepsilon_t \quad 3.7$$

Where α_0 is the intercept term, α_2 and ϕ are the coefficients of time trend and level of lagged dependent variable respectively, Δ is the difference operator and ε_t are the white noise residuals. ρ is the lag length chosen using the minimum value of the Akaike Information Criterion (AIC), Schwartz Information Criterion (SIC) or the Hannan Quinn Criterion (HQ) as seen in section 3.4 of this chapter.

3.4 Determination of the optimal lag length

The optimal lag length was determined using the Akaike Information Criterion (AIC), Schwartz Information Criterion (SIC) and Hannan-Quinn Criterion (HQ). Lower values of the AIC, SIC and HQ were considered in selection of the optimal lag length. Practically the AIC and SIC aim at minimizing the Residual Sum of Squares (RSS) or increasing the R^2 value. AIC and SIC compose a penalty for including an increasing large number of regressors. Thus there is a trade off between goodness of fit of the model and its complexity (as judged by the number of regressors).

3.4.1 Akaike Information Criterion (AIC)

The idea of the imposing a penalty for adding regressors to the model has been carried further in the AIC criterion which is defined as;

$$AIC = e^{\frac{2k}{n}} \frac{\sum \hat{u}_i^2}{n} = e^{\frac{2k}{n}} \frac{RSS}{n} \qquad \textbf{3.8}$$

Where k is the number of regressors (including the intercept) and n is the number of observations. Introducing natural logs on both sides of equation (3.8).

$$\ln AIC = \left[\frac{2k}{n}\right] + \ln\left[\frac{RSS}{n}\right] \qquad \textbf{3.9}$$

Where $\ln AIC$ = natural log of AIC and $\frac{2k}{n}$ is the penalty factor. In comparing two or more models, the model with the lowest value of AIC is preferred.

One advantage of the AIC is that it useful for not only in-sample but also out sample forecasting performance of a given regression model.

3.4.2 Schwartz Information Criterion (SIC)

The (SIC) is defined as

$$SIC = n^{\frac{k}{n}} \frac{\sum \hat{u}^2}{n} = n^{\frac{k}{n}} RSS/n \qquad \textbf{3.10}$$

Introducing natural logs to both sides of equation (3.10)

$$\ln SIC = \frac{k}{n}\ln n + \ln\left[\frac{RSS}{n}\right] \qquad \textbf{3.11}$$

Where $\left[\left(\frac{k}{n}\right)\ln n\right]$ is the penalty factor, SIC composes a harsher penalty than AIC making the AIC a more preferred criterion for lag length selection as is obvious from comparing (3.11) and (3.9). Like AIC, the lower the value of SIC, the better the model. Again, like AIC, SIC can be used to compare in-sample or out – of – sample forecasting performance of a model.

3.4.3 Hannan – Quinn Information Criterion (HQC)

The Hannan – Quinn Information Criterion (HQC) is a criterion for model selection and is always used as an alternative to the Akaike Information Criterion (AIC) and the Schwartz Information Criterion (SIC). It's is usually given as;

$$HQC = n\log\left[\frac{RSS}{n}\right] + 2k\log\log n \qquad \textbf{3.12}$$

Where k is the number of parameters, n is the number of observations and RSS is the Residual Sum of Squares. Burnham & Anderson (2002) say that HQC, "while often cited seems to have seen little use in practice". They also note that HQC, Kullback-Leibler divergence. Laeskens & Hjort (2008) note that HQC, like SIC but unlike AIC, is not asymptotically efficient.

3.5 Econometric Methodology

VAR Model

First step is to consider an unrestricted VAR (p) model

$$Y_t = \prod_1 Y_{t-1} + \prod_2 Y_{t-2} + ... + \prod_p Y_{t-p} + \Phi\beta_t + \varepsilon_t \qquad \text{..... (3.13)}$$

Where $\mathbf{Y_t}$is a $(n\times 1)$ vector of endogenous variables, $\beta_t$is a $(q\times 1)$ vector of deterministic terms (such as constraints, linear trends and dummies) and ε_t is a $(n\times 1)$ vector of n.i.d disturbance terms, with zero sum mean and non-diagonal covariance matrix, ε. Provided the data are I – (1), it will be convenient to express (3.13) in its unrestricted error correction representation.

$$Y_t = \prod_1 Y_{t-1} + \sum_{i=1}^{p-1} \Gamma_i \Delta Y_{t-1} + \Phi\beta_t + \varepsilon_t \quad \text{..... (3.13)}$$

Where each of (n×n) matrices $\Gamma_i = (-\prod_{i+1})$ and $\prod = (I - \prod_1 - \text{.....} - \prod_p)$

Comprise coefficients to be estimated by Johansen's (1988) maximum likelihood procedure, $i = 1,\text{.....}, k-1$ is the first number of lags included in the system and Δ is the first difference operator.

If at least some of the variables in $\mathbf{Y_t}$are unit-root non stationarity then $\prod$ in (3.14) has a reduced rank and can be formulated as the hypothesis of cointegration:

$$\prod = \alpha\beta^1$$

Where α and β are **n** × **r** coefficient matrices and r is the rank of $\prod$ corresponding to the number of linearly independent relationships among the variables of $\mathbf{Y_t}$. The effect of levels is isolated in the matrix $\alpha\beta^1$ while Γ_i describes the short run dynamics of the process. The r columns of **β** represent the co-integrating vectors that qualify the long run (or equilibrium) relationships between the variables in the system and the r columns of error correction coefficients of **α**, load deviations from equilibrium into $\mathbf{\Delta Y_t}$, thereby ensuring that the equilibrium is maintained.

3.6 Techniques of Data Analysis

The data collected for this study were analysed sequentially in accordance with the objectives stated in chapter one. The techniques of data analysis comprise of descriptive statistics, Unit root tests, and A VAR structure with 2 lags using the lag order selection criteria and johansen cointegration test base on maximum Eigen test and trace test as well as VAR Granger Casualty test.

3.6.1 Descriptive Statistics

The descriptive statistics involved computing the mean, standard deviation, skewness, kurtosis, minimum and maximum return of the variables under study, which include the following; total factor productivity, trade opnenness, foreign direct investment, consumer price index, population growth rate and human capital. While the mean presents information on the average of each variable, the standard deviation shows the level of variation of the series from their average. The skewness and the kurtosis provide insight into the distributional pattern of the variables.

3.6.2 Model Specification

Following from standard TFP function, the equation estimations

$$\text{TFP} = \beta_0 + \beta_1 top_1 + \beta_2 fdi_1 + \beta_3 cpi_1 + \beta_4 pgr_1 + \beta_5 huc_1 + \mu_1$$

Where all the variables were expressed in logaristhms, TFP is the total factor productivity, TOP is the trade openness, FDI is the foreign direct investment, CPI is the consumer price index, PGR is the population growth rate, HUC is the human capital and U is the Error term.

3.6.3 Estimation technique

For the estimation technique of the study Eview Econometric software package was used to generate the results of the study.

