APPLICATION OF AUTOREGRESSIVE DISTRIBUTED LAG COINTEGRATION TECHNIQUE ON SOME MACROECONOMIC VARIABLES ON ECONOMIC GROWTH IN NIGERIA

BY

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A THESIS SUBMITTED TO THE POSTGRADUATE SCHOOL FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA, NIGERIA IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF MASTER OF TECHNOLOGY IN STATISTICS

DECLARATION

I hereby declare that this thesis titled: **"Application of autoregressive distributed lag cointegration technique on some macroeconomic variables, on economic growth in Nigeria"**

Is a collection of my original work and it has not been presented for any other qualification anywhere. Information from other sources (published or unpublished) has been duly acknowledged.

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CERTIFICATION

The thesis titled **"Application of autoregressive distributed lag cointegration technique on some macroeconomic variables, on economic growth in Nigeria"** by ADEBISI Temitope Abdulwahab, (MTech/SPS/2019/10588) meets the regulations governing the award of the degree of Masters of Technology (MTech) of the Federal University of Technology, Minna and it is approved for its contribution to scientific knowledge and literacy presentation.

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DEDICATION

This research is dedicated to my beloved Wife and Son; and to my entire family.

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All gratitude goes to God almighty for the opportunity and privileges given to me in the course of this study. Special thanks go to my Supervisor Professor A. Isah and my Co-Supervisor Dr. R. A. Adeyemi for their guidance and word of encouragement during the study year. My appreciation also goes to H.O.D. Dr. Y Yakubu for the effort put in, to ensure the success of the MTech program. I also want to use this opportunity to appreciate the distinguished Lecturers in the department; Dr. A Usman, Dr. M. O. Adetutu, Mr O.A Bello, Mr. James Mayaki, Mr. I.S Onotu, Mr. Abdulahi Usman; for their advice and contribution to the success of the program.

To my lovely and precious wife and Son, I say thank you for the support and love. Big thank you to my superhero Mummy and Daddy. I say thank you to my entire family, friends, relatives, and well-wishers, I really appreciate each and every one of them for the love and prayers. Special regards go to my entire course mate without all of you, this study wouldn't have been a great success. May the almighty God reward them abundantly.

ABSTRACT

Gross domestic product is a monetary measure of the market value of all the final goods and services produced in a specific time period by a country or countries. GDP is most often used by the government of a single country to measure its economic health. This study investigated the impact of constructions, industries, services, trade and agriculture on real gross domestic product per capita (proxy for economic growth) and proffered its recommendations towards enhancing economic growth in Nigeria in this present time economic challenges. The study applied a linear dynamic model of Autoregressive Distributed Lag (ARDL) modeling technique to analyse the short-run dynamics and long-run relationship of the economic growth in Nigeria over the sample period between 1981 and 2019 using annual secondary data extracted from World Bank development indicators report (last updated January 2019). The research employed Kwiatkowski-Phillips-Schmidt Shin test (KPSS) to evaluate the stationarity of the studied variables. ARDL Bound test was also used to examine the presence of cointegrating factors between the variables. Breusch-Godfrey Serial Correlation was used to examine presence of serial correlation of the studied variables The empirical results from the ARDL error correction regression show that there is long-run relationship between construction, industry, service, trade and agriculture on real gross domestic product (proxy for economic growth) in Nigeria. The estimation results from ARDL error correction regression indicate that the negative coefficient value of Coint Eq(-1)* = -0.628624 with p-value = 0.0000 signifies a long run co-integrating relationship among the variables studied. The result of the Breusch-Godfrey Serial Correlation from the selected ARDL (4, 3, 3, 2, 3, 4) model with P-value = 0.6638 greater than 0.05 significance level shows that the model is not serially correlated. And the result from figure1 appendix1, shows that there is an upward trend of the studied variable within the studied period. The study further recommends that, there should be an improved policy framework that support the efficient supply of business services, constructions, industries, trade and agriculture as manufacturing to enhancer Nigeria gross domestic product. It also advocates that future researchers should consider the use of ARDL modeling using quarterly or monthly data as more data becomes available.

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ABBREVIATIONS

ARDL:	Autoregressive Distributed Lag
ADF:	Augmented Dickey-Fuller
AIC:	Akaike’s information criterion
BIC:	Baye’s information criterion
CBN:	Central Bank of Nigeria
ECM:	Error correction model

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background to the Study

The ultimate goal of different measures of economic growth is to provide a report card for government to see how their economy is doing and measure economic performance at the instance or over time. Real gross domestic product per capita (RGDPPC) as one of the measures for economic growth is defined as the average of individual incomes in the economy adjusted for inflation i.e. taking real gross domestic product (GDP) and dividing it by the population (Jim, 2019). The relationship between economic growth and macroeconomic variables (determinants) has long been a trendy issue of discussions in the literature of economic development (Nihat, *et al*., 2013). Research on economic growth being undertaken in both theoretical and applied work, focuses on macroeconomic policies to achieve stable prices (low inflation), low levels of debt (both foreign and domestic), free market economy, low rate of unemployment and an open economy (Mbulawa, 2015).

The real sector of Nigeria economy has arguably been the engine of the country economic transformation over the years. Importantly, the sector has metamorphosed into an emerging industrial workhorse from a hitherto rudimentary agrarian economy that can hardly be ignored. A plethora of factors, including infrastructural gaps, inefficiencies in the public sector project management and service delivery, the resource curse of oil exploration, dysfunctional macroeconomic policy environment, among others have obviously truncated the real sector revolution (Central Bank of Nigeria, 2013).

Since independence in 1960, Nigerias overall economic performance has not been encouraging. Despite the availability of large amount of foreign exchange mainly from its oil and gas resources and huge expenditure, economic growth has been insignificant and the incidences of poverty have increased. The objective of every sovereign nation like Nigeria is to improve the standard of living of its citizenry and promote economic growth and development of the country, as observed by Udeaja and Onyebuchi (2015) the Nigerian economy, has had a volatile "growth-history". The period of 1960-70, the Gross Domestic Product (GDP) annual growth was 3.1 per cent. In the oil boom era (1970-78), GDP grew positively by 6.2 percent annually but in 1980s negative growth rates were recorded. During the period of structural adjustment 1988-1997 and liberalisation of the economic, the GDP rise at a positive rate of 4.0 percent (Ekpo and Umoh, 2004). This insignificant growth experience has been blamed mainly on the high inflation rate, a mounting fiscal deficit, increasing foreign debt and debt servicing, political instability, and, among other factors, economic mismanagement and corruption.

Sustained economic growth is a process of continuous transformation of an economy's structure of production with the pace and magnitude of economic growth conditional on the structure of the growth-leading sector and strength of its linkages to other sectors. In this heterodox economic thinking, the growth-boosting effect of a unit of value-added in agriculture is not necessarily the same as in manufacturing or services. Consequently, sectors differ in their capacity to enhance economic growth. The Kaldorian literature, for instance, ascribed to manufacturing some special characteristics not shared by other sectors of the economy such that a unit of value-added in manufacturing offers greater opportunities for income growth, capital accumulation, economies of scale, technological innovation, and linkage and spillover effects.