3.6.4 Stability test

1-Normality of the error term, normal distribution of variables

2-Breusch Godfrey Serial Correlation LM test

3-Breusch pagan-godfrey Heteroscedtasticity test

3.7 Limitation of the study

Limited scope and reliability of the secondary data, some of the data that were retrieved and used in the study were computed by the government agencies, which include; National Bureau of Statistics (NBS), the Central Bank of Nigeria (CBN) some errors noticed in their computation which could have affected the study findings. However, to avoid that the researcher relied heavily on the highly reliable source of data from World Bank data base (WBDB).

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND INTERPRETATION OF THE FINDINGS

4.0 Introduction

This chapter focuses on the presentation, analysis and interpretation of the results. The chapter also presents the results for the diagnostic tests done on the data before and after model estimation. The estimation of the long run and short run dynamic models and lastly carrying out diagnostic checks on the models and granger casualty test.

4.1 Descriptive Statistics for the Series in Levels

Descriptive statistics for the various variables employed in this study were taken. In order to test the hypothesis that the variables were normally distributed, the Jarque-Bera statistic was used and the following results were obtained as presented in Table 4.1

Table 4.1; Descriptive Statistics Results of the variables in levels

	TFP	TOPEN	FDI	CPI	PGR	HUM
Mean	73155.44	0.549523	2.1209	35.79512	2.603237	15568701
Median	44391.72	0.586184	1.0509	6.255168	2.585222	14805937
Jarque – Bera	9.124734	1.100693	15.27144	17.66325	11.22064	0.784228
Probability	0.010437	0.576750	0.000483	0.000146	0.003660	0.675627
Observations	47	47	47	47	47	47

Source: Reseacher's computation

Key

TFP – Total Factor Productivity

TOPEN – Trade Openness

FDI – Foreign Direct Investment

CPI – Consumer Price Index

PGR – Population Growth Rate

HUM – Human Capital

The results obtained from the Table 4.1 for most of the indicators namely; TFP1 = (0.010437), CPI= (0.000146), PGR= (0.003660) and FDI = (0.000483) show that the variables are not normally distributed hence leading to the rejection of null hypothesis, that the variables are not normally distributed. Therefore, inorder to generate normally distributed series; all variables that were not normally distributed were transformed by taking natural logarithms as presented in Table 4.2

Table 4.2; Data showing descriptive statistics in natural logarithms

	TOPEN	**HUM**	**LTFP**	**LPGR**	**LFDI**	**LCPI**
Mean	0.549523	15568701	10.95334	0.955065	20.83729	1.663306
Median	0.586184	14805937	10.70081	0.949811	20.78644	1.833408
Jarque-Bera	1.100693	0.784228	1.152786	6.854323	3.136509	4.615772
Probability	0.576750	0.675627	0.561922	0.032479	0.208409	0.099471
Observations	47	47	47	47	47	47

Source; **Researcher's computation**

Key

LTFP1 – Log of Total Factor Productivity
TOPEN – Trade Openness
LFDI – Log of Foreign Direct Investment
LCPI – Log of Consumer Price Index
LPGR – Log of Population Growth Rate
HUM – Human Capital

From Table 4.2, results generated showed that variables LTFP (p=0.561922), LFDI (p=0.208409) and LCPI (p=0.099471) became normally distributed at 5% level of significance. LPGR (p=0.032479) became weakly normally didtributed at 1% level of significance. Since LPGR is an endogeneous variable, its distributive properties may not significantly affect model results.

4.2 Unit Root tests

Augmented Dickey-Fuller (ADF) and Phillip-Perron (PP) tests were carried out to test for stationarity of data series at levels as presented in Table 4.3.

Table 4.3(a): Unit root tests for series in levels

Variable	ADF	Order of intergration	PP stastistics	Order of intergration
LTFP1	-2.0915	1(0)	-2.387815	1(0)
TOPEN	-2.38838	1(1)	-2.352253	1(1)
LFDI	-1.4895	1(1)	-1.2721	1(1)
LCPI	-1.106	1(1)	-0.77446	1(1)
LPGR	-1.973	1(1)	-2.7446	1(1)
HUM	-0.0036	1(1)	0.1363	1(1)

Source: Reseacher's computation

Critical values for ADF and PP are -3.5811 at 1%, -2.9266 at 5% and -2.601 at 10%. Results in Table 4.3 showed that the ADF and PP computed values for LTFP1 (-2.0915, -2.3878), TOPEN (-2.388, -2.352), LFDI (-1.4895, -1.272), LCPI (-1.106, -0.7746), LPGR (-1.973, -2.745) and HUM (-0.0036, 0.1363) respectively were less than the critical value (-2.9266) in absolute terms at 5% level of significance. This showed presence of a unit root hence failure to reject the null hypothesis of non-stationarity at levels. Therefore, the first differences for non-stationary series were taken and the results were presented in Table 4.4.

Table 4.3(b): Unit root of the series at first difference

Variable	ADF statistics	Order of intergration	PP statistics	Order of intergration
LTFP	-5.9294	1(1)	-6.141	1(1)
LTOPEN	-7.9977	1(1)	-8.1396	1(1)
LFDI	-12.7336	1(1)	-12.7336	1(1)
LCPI	-4.0509	1(1)	-3.1994	1(1)
LPGR	-1.0728	1(1)	-2.483	1(1)
HUM	-4.4982	1(1)	-4.4982	1(1)

Source; Researcher's computation

Critical values for ADF and PP are -3.58474 at 1%, -2.9281 at 5% and -2.6022 at 10%.

The results showed that after differencing the series, the computed ADF, PP (in absolute terms) for LTFP (-5.9294, -6.141), TOPEN (-7.9977, -8.1396), LFDI (-12.7336, -12.7336), LCPI (-4.0509, -3.199) and HUM (-4.4982, -4.4982) were greater than the critical value at 5% level of significance leading to rejection of the null hypothesis of non stationarity. However, LPGR showed existence of unit root in the series but became stationary at second difference with an ADF value of -3.9037 which was greater that the critical value of -2.948 at 5% level of significance. All time series were stationary and integrated at order 1(1).

4.3 Results of the determinants of Total Factor Productivity of the manufacturing sector in Nigeria

A number of statistical techniques were used to examine the determinants of Total Factor Productivity of the manufacturing industry in Nigeria. Techniques such as the simple correlation coefficient to know if there is a direct or inverse relationship between Total Factor Productivity (the dependent variable) and the explanatory variables which are Trade openness, Foreign Direct Investment, consumer price index, population growthrate and human capital proxied by primary school enrolment. The Long run and short run (ECM) models were used to examine the dynamic interactions between the variables.

Table 4.4: Results of the correlation between variables

	LTFPI	TOPEN	LFDI	LCPI	LPGR	HUM
LTFP1	1.0000					
TOPEN	-0.3104	1.0000				
t-statistic	-2.166	-				
Probability	0.0358	-				
LFDI	0.2041	-0.1043	1.0000			
t-statistics	1.3829	-0.6955	-			
Probability	0.1757	0.4904	-			
LCPI	0.1567	-0.0491	0.9103	1.0000		
t-statistics	1.0527	-0.3262	14.5917	-		
Probability	0.2982	0.7458	0.000	-		
LPGR	0.7482	0.0339	0.0597	-	1.0000	
t-statistics	7.481	0.2248	0.3968	0.0091	-	
Probability	0.000	0.8232	0.6934	-	-	
				0.0606		
				0.9520		
HUM	0.2651	-0.1193	0.8405	0.9402	0.0539	1.0000
t-statistics	1.8238	-0.7972	10.2911	18.306	0.3579	-
Probability	0.075	0.4296	0.000	1	0.722	-
				0.0000		

SOURCE: Researcher's computation

Interpretation/Analysis of correlation coefficient results

The main objective is to find out if there is a positive or negative relationship between total factor productivity and the explanatory variables. Table 4.4 presents the simple correlation coefficient between the variables of discourse. First, the study found that there is a negative relationship between Total Factor Productivity and trade openness at 5% level of significance. This implies that this variable move in opposite direction i.e. an increase in the trade openness lead to a decrease in total factor productivity.

The study found a positive relationship between total factor productivity and other explanatory variables i.e. population growth rate and human capital. This implies that an increase in one of the variables will lead to increase in total factor productivity.

4.4 Determination of the optimal lag length

In order to determine the optimal lag length, the minimum of the Akaike Information Criterion (AIC), Schwartz Criterion (SC) and the Hannan Quinn Information (HQIC) value of the LR function was taken.

Table 4.5; VAR Lag Order Selection Criteria

Endogeneous variables: LTFP TOPEN LFDI LCPI PGR HUM

Exogeneous variables: C

Lag	LogL	LR	AIC	SC	HQ
0	-693.4491	NA	34.97246	35.22579	35.06405
1	-427.2024	439.3070	23.46012	25.23345	24.10130
2	-329.9992	131.2244	20.39996	23.69327	21.59072
3	-257.2390	76.39813*	18.56195*	23.37526*	20.30229*

*indicates lag order selected by the criterion

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

AIC: Akaike Information criterion

SC: Schwarz Information Criterion

HQ: Hannan-Quinn Information Criterion

Results from Table: 4.5 indicate 3 as the optimal lag length since the choice was to select the low values (minimum) of AIC, SC and HQ.

4.5 Cointegration test

Johansen cointegration tests based on the Maximum Eigen Value and Trace value were carried out in order to establish whether there exists a cointegrating relationship between the variables under study. The results were presented in Table 4.6 below;

Table 4.6(a); Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.615296	103.4776	95.75366	0.0132
At most 1	0.479769	61.44526	69.81889	0.1936
At most 2	0.361626	32.69199	47.85613	0.5739
At most 3	0.188698	12.94342	29.79707	0.8942
At most 4	0.056896	3.742360	15.49471	0.9232
At most 5	0.026127	1.164893	3.841466	0.2805

Trace test indicates 1 cointegratingeqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Table 4.6 (b); Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.615296	42.03236	40.07757	0.0297
At most 1	0.479769	28.75326	33.87687	0.1809
At most 2	0.361626	19.74857	27.58434	0.3588
At most 3	0.188698	9.201061	21.13162	0.8159
At most 4	0.056896	2.577467	14.26460	0.9708
At most 5	0.026127	1.164893	3.841466	0.2805

Max-eigenvalue test indicates 1 cointegratingeqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Using the trace statistic, Table 4.6(a) shows results from the unrestricted cointegration rank test indicating 1 cointegrating equation.

This shows that there exists a long run equilibrium relationship between the variables. Furthermore, results from the unrestricted cointegration rank test using the Eigen value also indicated that there is 1 cointegrating equation hence existence of a long run equilibrium relationship between the variables.

The null hypothesis of no cointegrating equation happens when the value of the Trace and Maximum Eigen statistic is less than the critical value at 5% level of significance. The results however indicate that the trace statistic (103.4776) and maximum Eigen statistic (42.03236) exceed the critical values 95.75366 and 40.07757, respectively at 5%, therefore the null hypothesis is rejected and conclude that there exists a significant cointegrating vector in this relationship.

4.6 Interpretation/Analysis of the Long run model

Since the variables in levels are cointegrated, the results from the model are not spurious. Therefore, a long run model was estimated in order to show the effects of foreign direct investments, consumer price index, trade openness, population growth rate and human capital development on total factor productivity of the manufacturing industry. These effects are shown in Table 4.7

Table 4.7: Dependent Variable: LTFPI

Dependent Variable: LTFP1
Sample: 1970- 2016

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.417365	2.592076	0.932598	0.0099***
LFDI	0.109531	0.049446	2.260771	0.0291**
TOPEN	-1.128508	0.337552	-3.343215	0.0018***
LCPI	-0.132560	0.073077	-1.813966	0.0770*
HUM	4.34E-08	2.63E-08	1.649248	0.1069
LPGR	8.954517	1.077198	8.312783	0.0000***
R-squared	**0.714431**	**F- statistics**		**20.01424**
Adjusted R-squared	**0.678735**	**Prob (F-statistics)**		**0.000000**
Durbin-Watson stat	**0.693855**			

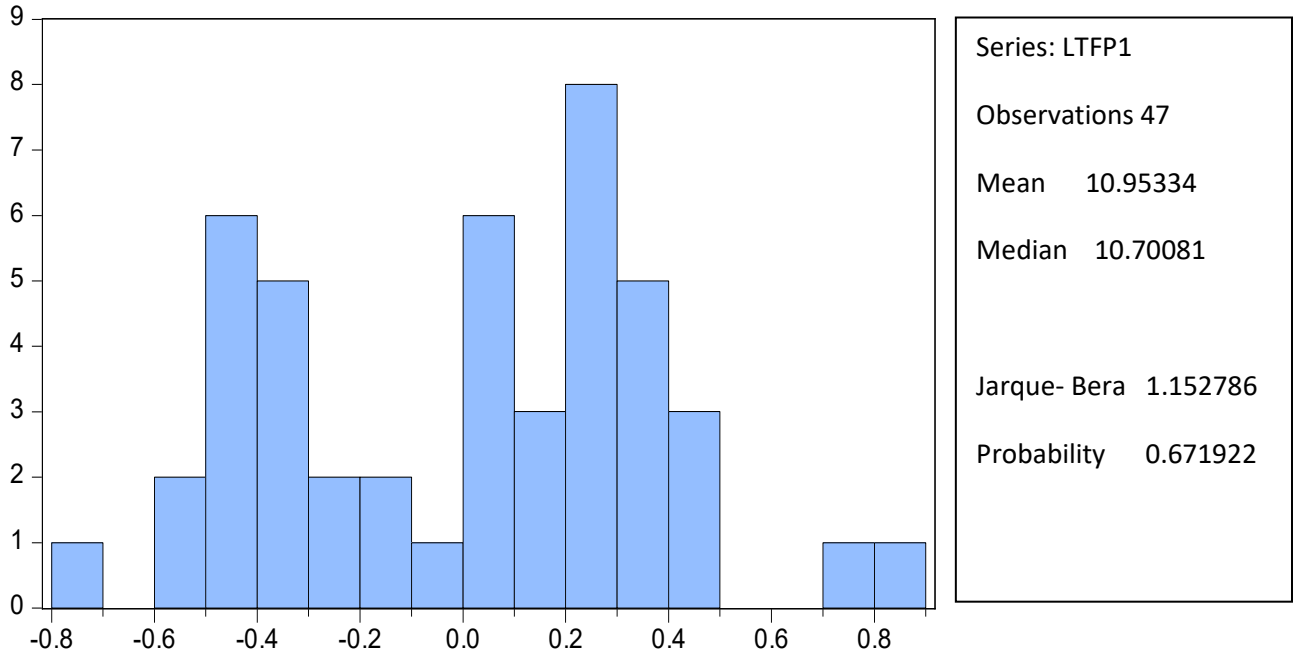
Source: Computed by the researcher

* Significant at 10% ** significant at 5% *** significant at 1%

Table 4.7 shows regression results obtained by method of least squares. Foreign Direct Investment (FDI) have a positive coefficient (0.1095, p=0.029) which was significant at 5%. This showed that a unit increase in Foreign Direct Investment led to a 0.11% increase in Total Factor Productivity. Therefore, in the long run, increased Foreign Direct Investments lead to increased productivity of the manufacturing sector.