The incidence of the high and increasing share of services in the total GDP and employment globally is well documented in the literature. The debate on the sustainability of service-led growth without a strong manufacturing base is still ongoing and unsettled. What is however not in doubt is that there are strong linkages between the two sectors. Manufacturing produces the machinery, tools and materials needed for building modern infrastructure and equipment that the services sector use to more efficiently runs their activities. On the other hand, the manufacturing sector uses some services as essential inputs in their production process as well as performs several services-related activities along the process which manufacturing firms may partly outsource or offshored (ECSIP Consortium, 2014). Given these strong interrelationships, Stehrer *et al*., (2015) posited that improvements in the performance of the services sectors and the conditions impacting on the interactions of the two sectors should have significant effects on the performance of the manufacturing sector. On this premise, we will interrogate in this project the implication for manufacturing of the high and growing contribution of the services sector to GDP in Nigeria. The a priori expectation is that if the manufacturing sector in Nigeria receives important inputs to its processes from the services sector and outsource its services-related activities to the services sector, improvement in the services sector's performance should exert a positive and significant influence on manufacturing performance.

A lot of studies have looked at the macroeconomic determinant of economic growth, effects of monetary policy on economic growth, monetary policy and economic growth in Nigeria (Adigwe *et al.*, 2015; Ismaila & Imoughele, 2015; Udeaja & Onyebuchi, 2015). However, there is dearth of research on contributions of real sector to economic growth in Nigeria. In view of above, this research tends to look at contribution of real sectors of Agriculture, Industry, Construction, Trade

and Services to economic growth in Nigeria, to determine few component of real sector that can bring about greater economic growth in Nigeria.

Trade liberalization is the process of removing barriers and opening the economy of one country to a broad investment and competition. According to Narayan and Smyth (2005), trade liberalization can refer to three aspects, namely diminution in a barrier of imports with unchanged in the incentive of exports; the composition in relative prices towards neutrality; and the substitution of cheaper for expensive forms of protection. The history of 70 years in Japan, it's economy had built by strong work ethic, mastery of high technology, a comparatively small defense allocation, and cooperation with government-industry (Central Intelligence Agency's World Fact book [CIA], 2018). The fourth biggest industrialized and free-market economy in the world is Japan. The main economy of Japan is well-known by its competitiveness and efficiency in exports oriented sectors, but the productivity of services, agriculture, and distribution are lower compare to other sectors. Japan had the second-highest gross domestic product (GDP) in the world during the 1970s but in the beginning of 1990s Japan has succumbed to the economic recession of 10 years, also called "*Lost Decade*". This is because Japan was a speculative asset price bubble during a boom cycle that sent valuations soaring throughout the 1980s (Kuepper, 2018). During the year 2011 to 2016, Japan's exports had decreased at an annualized rate of -4.4%, from JYP 65,546.48 billion in 2011 to JYP 70,035.77 billion in 2016. Besides that, Japan's imports totaled JYP 66,041.97 billion in 2016, decreasing -15.77% compared with the previous year. However, based on the export-led growth theory, Japan's economic growth should grow at an accelerated rate. Therefore, the economy of Japan may yet recover from the Lost Decade economic crisis. However, academic are sceptic whether the trade liberalization brings more positive or negative impacts to the economic growth. According to Drozdz and Miskinis (2011), a positive effect

between free trade toward economic growth may make a good intention for producers to expand their business to larger markets and help developing countries access the capital goods and as an intermediate in the process of development. If the import item of the country is an important raw material in the production, thus the country will become more dependent on other countries' supplies and markets (United Nations Development Programme [UNDP], 2018).

The autoregressive distributed lag model (ADL) is the major workhorse in dynamic single-equation regressions. One particularly attractive re-parameterization is the error-correction model (EC). Its popularity in applied time series econometrics has even increased, since it turned out for non-stationary variables that cointegration is equivalent to an error-correction mechanism, see Granger's representation theorem in (Engle and Granger 1987). By differencing and forming a linear combination of the non-stationary data, all variables are transformed equivalently into an EC model with stationary series only.

1.2 Statement of the Research Problem

Since independence in 1960 Nigeria overall economic performance has not been encouraging. Despite the availability of large amount of foreign exchange mainly from its oil and gas resources and huge expenditure, economic growth has been insignificant and the incidences of poverty have increased. The objective of every sovereign nation like Nigeria is to improve the standard of living of its citizenry and promote economic growth and development of the country. As observed by Udeaja & Onyebuchi (2015) the Nigerian economy, has had a volatile "growth-history". This study investigated the impact of the Agriculture, Industry, Construction, Trade and Services on real gross domestic product per capita (RGDPPC) (proxy for economic growth) and proffered recommendations towards enhancing economic growth and to reduce the distasteful effects of

inflation rate, unemployment rate and interest rate in Nigeria in this present time economic challenges.

1.3 Aim and Objectives

This study aimed to utilize autoregressive distributed lag (ARDL) cointegration technique to investigate effects of some macroeconomic variables on economic growth in Nigeria, from 1981-2019. Specific objectives are to:

i. examine the pattern and fluctuation of Nigeria real gross domestic product per capita (proxy for economic growth) from 1981 to 2020.
ii. utilize Autoregressive Distributed Lag model, Cointegration technique to determine few components of real sectors of Agriculture, Industry, Construction, Trade and Services that can bring about greater economic growth in Nigeria.
iii. investigate the long and short term influence of Agriculture, Industry, Construction, Trade and Services on economic growth in Nigeria.

1.4 Justification of the Study

Sustained economic growth is a process of continuous transformation of an economy's structure of production with the pace and magnitude of economic growth conditional on the structure of the growth-leading sector and strength of its linkages to other sectors. In this heterodox economics thinking, the growth-boosting effect of a unit of value-added in agriculture is not necessarily the same as in manufacturing or services. Consequently, sectors differ in their capacity to enhance economic growth. The objective of every sovereign nation like Nigeria is to improve the standard of living of its citizenry and promote economic growth and development of the country. As observed by Udeaja & Onyebuchi (2015) the Nigerian economy, has had a volatile "growth-history". This insignificant Nigerian economic growth experience has been blamed mainly on the

high inflation rate, a mounting fiscal deficit, increasing foreign debt and debt servicing, political instability, and, among other factors, economic mismanagement and corruption. Thus this study investigated the bi-directional relationship between Agriculture, Industry, Construction, Trade and Services on economic growth using autoregressive distributed lag (ARDL) cointegration technique.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Conceptual Framework

2.1.1 Gross domestic product (GDP)

According to World Bank Report (2011), the gross domestic product (GDP) at purchaser's prices is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products, It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. The Central Bank of Nigeria (2010) defines GDP as the money value of goods and services produced in an economy during a period irrespective of the nationality of the people who produced the goods and services. It is usually calculated without making an allowance for capital consumption (or deductions for depreciation).