Test for normality of the long run residuals

Figure 4.1: Normality Test



Source; Researcher's computation

From the results obtained in Figure 4.1, the probability value (0.67) exceeded 5% level of significance therefore we failed to reject the null hypothesis that the residuals are normally distributed. This result was evidence that the model was reliable and robust in explaining the relationship between Foreign Direct Investment, Trade openness, Consumer Price Index, Human Capital and Population Growth rate on Total Factor Productivity.

4.7 Interpretation/Analysis of the short run model

Since all the variables in the long run are cointegrated, an Error Correction Model (ECM) with three lags is estimated so as to investigate the short run dynamics of the Total Factor Productivity. In order to avoid over parameterization of the short run model, variables that had little or no significant impact on the dependent variable were excluded using the general to specific method in order to improve the remaining model estimators. The results obtained after applying the general to specific procedure were presented in Table 4.8;

Dependent variable: DLTFP

Included variables: 43 after adjustment

Variable	Coefficient	St. Error	t-statistics	Prob
C	-0.143	0.1038	-1.3776	0.186
DLTFP_1	0.291	0.2270	1.2819	0.217
DLTFP_2	0.3984	0.1911	2.0845	0.053
DLTFP_3	0.3226	0.1753	1.8403	0.083
DTOPEN	-1.1981	0.3952	-3.0316	0.008
DTOPEN_1	0.0258	0.4003	0.0644	0.949
DTOPEN_2	-0.1881	0.3608	-0.5214	0.609
DTOPEN_3	-0.2049	0.3655	-0.5606	0.582
DLFDI	-0.3755	0.1399	-2.6841	0.016
DLFDI_1	-0.6408	0.1836	-3.4906	0.003
DLFDI_2	-0.3534	0.1955	-1.8072	0.088
DLFDI_3	-0.0745	0.1460	-0.5104	0.616
DLCPI	0.6211	0.4264	1.4569	0.163
DLCPI_1	0.2875	0.6481	0.4437	0.663
DLCPI_2	1.0524	0.6257	1.6819	0.111
DLCPI_3	-0.7838	0.4501	-1.7412	0.099
DLPGR	29.1958	17.3175	1.6859	0.110
DLPGR_1	-7.4399	35.880	-0.2074	0.838
DLPGR_2	-29.5417	32.8894	-0.8982	0.382
DLPGR_3	18.8810	14.0165	1.3471	0.196
ECT_1	-1.0950	0.3025	-3.6198	0.002
R-squared	0.7763		F-statistics	2.9503
Adjusted R-square	0.5132		Prob (F-statistics)	0.0141

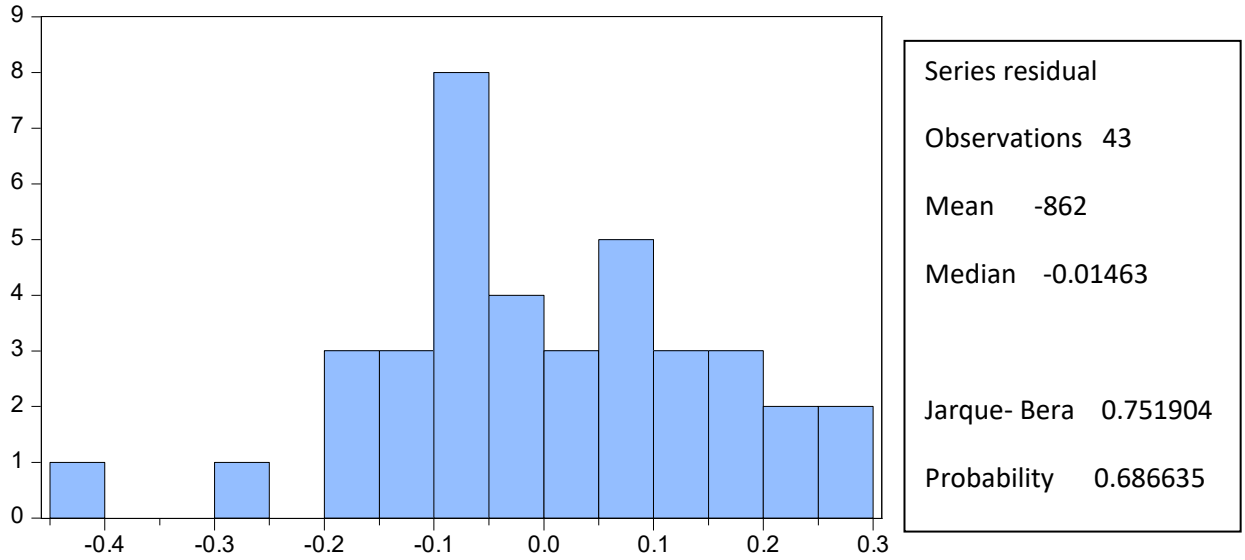
Source: Researcher's computation

The adjusted R-squared of about 0.513 shows that about 51.3 percent of the variations in Total Factor Productivity are explained by Trade openness, Foreign Direct Investments and Consumer Price Index in the short run. The coefficient of the error correction term -1.095 carries the correct sign and is statistically significant at 5% with the convergence to equilibrium. This confirms stability of the system and indicates a speed of adjustment which depicts convergence towards equilibrium in case of any disturbance in the system. Following a short run Total Factor Productivity, 109.5% deviation from the long run equilibrium was corrected.

4.8 Test for Normality of the short run residuals

In order to check the reliability of the results as well as the validity of the model, residuals were

Subjected to normality test as presented in Figure 4.2



Source: **Researcher's computation**

The jarque bera from the histogram of the residuals suggested that the error term is normally distributed. The P-value of the jarque bera statistic (0.687) exceeds 5% level of significance ; therefore we fail to reject the null hypothesis that the residuals are normally distributed. Similarly, Breusch-Pagan-Godfrey serial correlation and heteroscedasticity tests were also carried out. The Breusch-Pagan-Godfrey heteroscedasticity test generated a probability value of 99.8% (F-statistic = 0.2476) which was greater than 5%. This result implied that the null hypothesis that suggests that residuals are homoskedastic could not be rejected. Furthermore, Breusch Godfrey Serial Correlation LM Test generated a probability value of 5.7%. Since the p-value (F-statistics = 1.336) was greater than 5%, the null hypothesis that stated that there is no serial correlation could not be rejected. Therefore, the model was free from serial correlation.