Also GDP is the monetary value of goods and services produced in an economy during a period of time irrespective of the nationality of the people who produced the goods and services. It is calculated without making deductions for depreciation. GDP at current basic prices (i.e. Nominal GDP) equals GDP at current market prices less indirect taxes net of subsidies. GDP at constant basic prices (otherwise known as the real GDP) equals GDP at market prices less indirect taxes net of subsidies. classified as confidential; GDP at current market prices equals GDP at current basic prices plus indirect taxes net of subsidies. This is GDP valued at the market prices which purchasers pay for the goods and services they acquire or use.

2.1.2 Agriculture

Agriculture is the science or practice of faming, including cultivation of the soil for the growing of crops and rearing of animals to provide food, wool, and other products (definition from Oxford language Dictionary, sixth edition). International Labour Organization 1999 stated that Agriculture was the key development in the rise of sedentary human civilization, whereby farming of domesticated species created food surpluses that enabled people to live in cities. The history of agriculture began thousands of years ago. After gathering wild grains beginning at least 105,000 years ago, nascent farmers began to plant them around 11,500 years ago. Pigs, sheep, and cattle were domesticated over 10,000 years ago. Plants were independently cultivated in at least 11 regions of the world. Industrial agriculture based on large-scale monoculture in the twentieth century came to dominate agricultural output, though about 2 billion people still depended on subsistence agriculture.

The development of agriculture enabled the human population to grow many times larger than could be sustained by hunting and gathering (Bocquet-Appel and Jean-Pierre 2011). Agriculture began independently in different parts of the globe, (Stephens *et al*., 2019) and included a diverse range of tax, in at least 11 separate centres of origin (Larson, *et al*., 2014). Wild grains were collected and eaten from at least 105,000 years ago (Harmon and Katherine 2009). From around 11,500 years ago, the eight Neolithic founder crops, emmer and einkorn wheat, hulled barley, peas, lentils, bitter vetch, chickpeas and flax were cultivated in the Levant. Rice was domesticated in China between 11,500 and 6,200 BC with the earliest known cultivation from 5,700 BC, (McTavish *et al*., 2013) followed by mung, soy and azuki beans. Sheep were domesticated in Mesopotamia between 13,000 and 11,000 years ago (Ensminger *et al*., 1986). Cattle were domesticated from the wild aurochs in the areas of modern Turkey and Pakistan some 10,500 years

ago (McTavish *et al*., 2013). Pig production emerged in Eurasia, including Europe, East Asia and Southwest Asia (Larson *et al*., 2005) where wild boar were first domesticated about 10,500 years ago (Larson *et al*., 2007). In the Andes of South America, the potato was domesticated between 10,000 and 7,000 years ago, along with beans, coca, llamas, alpacas, and guinea pigs. Sugarcane and some root vegetables were domesticated in New Guinea around 9,000 years ago. Sorghum was domesticated in the Sahel region of Africa by 7,000 years ago. Cotton was domesticated in Peru by 5,600 years ago (Broudy and Eric 2018) and was independently domesticated in Eurasia. In Mesoamerica, wild teosinte was bred into maize by 6,000 years ago. Scholars have offered multiple hypotheses to explain the historical origins of agriculture. Studies of the transition from hunter-gatherer to agricultural societies indicate an initial period of intensification and increasing sedentism; examples are the Natufian culture in the Levant, and the Early Chinese Neolithic in China. Then, wild stands that had previously been harvested started to be planted, and gradually came to be domesticated (Hillman, (1996), Sato, (2003) and Gerritsen, (2008)).

Agriculture is the economic mainstay of the majority of households in Nigeria (Udoh, 2000) and is a significant sector in Nigeria's economy. The important benefits of the agricultural sector to Nigeria's economy include: the provision of food, contribution to the gross domestic product, provision of employment, provision of raw materials for agro-allied industries, and foreign exchange earnings (Oni *et al.*, 2009). The advent of oil in the early 1970s made Nigeria highly dependent on oil revenue, with the performance of the agricultural sector adversely affected over the years. Though, the growth rate in the agricultural sector in Nigeria increased from an average of about 3 percent in the 1990s to about 7 percent in mid-2000, certain performance indicators such as food security/sufficiency status of Nigerians continued to decline.

2.1.3 Economic situation of Nigeria with the intervention of Agriculture

Nigeria's economy unexpectedly came out of recession in the fourth quarter of 2020 with the agriculture and telecommunication sectors compensating for the drop in oil production. GDP growth was estimated at 0.11% in the last three months of 2020, compared with a decline of 3.6% in the third quarter. Economists have lauded the recovery in non-oil GDP growth. The agricultural sector rose by 1.6% year on year. Among its subsectors, fishing and livestock grew the fastest, at 5.7% and 2.2% respectively, compared with 1.4% and 1.1% for crop production and forestry.

2.1.4 Industries

Industrial activities/sectors in Nigeria means material handling, transportation, or storage; manufacturing; maintenance; treatment; or disposal. Industrial development provides employment, foreign exchange, and domestic earnings.

2.1.5 Three different types of Industries: primary, secondary and tertiary

The primary, secondary and tertiary industries represent the different kinds of businesses in a country’s economic setup. These major types of industries differ based on economic activities and income levels as well. In this study, we will discuss the three different types of industries in detail and understand the major differences between them (Okcredit 2021).

In a primary industry, the economic activities usually depend on the environment of that specific region. The economic activities in a primary industry revolve around the usage of the natural resources of the planet like vegetation, water, minerals, earth, etc. In this industry, the major economic activities are harvesting and hunting, fisheries, pastoral activities, mining, agriculture,

extraction, and afforestation. The people engaged in working in the primary industry are generally referred to as red-collar workers (Okcredit, 2021).

In a secondary industry, the economic activities revolve around adding value to the natural resources by transforming the various raw materials into usable and valuable products. This is done via several processing, manufacturing, and construction industries. The workers belonging to this industry are generally referred to as blue-collar workers (Okcredit, 2021).

In a tertiary industry, the major economic activities include exchange and production. Production usually involves the "provision" of a large array of services consumed on a large scale by millions of consumers. When we talk of exchange, this involves transportation, trade, and communication facilities that are often used to overcome distances. The workers belonging to this sector are generally referred to as white-collar professionals (Okcredit, 2021).

2.1.6 Constructions

Construction is a general term meaning the art and science to form objects, systems, or organizations, (Oxford University Press, 2009) and comes from Latin construction (from com- "together" and struere "to pile up") and Old French construction (Etymology Dictionary, 2014). To construct is the verb: the act of building and the noun is construction: how something is built, the nature of its structure.