4.9 Variance decomposition analysis

Table 4.8 shows the fraction of forecast error variance of the dependent variable attributed to its own shock and shocks of other variables. The results show that in the first period, 100 percent of the shocks to Total Factor productivity are fully driven by its own productivity ; in other wards Total Factor Productivity rates are largely drives itself. It can be observed that from the first to the tenth period between 49 – 99% of shocks are due to Total Factor Productivity itself. In the 10^{th} period, Total Factor Productivity explains about 49.25% of its enhancement; trade openness, foreign direct investment, population growth rate and human capital contribute about 2.96%, 25.82%, 5.2% and 16.16% respectively to the total variations in Total Factor Productivity. Consumer Price Indices however do not explain any significant variance of the total factor productivity as its relative importance is less than 1%. In the last period, the variations in total factor productivity are explained by itself at 49.68%, trade openness 2.07%, foreign direct investments, population growth rate 4.48% and human capital 16.16%.

Table 4.8 Variance decomposition of LTFP1

Variance decomposition of LTFP1

Period	S.E.	LTFP1	TOPEN	LFDI	LCPI	LPGR	HUM
1	0.253328	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000
2	0.342493	78.99537	11.21315	4.177990	0.847966	2.603380	2.162143
3	0.461294	73.46041	11.24314	8.727623	1.830356	3.545865	1.192607
4	0.591763	69.26637	8.924557	12.50966	1.935163	4.567103	2.797149
5	0.731613	62.56477	7.704546	17.19342	1.713463	5.326330	5.497472
6	0.884881	58.03087	5.918337	20.48382	1.338774	5.345376	8.882831
7	1.028755	54.53516	4.668672	22.40573	1.046829	5.354233	11.98938
8	1.158660	51.87660	3.877734	24.08945	0.835937	5.331096	13.98918
9	1.273230	50.28065	3.321760	25.08502	0.692841	5.264483	15.35525
10	1.371388	49.25148	2.962017	25.82489	0.598385	5.203875	16.15935
11	1.456055	48.69642	2.727936	26.33587	0.534404	5.122720	16.58265
12	1.530538	48.49561	2.561231	26.64579	0.488761	5.015035	16.79357
13	1.596682	48.50655	2.443367	26.80895	0.453410	4.898412	16.88931
14	1.656793	48.65416	2.352274	26.87683	0.423765	4.779157	16.91381
15	1.712237	48.87687	2.276950	26.86916	0.397657	4.670962	16.90840
16	1.764190	49.11160	2.215609	26.83643	0.374627	4.584059	16.87768
17	1.813808	49.32861	2.165921	26.79795	0.354666	4.523193	16.82967
18	1.862148	49.50202	2.127009	26.77423	0.337631	4.489512	16.76960
19	1.910123	49.61963	2.097807	26.77423	0.322952	4.479517	16.70587
20	1.958464	49.68130	2.074944	26.80025	0.309661	4.485097	16.64875

Source: Researcher's computation

Table 4.9 VAR GRANGER CASUALTY TEST

Dependent variable	LTFPI	TOPEN	LFDI	LCPI	LPGR	HUM
LTFP1		0.7399	0.0882*	0.5523	0.037**	0.1173
TOPEN	0.0334**		0.7307	0.4360	0.4839	0.2261
LFDI	0.8181	0.1659		0.9180	0.8742	0.3545
LCPI	0.5037	0.1800	0.0906*		0.1268	0.1979
LPGR	0.1024	0.9905	0.3125	0.9422		0.1549
HUM	0.3762	0.1836	0.0607*	0.6247	0.8162	

Source: Researcher (2018) Note: The table gives marginal significance levels which test the hypothesis that all lags of a particular variable have no explanatory power for the dependent variable. For example, the figure 0.037 in the first row of the sixth column indicates that the null hypothesis that lags of the consumer price index have no explanatory power for the total factor productivity of manufacturing industries is rejected at the 5 per cent level of significance. The numbers shown in the table represents probability values

Interpretation/Analysis of the var granger casualty test

The table 4.9 shows that Foreign Direct Investments and population growth rate granger cause total factor productivity of the manufacturing sector at 1 and 5 percent level of significance respectively. There is no evidence of a bi-directional casualty in between any variables. However, there is uni-directional causality from total factor productivity to trade openness, from foreign direct investment to consumer price index and human capital.

Hypothesis 1

$H0_1$: Trade openness, foreign direct investment, consumer price index, population growth rate and human capital do not Significantly Examine the short run effect on total factor productivity of the Manufacturing industry in Nigeria.

Discision Rule

If the calculated t – statistics is less that (L) the critical t – statistics, we therefore reject the null hypothesis (H_{01}) otherwise we accept the null hypothesis. Also the P-Value involves comparing the P-Value with the chosen significance level of 5%. If the P-Value is less than (L) or equal (=) to the significance level, we would reject the null hypothesis (H_{01}), otherwise, we would accept the null hypothesis. The evidence provided above are not in support of the stated null hypothesis ($H0_1$) given that the calculated t – statistics of the co-efficients of trade openness, consumer price index, foreign direct investment, population growth rate and human capital have significant relationship at 1% and 5% level of significance, respectively. However, these imply that trade openness, foreign direct investment and consumer price index explained about 51.3% of the variation. This implies that were significant determinants of total factor productivity of the manufacturing industry in Nigeria. Therefore, we reject the null Hypothesis ($H0_1$) and conclude that trade openness, foreign direct investment and consumer price index Significantly Examine the short run effect on total factor productivity of the Manufacturing industry in Nigeria.

Hypothesis 2

$H0_2$: Trade openness, Foreign Direct Investment, consumer price index, population growth rate and human capital do not Significantly Determine the long run effect on total factor productivity of the Manufacturing industry in Nigeria.

Discision Rule

If the calculated t – statistics is less that (L) the critical t – statistics, we therefore reject the null hypothesis (H_0); otherwise we accept the null hypothesis. Also the P-Value involves comparing the P-Value with the chosen significance level of 5%. If the P-Value is less than (L) or equal (=) to the significance level, we would reject the null hypothesis (H_0), otherwise, we would accept the null hypothesis. The evidence provided above indicated foreign direct investment and population growth rate have a long run effect on total factor productivity in the manufacturing industry in Nigeria.
Therefore, we reject the alternative Hypothesis (H0) and conclude that only foreign direct investment and population growth rate determine total factor productivity in the long run in manufacturing industry in Nigeria.

Hypothesis 3

$H0_3$: There is no significant casaul relationship between trade openness, foreign direct investment, consumer price index, population growth rate, human capital and total factor productivity of the Manufacturing industry in Nigeria.

Decision Rule

The null Hypothesis (H_0) of no cointergrating equation happens when the value of the trace and maximum Eigen statistic is less than the critical value at 5% level of significance. The results (Table 4.9) of trace and maximum Eigen value however indicate that the trace statistic (103.4776) and maximum Eigen statistics (42.03236) exceed the critical values 95.75366 and 40.07757, respectively at 5% with a P-Value of 0.000. We therefore reject the null hypothesis ($H0_3$) and conclude that there exists a Significant cointegrating casualty relationship at 5% level.