The Nigerian construction industry struggled in 2020 due to disruptions caused by the COVID-19 outbreak and the subsequent lockdown measures. The collapse in oil prices and the pandemic plunged the country into recession in 2020. High debt-servicing costs and low tax revenue also left little scope for fiscal spending and new public projects. This trend has continued in 2021, and a report published by the World Bank in June 2021 (*Nigeria Economic Update: Resilience through*

Reforms) stated that the Nigerian economy was expected to grow by 1.8% in 2021, but the outlook was uncertain. GDP per capita is projected to continue declining because the economy is forecast to grow more slowly than the population.

Data provided by the National Bureau of Statistics (NBS) shows that the construction sector grew by only 1.42% in Q1 2021 from 1.21% in Q4 2020. Despite the impact of the pandemic that led to a significant decline of construction activities, the industry was forecast to be one of the lead drivers of the Nigerian economy in 2021.

The Data provided by the National Bureau of Statistics (NBS) also shows that, the Federal Government of Nigeria (FGN) is committed to growing the infrastructure industry including modernizing and expanding the existing power production capacities in the country, both on-grid and off-grid. In June 2021, the President announced his approval of Infraco Plc, a world-class infrastructure development vehicle wholly focused on developing infrastructure projects in Nigeria which has a capital of NGN15 trillion (about USD3.6 billion**).**

Any significant expansion in the construction industry will partly depend on the pace of implementation of the Nigeria Economic Sustainability Plan (NESP), the country's post-COVID economic recovery plan, and the Economic Recovery and Growth Plan for 2017-2020 (ERGP).

2.1.7 Trade and services

Trade in Services refers to the sale and delivery of an intangible product, called a service, between a producer and consumer. Trade in services that takes place between a producer and consumers that are, in legal terms, based in different countries are called International Trade in Services. But with the growing importance of services generally, and trade-in-services in particular, for economies and societies all around the world, policy makers, trade negotiators and economists are

demanding better data availability, enhanced quality and improved international comparability. “Trade in services statistics is a key tool in trade negotiations as countries have to understand and precisely assess their offensive and defensive interests. Such statistics are also crucial ingredients in the modeling of the potential impact of specific trade arrangements on the domestic economy.” (UNCTAD, 2016)

2.1.8 Recent trends affecting the regulation of international trade in Nigeria

Following the implementation of the Economic Recovery and Growth Plan (ERGP) from 2017 to 2020, His Excellency, President Muhammadu Buhari, the President of the Federal Republic of Nigeria, established the Economic Sustainability Committee (ESC) on 30 March 2020 to, among other things, develop a clear Economic Sustainability Plan in response to the 2019 novel coronavirus disease (COVID-19) pandemic. In line with this mandate, the ESC developed the Nigeria Economic Sustainability Plan 2020, which incorporates the ERGP.

The main objectives of the Economic Sustainability Plan include the following:

i. Stimulate the economy by preventing business collapse and ensuring liquidity.
ii. Retain or create jobs using labour intensive methods in key areas such as agriculture, facility maintenance, housing, and direct labour interventions.
iii. Undertake growth-enhancing and job-creating infrastructural investments in roads, bridges, solar power, and communication technologies.
iv. Promote local manufacturing and production at all levels and advocate the use of "Made in Nigeria" goods and services.

Following the adverse impact of COVID-19, the Economic Sustainability Plan provides a blueprint of how to sustainably check the effect of the virus on the economy, trade, health, education and other critical sectors.

2.1.9 Trade barriers

Trade barriers include the barriers (tariff and non-tariff) that Nigeria companies face when exporting to this country. Nigeria employs a combination of tariffs and quotas for the double purpose of taxing international trade for revenue generation and protecting local industries from highly competitive imports. The country's tariffs are determined by the ECOWAS 2015 – 2019 Common External Tariff (CET). The tariff has five bands: zero duty on capital goods and essential drugs, 5% duty on raw materials, 10% on intermediate goods, 20% on finished goods and 35% on imports into strategic sectors. Nevertheless, effective rates tend to be higher since the Nigerian government may apply additional charges (e.g., levies, excise, and VAT) on the imports. However, the total effective rate of each line item is not to exceed 70%.

Furthermore, in December 2019 the Nigerian Senate passed an amendment to the Public Procurement Act of 2007 which would compel Nigerian government ministries, departments, and agencies to show preference for local goods and services. The amendment is awaiting passage by the House of Representatives as well as assent by the President prior to its enactment.

2.2 Theoretical framework

This study relies on pure theory of public expenditure, and human capital theory. The pure theory of public expenditure was expounded in the 1950s according to Greg and Agboro (2014), public expenditure is made to achieve growth in labour; with a target to increase spending on education. The theory preaches for growth in capital (K) and technological innovation through the

contributions of Agriculture, Industry, Construction, Trade and Services; and argues that government expenditure grows an economy through economic activities. In the context of our study, when government increases expenditure on Agriculture, Industry, Construction, Trade and Services, both labour and capital, as factors of production, would be enhanced through creativity, inventions, and innovations. It is further inferred that through such expenditure, new technologies are developed and improve upon the existing one(s) for effective and efficient production.

2.2.1 Human capital theory

The human capital theory argued that investment in human capital makes education and training improve the output and productivity of labor because it instills useful skills, knowledge and attitude that will raise the quality of the labour force and workers' expected future income by increasing their earnings for lifetime (Becker as cited in Mutamba 2016; and Kalu, 2001). The theory argues that a rise in the quality of workforce will result in tremendous economic growth.

The choice for the study variables is informed and inferred from the theoretical disposition demonstrated in the foregoing discourse – which clearly points to a positive relationship between investment in human capital and economic growth and development. With emphasis on Agriculture, Industry, Construction, Trade and Services, it is theoretically expected that these sectors, through the service sector employment should create ripe opportunities for the workforce to be fully equipped in the real sense creativity, inventions and innovations, and with useful knowledge and skills - so as to be able to make massive contributions for significant growth of the Nigerian economy. Arising from this therefore, the theoretical framework for this study is that investment in human capital through expenditure in Agriculture, Industry, Construction, Trade and

Services; the workforce will be well equipped, get employed, be more productive and make contributions that would enable the Nigerian economy to scale new heights.

2.2.2 Classical theory of economic growth

The traditional classical and neo-classical growth models developed by Solow (1956) and Mincer (1958) in the late 1950's, showed that an economy grows in response to larger inputs of capital and labour (all physical inputs). Non-economic variables such as human capital or human health variables have no function in these models. This theory revealed how capitals including technology leads to increase in productivity and efficiency of workers and expand production of goods and services. In economic lexicon, this simply means that the technological progress is "exogenous" to the system. The neo-classical growth theory as modelled by Solow (1956) emphasized the view that economic growth is a result of the accumulation of physical capital and an expansion of the labour to be more productive. Therefore, this study considers the role of economic Lexicon and neo-classical impacts on the gross domestic products (GDP) in the Nigerian economy.