CHAPTER FIVE
DICUSSION OF THE FINDINGS, SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.0. Introduction

In this chapter, the results presented in the previous chapters were discussed. The chapter also presents the summary, conclusion and recommendations based on the study findings and objectives.

5.1. Discussion

The discussion was based on the analysis presented previously which marched with the related studies and theories as well as the conceptual frame work of the study.

5.1.1 Disscusion of short run model:

The adjusted R-squared of about 0.513 shows that about 51.3 percent of the variations in Total Factor Productivity are explained by Trade openness, Foreign Direct Investments and Consumer Price Index in the short run. The coefficient of the error correction term -1.095 carries the correct sign and is statistically significant at 5% with the convergence to equilibrium. This confirms stability of the system and indicates a speed of adjustment which depicts convergence towards equilibrium in case of any disturbance in the system. Following a short run Total Factor Productivity, 109.5% deviation from the long run equilibrium is corrected.

The second and third lagged total factor productivity coefficients are positive and significant at 5 % and 10% level of significance (p=0.053, p=0.083) implying that in the short run, previous total factor productivity values can improve the current productivity predictions. The coefficient on trade openness is negative but significant at 1% level of significance (p=0.008). This showed that the greater the trade openness, the lesser the total factor productivity in the short run.

This finding is similar to Isaksson, (2001) using data on some countries in 1960 to 1994 found that trade openness could serve as negative if knowledge or technology bypass potential recipients.

The study is also in disagreement with study of Wong, (2016) investigated total factor productivity and trade openness in manufacturing industries in Ecuador used ordinary least square and concludes that there is a positive and significant effect of trade openness on the total factor productivity of manufacturing industries. Furthermore, the coefficients of -0.376 and -0.641 on Foreign Direct Investments are positive and significant at 5 % and 1% level of significance (p=0.016, p=0.003). This showed that in the short-run, an increase in the foreign direct investments leads to reduced level of productivity in the manufacturing insudtry.

The coefficient on inflation is positive but only significant at 10% in the short run in Nigeria which is quite contradictory to other finding from similar studies. This could be attributed to the fact that most remittance inflows that came into the economy were not recorded by most financial institutions in the short run.

5.1.2 Discussion of the long run model:

Table 4.7 shows regression results obtained by method of least squares. Foreign Direct Investment (FDI) have a positive coefficient (0.1095, p=0.029) which was significant at 5%. This showed that a unit increase in Foreign Direct Investment led to a 0.11% increase in Total Factor Productivity. Therefore, in the long run, increased Foreign Direct Investments lead to increased productivity of the manufacturing sector.

This is in line with findings by Keller and Yeaple (2003) findings which show that 14 % of total factor productivity among manufacturing plants in united state of America over the period 1987-1996 was as a result of Foreign Direct Investment spillover.

Also the study findings is inagreement with the study findings of Griffith et al., (2003) shows that foreign direct investment been critical to total factor productivity growth, bring technology and create employment. FDI generates positive externalities in the form of knowledge spillover to the domestic economy, through linkages with local suppliers and clients, learning from nearby foreign firms and employee training programme.

The study findings is in disagreement with the study of Harrison, (1999) which show a negative effect of Foreign Direct Investment on total factor productivity among Venezuelan manufacturing plants.

Similarly, population growth rate had a positive coefficient (8.954, P = 0.000) which was significant at 1%. This means that a unit increase in population growth will lead to an 8.954% increase in Total Factor Productivity. The study findings is in conformity with the findings of Griffith et al., (2003) in United Kingdom that population growth rate has a significant impact on total factor productivity of manufacturing industry in UK.

The study findings also inagreement with Acemoglu et al., (2003) who shows that even the impact of desease on economic development is not a result of the direct effect of health on income, but of its indirect effect via institutions, when isolated populations came into contact during the period of European colonization, differences on desease environments had a major impact on the path of institutional development and consequently on economic growth.

The results also indicated a negative coefficient for trade openness (-1.128, P = 0.0018) which was significant at 1%. This showed that a unit increase in trade openness led to a 1.13% reduction in Total Factor Productivity. The study concurred with the findings of Kankesu, (2012) reveals that evidence from under developed countries indicate that trade openness is a necessary but not a sufficient condition for rapid total factor productivity.

Also inagreement with the study conducted by Grossman and Helpman, (1999) argued that trade openness could discourage efforts for invention by lowering expected potentials profitability of a successful innovation.

However, the study findings is in disagreement with Coe and Helpman, (1995) which support the view that trade openness enhances technology transfer and therefore total factor productivity growth.

Furthermore, the negative coefficient (-0.132, P = 0.08) on consumer Price Index meant that a unit increase in inflation reduces Total Factor Productivity by 0.132%.

The study findings is in line with so many studies that have provided evidence in favour of a negative effect of on total factor productivity growth, which includes; Cozier and Selody, (1992) Smyth, (1995 a&b).

5.1.3 Discussion of the var granger casualty test:

The table 4.9 shows that Foreign Direct Investments and population growth rate granger cause total factor productivity of the manufacturing sector at 1 and 5 percent level of significance respectively. There is no evidence of a bi-directional casualty in between any variables. However, there is uni-directional causality from total factor productivity to trade openness, from foreign direct investment to consumer price index and human capital.

The study investigated Granger casualty between trade openness, foreign direct investment, consumer price index, population growth rate, human capital and total factor productivity. The result in (Table 4.9) shows that there is uni-directional casualty from total factor productivity to trade openness from foreign direct investment to consumer price index and human capital.

Unrestricted cointergration rank test (Trace and maximum Eigen value) the results indicate that there exists a cointergration significant relationship between the variables at 5% significance level.

These results conformed to most of the literatures among other was Anyanwu, (2004) who found out that there is a significant relationship. That is, casual relationship between the trade openness, foreign direct investment, consumer price index, population growth rate, human capital and total fact or productivity.

The study findings inagreement with the works of Shameek and Shahoma, (2014) Kankesu, (2012) and Afolabi, (2015) who also found out that such relationship between trade openness, foreign direct investment, consumer price index, population growth rate, human capital and total factor productivity exists.

However, the study findings in disagreement with the study of Grossman ana Helpman, (1999) whose argued that trade openness could discourage efforts for invention by lowering expected potentials profitability of a successful innovation, also trade openness can make a coutry with abundant unskilled lobour to specialize in traditional, low-technology manufacturing and international competition with possible adverse effect on total factor productivity.

5.2. Summary

The study focused on determinants of total factor productivity of the manufacturing industry in Nigeria from 1970 – 2016. The study employed various estimation techniques based on time series analysis to identify determinants of total factor productivity of the manufacturing industry in Nigeria, their short run and long run effects and granger casualty.

Firstly, the study examines the short run effect of trade openness, foreign direct investment, consumer price index, population growth rate and human capital on total factor productivity of the manufacturing industry in Nigeria. The results of the short run model evaluation reveal that the total factor productivity explained by the trade openness, foreign direct investment & consumer price index in the short run as by the adjusted R- square about 51.3% of the variation.