2.2.3 Resource endowment theory of growth

The major advocates of this theory were Adam Smith "absolute cost advantage" in 1776 and David Ricardo "Comparative cost advantage" in 1817 among others, they argue that countries should specialize to produce and export according to their comparative advantage. The theory of comparative advantage suggests that a country gains the greatest economic benefit relative to other countries by producing at lower overall cost, commodities which a country has in abundance or can be easily produced. Other countries will therefore benefit from trade only if they accept the cost advantage of the trading country and focus on producing a commodity in which they have an advantage. It is this theory that guides resource endowment economist's belief in free trade,

specialization and the international division of labour. This was attributed to why some countries produce agricultural and mineral commodities while others produce industrial goods (Igbeasere, 2013).

2.2.4 The resource curse theory

The resource curse concept was introduced by Richard Auty in 1993. It was also known as the paradox of plenty and refers to the failure of many resource-rich countries to benefit fully from their natural resource wealth, and for governments in these countries to respond effectively to public welfare needs. While one might expect to see better development outcomes after countries discover natural resources, resource-rich countries tend to have higher rates of conflict and authoritarianism, and lower rates of economic stability and economic growth, compared to their nonresource- rich neighbors. Auty (1998) was the first author to use the term resource curse to describe how countries rich in natural resources were unable to use that wealth to boost their economies; these countries had lower economic growth than countries without an abundance of natural resources.

2.3 Empirical framework

Adeyemi and Ogunsola (2016) investigated the impact of human capital development, through Research and Development (R&D), on economic growth in Nigeria, from 1990 to 2015, using ARDL approach. Their study reported a positive long-run relationship between government expenditure on R&D and economic growth.

Gamayuni (2015) examined the effect of intangible assets, financial performance and financial policies on the firm value of Public companies in Indonesia, from 2007–2009. The study adopted Ordinary least square (OLS) method, and it was reported that returns from research and

development have positive and significant effect on the firm value, while others failed in that test, within the period of the study.

Rahko (2014) studied market value of research and development (R&D) patents, and organizational capital with Finnish evidence on 56,000 firm's year observations between 1995 and 2008 using Non Linear Square (NLS) regression method, the study reported that organizational capital, R&D, patents, and patent citations have positive and significant effects on market value.

Ebong *et al.* (2016) carried out a study to assess the impact of government capital expenditure on economic growth in Nigeria from 1970 and 2012. A multiple regression model based on a modified endogenous growth framework was utilized to capture the relationships among capital expenditure on agriculture, education, health economic infrastructure and economic growth. Drawing on error correction and cointegration specifications, an Ordinary least square (OLS) technique was used to analyze annual time series. Both short and long run effects of government capital expenditure on economic growth were estimated. Government capital expenditure had differential effects on economic growth, and capital expenditure on agriculture did not exert a significant influence on growth in the long or short runs.

Obialor (2017) examined the effect of government human capital investment on economic growth in three Sub-Saharan Africa countries (Nigeria, Ghana and South Africa) from 1980 to 2013. He used government investment in health and education as well as literacy rate as proxies for government human capital investment and GDP growth rate as a proxy for economic growth. Using cointegration and the vector error correction mechanism, the study revealed that government investment in education and health showed a positive effect on economic growth only in Nigeria, while literacy rate had an insignificant positive effect on economic growth in all three countries.

Adejumo (2017) carried out analysis to study human capital development and productivity growth in Nigeria to find the direction of causality. The study covered a period from 1970 to 2010 and adopted the endogenous growth model. The variables used were total factor productivity, gross fixed capital and secondary enrollment rate. The results revealed that productivity growth has been very low and unstable in Nigeria as it fluctuated between -1.5% and 0.6%. In addition, the connection between human capital and productivity growth was examined. The findings revealed that while productivity growth led to human capital development, human capital development did not lead to productivity growth.

Okafor *et al.* (2013) carried out a study to investigate the long run relationship between government expenditure on education and health and human capital investment in Nigeria. They used secondary data that covered the period from 1986 to 2016. They used the unit root, Granger causality, and vector auto regression tests for empirical analysis. It was discovered that there was no direct impact between the human development index (describing the quality of education, health and income growth) and government expenditure on education and health. The study has also shown that an inverse relationship exists between the human development index (HDI) and government expenditure on education and health in previous years. The HDI was also observed to be positively related to government expenditure in education and health in the current year.

Onwachukwu (2015) examined time series data from 1985 to 2010 on macroeconomic variables real gross domestic product (RGDP), inflation rate and unemployment rate in Nigeria. The study employed the Augmented Dickey Fuller technique and the ordinary least squares (OLS). The result showed a significant and an insignificant negative effect of unemployment rate and inflation rate on economic growth in the Nigerian economy. The negative impact of unemployment and inflation

rate on economic growth in Nigeria is in line with the empirical findings from the studies of Bakare (2012) and Ogueze and Odim (2015).

Aminu and Salihu (2018) carried out a study to investigate the impact of inflation rate and unemployment rate on economic development in Nigeria from 1986 to 2010. The study employed Augmented Dickey Fuller technique and the ordinary least squares (OLS) similar techniques as Inyiama in the year 2013. The Granger causality test result revealed that unemployment and inflation granger cause real gross domestic product (RGDP) in the economy of Nigeria.

Ghirmay *et al.* (2019) studied the relationship between exports and economic growth in nineteen developing countries. Their results supported a long-run relationship between the two variables only in twelve of the developing countries and the promotion of exports attracted investment and increased GDP in these countries.

Mamun and Nath (2013) found a long-run unidirectional causality from exports to economic growth in Bangladesh using a bivariate technique.

Narayan *et al.* (2007) examined the export-led growth hypothesis for Fiji and Papua New Guinea. Their results support the East London Genes and Health (ELGH) in the long-run for Fiji, while for Papua New Guinea there is evidence of ELGH in the short-run.

Borensztein *et al.* (1998) studied the effect of foreign direct investment on economic growth in a cross-country regression approach. According to their findings, foreign direct investment can be an important tool and a channel to the transfer of modern technology, but its effectiveness depends on the stock of human capital in the host country.

Anthukorala (2017) examined effect of foreign direct investment (FDI) on GDP, the result showed a positive effect on GDP and a unidirectional causality running from GDP to foreign direct investment in Sri Lanka. The finding of Baliamoune-Lutz (2004) is that the impact of FDI on economic growth is positive and there is a bidirectional relationship between exports and FDI in Morocco. This result implies that FDI can also promote exports and vice versa. Also, some authors have studied the relationship between regional integration and FDI.

Darrat *et al.* (2015) investigated the impact of foreign direct investment on economic growth in Central and Eastern Europe (CEE) and the Middle East and North Africa (MENA) regions. They found that FDI inflows stimulate economic growth in EU accession countries, while the impact of FDI on economic growth in MENA and in non-EU accession countries is either non-existent or negative.