Secondly, the study determined the long run effect of trade openness, foreign direct investment, consumer price index, population growth rate and human capital on total factor productivity of the manufacturing industry in Nigeria. By using different statistics and econometrics techniques; Simple correlation coefficient, the results indicate that there is a negative relationship between total factor productivity and trade openness; that is, when there is an increase in the trade openness leads to a decline in total factor productivity. However, the long run model found a positive relationship between total factor productivity and foreign direct investment & population growth rate. This implies that an increase in either of foreign direct investment or population growth rate will lead to increase in total factor productivity.

The study also used the Ordinary Least Squares (OLS), the result obtained indicates that an increase in trade openness and consumer price index would lead to a decline in the total factor productivity. Furthermore, the study found a positive and significant relationship between foreign direct investment, population growth rate and human capital at 5% level.

The adjusted R-Square shows that trade openness, foreign direct investment consumer price index, population growth rate and human cpital explain about 68 percent changes in total factor productivity of the manufacturing sector, while the remaining 32 percent are other factors which affect total factor productivity but were not captured by the model. However, there exists a long run equilibrium relationship between the variables under study.

Thirdly, the study investigated Granger Casualty between trade openness, foreign direct investment, consumer price index, population growth rate, human capital and total factor productivity. The result showed in (Table 4.9) that foreign direct investment and population growth rate granger cause total factor productivity of the manufacturing sector at 1 and 5 percent level of significance (0.0883) and (0.037) respectively.

There is no evidence of a bi-directional casualty in between any variable. However, there is uni-directional casualty from total factor productivity to trade openness from foreign direct investment to consumer price index and human capital.

5.3. Conclusion

This study set out to examine the short run effect of trade openness, foreign direct investment, consumer price index, population growth rate and human capital on total factor productivity.Study result has shown that the short run model evaluation reveals that total factor productivity explained by the trade openness, foreign direct investment and consumer price index (Adjusted R-square about 51.3% of the variation). This was attributed to the fact that most of the remittance inflows into the economy were not recorded by the financial institutions in the short run.

The study set out to determine long run effect of trade openness, foreign direct investment, consumer price index, population growth rate and human capital on total factor productivity. The result shows that the long run model evaluation reveals a positive relationship exists between total factor productivity and foreign direct investment & population growth rate.This implies that an increase in either of foreign direct investment or population growth rate will lead to increase in total factor productivity.

This indicated existence of long run equilibrium relationship between foreign direct investment and population growth rate in the manufacturing industry in Nigeria.

The study was designed to investigate the Granger Casaulty between trade openness, foreign direct investment, consumer price index, population growth rate, human capital and total factor productivity. There was no evidence of a bi-directional casualty in between any variable but there exist uni-directional causalty from total factor productivity to trade openness from foreign direct investment to consumer price index and human capital.

5.4. Recommendations

The following recommendations were made based on the study findings;

Policy Recommendation:

The evaluation of the short run model reveals that the total factor productivity explained by the trade openness, foreign direct investment and consumer price index. The study recommends; there should be effort to strengthen and sustained foreign direct investment at all time by the successive government.

The evaluation of the long run model reveals a positive relationship between total factor productivity and foreign direct investment & population growth rate. The study recommends; there should be a long run development plan in respect to trade openness, consumer price index and human capital development that will be geared towards improving manufacturing industry total factor productivity such as; complete trade openness, inflation control measures, improve human capital (Technical Education Research & Innovation).

The study findings indicated that there exist uni-directional casualty from total factor productivity to trade openness from foreign direct investment to consumer price index and human capital. Therefore, study recommends more trade liberalization policies should be formulated ie, export liberalization against import liberalization so that the sector will be fortified to satisfy domestic demand and bring about transfer of technology among others.

Other Recommendations:

The study model was able to explained 68 percent (Adjusted R square) of the total variables which means there are other concealed variables that could significantly explain tatal factor productivity of the manufacturing industry in Nigeria. Therefore, the study recommends further study to explain the remaining 32 percent which this study model has not explained.

The study recommends that financial institutions should ensure all remittance inflows into the Economy were recorded at all time.

The study also recommends Improve human capital (Technical Education, Research and Innovation) should be strengthened so as to meet up with modern Manufacturing Technology.

5.5 Contribution to Knowledge

The study contributed in no small measure to the body of knowledge, such as:

It gives an insight to the Nigerian government to evaluate some of the instruments that have been implemented so as to determine which one should be strengthened to achieve more productivity, in order to attract investors to the sector from within and outside the country.

The study findings add to the existing knowledge on total factor productivity of the Manufacturing industry in Nigeria.

Form a basis for further study on total factor productivity of the manufacturing industry in Nigeria.

The study gives an elaborate portrait of total factor productivity of the manufacturing industry in Nigeria, from 1970-2016.Considering the fact that most studies on manufacturing industry in Nigeria were comparatively scanty.

Lastly, for the academic world, the study will serve as a reference point for those who will make study in the same area in the future time.

5.6 Area for further Study

This study focused on the determinants of total factor productivity of the manufacturing industry in Nigeria. The study viewed total factor productivity in terms of foreigh direct Investment, Consumer Price Index, Trade openness, population growth rate and human capital (proxy for primary school enrollment) for the period (1970 – 2016). However, there is need for further study of determinants of total factor productivity of the manufacturing industry in Nigeria for the other period ahead.

The study model was able to explained 68 percent (adjusted R square) of the total variables which means there are other concealed variables that could singnificantly explain total factor productivity of the manufacturing industry in Nigeria. In other words, the remaining 32 percent of the variables could be explained by other variables which were not captured by this study.

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APPENDIX I: INFORMED CONSENT

I am giving my consent to be part of the study of Mr. Bature Isa Usman.

I agree to participate, but should be assured of privacy, anonymity and confidentiality, and that I will be given the option to refuse participation as well as right to withdraw my participation at any time.

I have been informed that the research participation is voluntary and that the results will be given to me if I ask for

Name: _____

Signature: _____

Date: _____

RESEARCH TOPIC: DETERMINANTS OF TOTAL FACTOR PRODUCTIVITY OF THE MANUFACTURING INDUSTRY IN NIGERIA

APPENDIX II: TIME FRAME

Activity	2017								2018								
	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	une	Jul	Aug	Sept
1. Conceptual Phase 1 Chapter 1																	
2.Design & Planning phase																	
Chapter 2-3																	
3.Dissertation proposal																	
4.Empirical Analysis																	
Data Collection																	
5.Analytical phase																	
Chapter 4-5																	
6.Discrimination phase																	
VIVA VOCE																	
7.Revision																	
8.Final Book Binding																	
9.Clearance																	
10.Graduation																	

APPENDIX III: PROPOSED BUDGET

Particulars	**Quantity**	**Amount**
Stationary	Paper 10 Reams Ink 2 Cartridges etc.	$ 180:00
Travel		$ 2,000:00
Subsistence		$ 500:00
Research Assistants	3 @200	$ 600:00
Services (E.g. Secretarial , Photocopying, Printing, Binding)		$ 200:00
Miscellaneous		$ 300:00
	Total	$ 3,780:00

APPENDIX IV: DATA SET

YEARS	TFP	TOPEN	FDI $	CPI %	PGR %	PENR
1970	14684.4	0.183243	205000000	0.100082	2.284989	3515827
1971	11122.98	0.362506	286000000	0.116094	2.319753	3894539
1972	27604.1	0.3002	305000000	0.120108	2.358541	4391197
1973	44026.81	0.351108	373000000	0.126597	2.438098	4662400
1974	110553.5	0.482022	257000000	0.142643	2.567188	5100085
1975	155720.3	0.4995	470120000	0.19109	2.719163	5493723
1976	159849.5	0.517209	339000000	0.237525	2.881474	4889857
1977	197974	0.636424	440514242.5	0.273363	3.004674	6165547
1978	119106	0.623061	210933271.4	0.332708	3.044341	8100324
1979	110903.9	0.582999	309598869.2	0.371667	2.982404	9867961
1980	130134.6	0.663969	-738870004.4	0.40873	2.857502	10798550
1981	82173.7	0.633992	542327289.1	0.493799	2.715063	12117483
1982	71993.99	0.54956	430611256.5	0.53181	2.602676	13760030
1983	59320.56	0.6378	364434580.2	0.655256	2.535412	14311608
1984	46856.79	0.74454	189164784.9	0.772026	2.529287	14654798
1985	56362.14	0.742018	485581320.9	0.829428	2.562732	14383487
1986	42759.51	0.443452	193214907.5	0.876848	2.603203	13025287
1987	37993.72	0.468057	610552091.5	0.975847	2.625639	12914870
1988	46760.35	0.498106	378667097.7	1.507793	2.630931	12690798
1989	34127.62	0.585486	1884249739	2.268726	2.612415	12721087
1990	34241.62	0.624994	587882970.6	2.435804	2.579037	13607249
1991	36290.7	0.775749	712373362.5	2.752629	2.545611	13776854
1992	31482.38	0.688068	896641282.5	3.979994	2.521242	14805937
1993	23578.93	1.103046	1345368587	6.255168	2.502971	15870280
1994	33556.24	0.886191	1959219858	9.822597	2.492996	16190947
1995	40865.29	0.720357	1079271551	16.97694	2.489435	15741078
1996	40756.9	0.645679	1593459222	21.94579	2.488365	14078473
1997	40527.95	0.689737	1539445718	23.81774	2.488183	15828278
1998	37655.3	0.595727	1051326217	26.19865	2.490724	16068533
1999	44391.72	0.62569	1004916719	27.93258	2.495813	17907008
2000	39110.09	0.640193	1140137660	29.86923	2.503397	19151442
2001	39980.21	0.671326	1190632024	35.50664	2.511214	19041224
2002	37852.1	0.431721	1874042130	40.07868	2.521106	19806082
2003	33718.19	0.51561	2005390033	45.70243	2.53684	20600796
2004	38002.51	0.600999	1874033035	52.5569	2.559239	21395510
2005	46018.44	0.634495	4982533943	61.9454	2.585222	22115432
2006	41822.54	0.586184	4854416867	67.04941	2.610391	22861884

2007	44456.49	0.609405	6034971231	70.65815	2.631654	21513996
2008	47592.25	0.65472	8196606673	78.83894	2.648967	20008142
2009	34918.55	0.534856	8554840769	87.93512	2.661221	20957642
2010	119250.4	0.347462	6026232041	100	2.668747	21558460
2011	140827.9	0.417735	8841113287	110.8408	2.674755	23668904
2012	165431.3	0.359472	7069934205	124.3822	2.677659	24822374
2013	184484.6	0.307593	5562873606	134.9246	2.672919	26167544
2014	203352.6	0.271241	4655849170	145.796	2.659551	27540100
2015	174486.7	0.206624	3128591679	158.9435	2.640357	28908472
2016	123625.4	0.177436	4434648308	183.8926	2.619034	30276844

Source: World Bank Data base.

FOOT NOTE:

Unit of measurement, refer to methodology (Chapter 3). Description of the study variables

APPENDIX V: RESEARCHER'S CURRICULUM VITAE (CV)

Surname : Usman

First name : Bature Isa

Date of birth : 16th June, 1974

State of origin : Kaduna state.

Local Govt. Area : Zaria

Nationality : Nigerian

Marital status : Married

Contact Address: Department of Statistics, Nuhu Bamalli Polytechnic, P.M.B 1061, Zaria, Kaduna State, Nigeria.

Mobile phone number: + 2348039651183

+ 256705900914

INSTITUTIONS ATTENDED:		QUALIFICATIONS
1. Bayero University, Kano	:	Master of Business Administration.
2. Ahmadu Bello University, Zaria	:	Post Graduate Diploma in Statistics.
3. National Teachers' Institute, Kaduna	:	Post Graduate Diploma in Education.
4. Kaduna St Polytechnic, Zaria	:	Higher Nat'l Diploma in Statistics.
5. Federal Polytechnic, Nasarawa	:	Nat'l Diploma in Statistics.
6. Ondo State University, Ado- Ekiti	:	Diploma in computer science
7. G.S.S Fadan-Kaje, Via Zonkwa	:	Higher School Certificate
8. L.E.A Primary Sch. Kagoro Rd Kaduna	:	School Leaving Certificate

PUBLICATIONS

1. An assessment of competitive strategies in the Nigeria soft drink industry (study of NBC &7UP PLC's)
2. Statistics analysis on crime and Justice in Kaduna State, Nigeria.
3. Significance of statistics to other fields of study.
4. Statistics analysis on effects of dress code in Nigerian Tertiary institutions.
5. Applications of Non – parametric statistics in Agric- Business, unpublished (2014)

6. Examining employee (human capital) characteritics as determinants of level of productivity of the manufacturing industry in Nigeria: cross sectional approach; KIU Journal of social sciences volume 3, number 2, (2017). Kampala, Uganda.

7. Assessing the manufacturing characteristics (Technological and Financial) as determinants of productivity of the manufacturing industry in Nigeria: cross sectional approach; KIU journal of humanities volume 3, number 1, march (2018). Kampala, Uganda.

8. Granger casualty between trade openness, foreign direct investment. Consumer price index, population growth rate, human capital and total factor productivity of the manufacturing industry in Nigeria, 1970-2016. International journal of innovative research and advanced studies (IJIRAS) ID N0: EP18091J0050

WORKING EXPERIENCE

1. Lecturer: Department of Statistics, Nuhu Bamalli Polytechnic, P.M.B 1061 Zaria, Kaduna State, Nigeria. 2000 –Date.
2. Industrial attachment: Hassan and partners, Baure Road Unguwan Sarki, Kaduna State, Nigeria.
3. Teaching at A.U.D Comprehensive High School Ado-Ekiti, Ekiti State, Nigeria (NYSC).

HOBBIES

Reading and Research

Travelling

Football

REFEREES

1. Alhaji (price) Ibrahim Jibril Mairiga (Fakacin Nasarawa): Director of Physical Planning, Federal Poltechnic, Nasarawa, Nigeria.
2. Malam Abudullahi Jafar Bambale (PhD): Department of Business Administration, Bayero University, Kano, Nigeria.
3. Malam Hussain Garba Dikko (PhD): Department of Mathematics, Ahmadu Bello University, Zaria, Kaduna State, Nigeria.