Similar to that of Darrat *et al.* (2015), Hisarciklilar *et al.* (2016) did not find causality between foreign direct investment and GDP for most of the following Mediterranean countries of Algeria, Cyprus, Egypt, Israel, Jordan, Morocco, Syria, Tunisia and Turkey for the period of 1979-2000. These countries could create an environment that attract foreign direct investment and lead to the transfer of technology and skills and increase production, creation of new jobs and exports.

Dritsaki and Adamopoulos (2016) found a unidirectional causal relationship from foreign direct investment to economic growth and a bidirectional causal relationship between exports and economic growth for Greece.

Yao (2016) found that there is a strong relationship between exports, foreign direct investment and economic growth for China, using correlation analysis.

Rahman (2017) re-examined the effects of exports, foreign direct investment and expatriates' remittances on real GDP of some Asian countries (Bangladesh, India, Pakistan and Sri Lanka) using the Autoregressive Distributed Lag (ARDL) technique for cointegration for the period of 1976-2006. The ARDL technique confirmed cointegrating relationship among variables in these three countries. The short-run net effects of exports on real GDP of Bangladesh are more visible than those of FDI.

Odularu (2008) carried out a study on crude oil and the Nigerian economic performance. The aim of the study was to ascertain the impact of crude oil on the Nigerian economy. The study analysed the relationship between the crude oil sector and the Nigerian economic performance using the Ordinary Least Square regression method. The study found that crude oil consumption and export have contributed to the improvement of the Nigerian economy. The study concludes that the production of crude oil (domestic consumption and export) despite its positive effect on the growth of the Nigerian economy has not significantly improved the growth of the economy, due to many factors like misappropriation of public funds (corruption) and poor administration.

Akinlo (2012) carried out a study on how important is oil in Nigeria's economic growth? The study assessed the importance of oil in the development of the Nigerian economy over the period 1960-2009. The study used secondary data. The multivariate cointegration VAR model developed by Johansen (1988) and Johansen and Juselius (1992) was used. Quarterly time series data of GDP indices of the five sectors over the 1960-2009 were used in setting up the VAR model namely: agriculture, manufacturing, building & construction, oil and trade & services. The study found that the five subsectors were cointegrated and that the oil caused other non-oil sectors to grow. However, oil had adverse effect on the manufacturing sector. Granger causality test found bidirectional causality between oil and manufacturing, oil and building/construction,

manufacturing and building/construction, manufacturing and trade/services, and agriculture and building/construction. It was also revealed that a unidirectional causality from manufacturing to agriculture and trade/services to oil.

Ibeh (2018) investigated the impact of the oil industry on the economic growth performance of Nigeria. Using ordinary least square (OLS) regression technique, gross domestic product was regressed against oil revenue and time appeared as regressor's. The test for the significance revealed that the two explanatory variables did not have any significant impact on growth performance of the Nigerian economy within the same period. Thus, it was emphasized that government should formulate appropriate policy mix that would motivate the firm in the oil sector to enhance improved performance and contribution of the sector.

Ayuba (2014) investigated the impact of non-oil tax revenue on economic growth in Nigeria, using secondary data collected from the Statistical Bulletin of the CBN from the period 1993 -2012. The study employed ADF Unit Root test, error correction model and OLS technique to analyze the data collected on the variables. The results showed that non-oil tax revenue impacted positively on economic growth in Nigeria

Usman *et al*. (2015) carried out a study on evidence of petroleum resources and Nigerian economic development (2000-2009). The main objective of the study was to examine the impact of petroleum on Nigeria's economic development. The variables were two, that is, crude oil Revenue and the gross domestic product (GDP). The study was based on secondary data. Data was sourced from the Central Bank of Nigeria Statistical Bulletin and National Bureau of Statistics. The data span through ten years' record of GDP and oil revenue, 2000-2009. The tool of analysis used was

simple linear regression model with the aid of Statistical Packages for Social Sciences (SPSS). The study found that petroleum has a direct and positive significant relationship with the economy.

Koukou (2011) employed Autoregressive Distributed Lag (ARDL) bounds testing techniques and studied electricity consumption, industrial output and economic growth in Cote d' Ivoire over the period of 1971 to 2008. The study reveals the existence of cointegration between the variables. A test of granger causality identified short run bi-directional causality between economic growth and electricity consumption while causality only runs from electricity consumption to growth in the long run.

Mastroyiannis (2007) examined the degree of integration of the Greek economy into international capital markets using the analytical framework proposed by Felstein-Horioka. The author examined the argument using time series properties of data on current account balance and national savings for the period 1960-2004. Further stated, Mastroyiannis (2007) applied structural breaks to account for historical evolution of the institutional framework that governs international transactions. Evidently and Mastroyiannis (2007) suggested that the links of the Greek economy to international capital markets have significantly strengthened after its accession to the European Union. Furthermore, the empirical results add another piece of evidence –albeit small- to the literature on the Feldstein-Horioka puzzle, indicating that the Feldstein-Horioka puzzle does not hold for the Greek economy.

Okereke and Bernard (2014) used Box-Jenkins procedure to model the gross domestic product (GDP) of Nigeria. They fitted SARIMA model $(2, 1, 2) \times (1, 0, 1)_4$ to the quarterly GDP of Nigeria. In their work, they made use of log transformation and first order regular differencing to stabilize the variance and achieve stationarity respectively in the series.

Onuoha *et al.* (2021) studied the probability plot of the GDP series used in the work, it showed non-normality and heteroskedasticity. After the decomposition of the series into its component parts, they found that the GDP of Nigeria has a strong trend component with little or no seasonal component. The result of their analysis shows that the economy of Nigeria has an upward trend which indicates a positive growth rate of the economy. However, their assertion that the GDP has no or little seasonal component could be because they used annual date despite having 53 observations.

Akanbi *et al.* (2018) modeled gross domestic product (GDP) of Nigeria using Bayesian Model Averaging. According to them, this model helped overcome the problem of model uncertainty. Estimates of the posterior probabilities were obtained via Markov Chain Monte Carlo which was further used as weights to model averaged estimates and predictions. Their results show that Exchange Rate is the most important variable affecting GDP of the Nigerian economy followed by Interest Rate. The best model consisted of an average of two predictors with exchange rate as one of the major contributors. The top 5 models in their work were checked and they explained 40.16% of uncertainty. According to Akanbi *et al.* (2018), among the selected financial indicators that they studied, Credit to Private Sector (CPS) has a positive relationship with GDP.

Usoro (2018) carried out analysis to model Nigeria's gross domestic product (GDP) using two models which were SARIMA and BARIMA models. SARIMA model is a linear model while BARIMA model is a nonlinear model. He essentially compared the two models and observed that BARIMA performed better than SARIMA. The SARIMA Model he fitted was of the order $(0, 1, 2) \times (0, 1, 1)_4$ and the BARIMA model has the order (0, 2, 1, 0, 1). In doing SARIMA analysis, he employed seasonal and non-seasonal differencing whereas Okereke and Bernard (2014) only did non-seasonal differencing.

Oboh *et al.* (2010) investigated the impact of human capital development on economic growth in Nigeria. The data used spanned from 1970 to 2008. The Johansen cointegration technique and vector error correction analysis was used to ascertain this relationship. The macroeconomic variables used in the study were real gross domestic product (GDP) as a proxy for economic growth, and real capital expenditure (RCE) on education, real recurrent expenditure (RRE) on education, real capital stock (RCS), total school (SCHE) enrolments, and labour force (LF) were used as proxies for human capital development. The results indicate that human capital development has a significant impact on Nigeria's economic growth.

Oluwatobi and Ogunrinola (2011) conducted a study that examined the relationship between the human capital development efforts of the government and economic growth in Nigeria. They used a unit root test, the Johansen cointegration technique and the error correction mechanism to analyze the data. They used government capital and recurrent expenditure on education and health as proxies to measure the level of government investment in education and health and their effect on economic growth. It was discovered that while government recurrent expenditure on human capital was positively related to economic growth, expenditure on human capital development was negatively related to economic growth.

Matthew (2011) focused on Human Capital Investment and Economic Growth in Nigeria – the Role of Education. The study used the augmented Dickey–Fuller test (ADF), cointegration test and the error correction model and found that a positive relationship exists between government expenditure on education and economic growth while a negative relationship exists between government expenditure on health and economic growth. Therefore, based on these findings, the study recommended that the government should increase not just the amount of expenditure on the

education and health sectors, but also the percentage of its total expenditure according to these sectors.

Adelakun (2011) carried out a study that showed the relevance of human capital development to growth in the Nigerian economy. He used GDP as the variable for measuring economic growth and total government expenditure on education and health, and the enrollment pattern of tertiary, secondary and primary schools as variables for human capital, and used the ordinary least square (OLS) method of empirical analysis. The study revealed that there is a strong positive relationship between human capital development and economic growth.

Isola and Alani (2014) analyzed the relationship between human capital development and economic growth in Nigeria. They used the unit root test and regression analysis to examine the contribution of different measures of human capital development to economic growth in Nigeria. Time series data on Nigeria from 1980 to 2005 was used for the analysis and estimation. Using the ordinary least square method of data analysis, they discovered that both health (measured by life expectancy) and education (measured by adult literacy) were necessary for economic development. Yet, it was discovered that little investment had been made by the federal government in the health sector compared to education.

Akintunde and Satope (2013) investigated the effect of health investment on economic growth in Nigeria from 1977 to 2010. They used the vector error correction model and discovered that although a long run relationship existed between health expenditure and economic growth, the short run impact did not converge to long run economic growth and, therefore, advised the government to increase their spending on health. Health investments (both private and government) were measured as a ratio to the labor force population.

Mba *et al.* (2013) carried out a study to evaluate the effect of human capital development on economic growth in Nigeria. GDP was used as a proxy for economic growth; real gross domestic product per capita, primary school enrolment, public expenditure on education and health, life expectancy, and stock of physical capital were used as proxies for human capital. The data for this study are time series covering the period from 1977 to 2011 a total of 35 years. The empirical methods employed were the ADF, cointegration and OLS. From the analysis, it was deduced that there is a strong positive relationship between human capital development and economic growth. The recommendations drawn from the study centered on revisiting the manpower requirements of the various sectors of the economy.

Ogujiuba (2013) studied the impact of capital formation on economic growth in Nigeria. He made use of secondary data from 1970 to 2010 and used the OLS, cointegration and error correction model for his analysis. The variables used were real GDP growth rate, capital expenditure on education, recurrent expenditure on education, real gross capital formation, primary education enrolment, post-primary education enrolment and tertiary education enrolment. His findings revealed that recurrent expenditure on education as well as capacity building impacted significantly on economic growth, while capital expenditure on education was insignificant to the growth process.

Adejumo *et al.* (2013) carried out a study on the impact of human capital on industrial development in Nigeria. The study made use of the different educational enrollment rates (primary, secondary and tertiary) in order to find out if any significant positive impact using these variables are felt in the industrial sector. Time series data covering the period between 1980 and 2010 were used. The study used the unit root test, regression analysis and cointegration method of empirical analysis. It

was discovered that human capital has to a large extent impacted on industry value-added, but in terms of output generated industrially, the effect of human capital in Nigeria remains low.

Eigbiremolen and Anaduaka (2014) carried out a study which adopted the augmented Solow growth model that was used by Oluwatobi and Ogunrinola (2011). They investigated the impact of human capital development on national output using quarterly time series from 1999 to 2012. They used the econometric methods of the augmented Dickey–Fuller test and cointegration, and revealed that there was an inelastic relationship between human capital development and output level measured by real GDP.

Oladeji (2015) conducted research to investigate the relationship between human capital (through education and effective health care services) and economic growth in Nigeria using annual time series data from 1980 to 2012. The paper employed OLS methodology. The result showed that an increase in allocation for education and health leads to an increase in GDP. These findings have a strong implication on educational and health policy in Nigeria. The study seems to suggest that a concerted effort should be made by policy makers to enhance educational and health investment in order to accelerate growth, which would, in turn, generate economic growth.

Okafor and Ike (2016) focused on a detailed analysis of the impact of human capital investment on economic development in Nigeria. Analysis of the data was done using the OLS technique. The study employed two models, the first used GDP per capita as a proxy for economic development, while the second used infant mortality rate as a proxy for economic development. Government recurrent and capital expenditure on education and health were used as proxies to measure human capital investment. From the study, it was discovered that government recurrent expenditure on education and government capital expenditure on education and health impacted positively on

GDP per capita, while government recurrent expenditure on health had a negative impact. Also, all components of human capital investments, except government recurrent expenditure on health, had positive significant impacts on infant mortality rate. Finally, infant mortality rate was more reliable than GDP per capita as an index of economic development.

Idenyi *et al.* (2016) examined the effect of human capital development on the growth of the Nigerian economy. Using Johansen's cointegration and the vector error correction model it was discovered that there was a significant long run relationship between human capital development and economic growth. Government expenditure on education and health had a significant effect on economic growth. While government expenditure on education had a positive relationship with economic growth, the relationship between government expenditure on health and economic growth was negative.

2.5 Research GAP

A lot of studies have looked at the macroeconomic determinant of economic growth, effects of monetary policy on economic growth, monetary policy and economic growth in Nigeria (Adigwe *et al.*, 2015; Ismaila & Imoughele, 2015; Udeaja & Onyebuchi, 2015). However, there is dearth of research on contributions of real sector to economic growth in Nigeria. In view of above, this research tends to look at contribution of real sectors of; Agriculture, Industry, Construction, Trade and Services to economic growth in Nigeria using Autoregressive Distributed Lag Cointegration technique to determine few components of real sector that can bring about greater economic growth in Nigeria.

CHAPTER THREE

3.0 METHODOLOGY

This chapter deals with data presentation/description and methods. The study utilizes autoregressive distributed lag (ARDL) cointegration technique to investigate effects of some macroeconomic variables in Nigeria, from 1981-2019. This scope was chosen because of the availability of relevant data and sufficient scope to influence policy decisions in the country. These data were sourced from the CBN data bank, and data will be analyzed using STATA, GRETL and EVIEW statistical software.

3.1 Data Description

The data for this study was extracted from the World Bank Development Indicators (Last updated 30/01/2019). Below is the description of the data:

3.1.1 Gross domestic product (GDP)

Gross Domestic Product is the monetary value of goods and services produced in an economy during a period of time irrespective of the nationality of the people who produced the goods and services. It is calculated without making deductions for depreciation. GDP at Current Basic Prices (i.e. Nominal GDP) equals GDP at Current Market Prices less indirect taxes net of subsidies. GDP at Constant Basic Prices (otherwise known as the real GDP) equals GDP at Market Prices less indirect taxes net of subsidies. Classified as confidential; GDP at Current Market Prices equals GDP at Current Basic Prices plus indirect taxes net of subsidies. This is GDP valued at the market prices which purchasers pay for the goods and services they acquire or use. It is collected from World Bank, 2019

3.1.2 Agricultural

Agriculture is the practice of cultivating plants and livestock. International Labor Organization 1999 stated that Agriculture was the key development in the rise of sedentary human civilization, whereby farming of domesticated species created food surpluses that enabled people to live in cities. The history of agriculture began thousands of years ago, after gathering wild grains beginning at least 105,000 years ago, nascent farmers began to plant them around 11,500 years ago. Pigs, sheep, and cattle were domesticated over 10,000 years ago. Plants were independently cultivated in at least 11 regions of the world. Industrial agriculture based on large-scale monoculture in the twentieth century came to dominate agricultural output, though about 2 billion people still depended on subsistence agriculture. The Agricultural data was also sourced from the CBN data bank.

3.1.3 Industries

Industrial activities/sectors in Nigeria means material handling, transportation, or storage; manufacturing; maintenance; treatment; or disposal. Industrial development provides employment, foreign exchange, and domestic earnings. Three different types of industries (primary, secondary and tertiary) are considered in this study.

3.1.4 Constructions

Construction is a general term meaning the art and science to form objects, systems, or organizations, (Oxford University Press 2009) and comes from Latin construction (from com- "together" and struere "to pile up") and Old French construction (Etymology Dictionary 2014). To construct is the verb: the act of building and the noun is construction: how something is built, the nature of its structure.

The Nigerian construction industry struggled in 2020 due to disruptions caused by the COVID-19 outbreak and the subsequent lockdown measures. The collapse in oil prices and the pandemic plunged the country into recession in 2020. High debt-servicing costs and low tax revenue also left little scope for fiscal spending and new public projects. This trend has continued in 2021, and a report published by the World Bank in June 2021 (Nigeria Economic Update: Resilience through Reforms) stated that the Nigerian economy was expected to grow by 1.8% in 2021, but the outlook was uncertain. GDP per capita is projected to continue declining because the economy is forecast to grow more slowly than the population.

Data provided by the National Bureau of Statistics (NBS) shows that the construction sector grew by only 1.42% in Q1 2021 from 1.21% in Q4 2020. Despite the impact of the pandemic that led to a significant decline of construction activities, the industry was forecast to be one of the lead drivers of the Nigerian economy in 2021.

3.1.5 Trade and services

Trade in Services refers to the sale and delivery of an intangible product, called a service, between a producer and consumer. Trade in services that takes place between a producer and consumers that are, in legal terms, based in different countries are called International Trade in Services. But with the growing importance of services generally, and trade-in-services in particular, for economies and societies all around the world, policy makers, trade negotiators and economists are demanding better data availability, enhanced quality and improved international comparability. “Trade in services statistics is a key tool in trade negotiations as countries have to understand and precisely assess their offensive and defensive interests. Such statistics are also crucial ingredients

in the modeling of the potential impact of specific trade arrangements on the domestic economy." (UNCTAD, 2016)

3.2 Model specification

The general model of the ARDL (p, q) is as follows:

$$y_t = \varphi + \sum_{i=0}^{p} \alpha_i y_{t-i} + \sum_{i=0}^{q} \beta_t \, x_{t-i} + \varepsilon_t \quad (3.1)$$

Or broken down as:

$$y_t = \varphi + \alpha_i y_{t-1} + \alpha_2 y_{t-2} \ldots + \alpha_p y_{t-p} + \beta_0 x_t + \beta_1 x_{t-1} + \beta_2 x_{t-2} + \cdots + \beta_q x_{t-q} + \varepsilon_t \quad (3.2)$$

Where:

y_t: Is GDP_t.

y_{t-i}: Is the Lag of GDPt-i

x_t: Represent ($AGRICULTURE_{-t}$, $INDUSTRY_{-t}$, CONSTRUCTION-t, $TRADE/SERVICE\text{-}_t$)

x_{t-i}: Lag of the variables ($AGRICULTURE_{t-i}$, $INDUSTRY_{t-i}$, $CONSTRUCTION_{t-i}$ $TRADE/SERVICE_{t-i}$)

p: Optimal lag order associated with GDP

q: Optimal lag order associated with ($AGRICULTURE_{-t}$, $INDUSTRY_{-t}$, CONSTRUCTION-t, $TRADE/SERVICE\text{-}_t$)

φ: Constant

α_i: Coefficient of GDP (coefficients for short-run)

β_i: Coefficient of (AGRICULTURE$_{-t}$, INDUSTRY$_{-t}$, CONSTRUCTION-t, TRADE/SERVICE-t)

(Coefficient for long-run)

ε_t: Is the error term which is assumed to be normally distributed.

Variables used to assess the significance of the relationship between the macroeconomic variables and the economic growth of Nigeria, are in their natural log form. The growth model can be represented mathematically as:

$$In(RGDP) = f(InAgriculture, InIndustry, InConstruction, InTrade\ and\ Services)$$

The linear relationship of equation above could be stated as:

$$In(GDP) = \varphi + \beta_1 In(Agriculture) + \beta_2 In(Industry) + \beta_3 In(Construction) + \beta_4 In(Trade\ and\ Services) + \varepsilon \quad (3.3)$$

3.3 Pre-Estimation tests

Where GDP is the dependent variable, φ is the intercept term, β_1 is the coefficient of Agriculture (independent variable), β_2 is the coefficient of Industry (independent variable), β_3 is the coefficient of Construction (independent variable), β_4 is the coefficient of Trade and Services (independent variable) andε_t is the unexplained part of the actual data and fitted line by regression equation known as the error term.

Pre-estimation test is parametric test carried out on the time series data to meet the assumptions of the model to be estimated. The pre-estimation tests are normality test (Jarque-Bera test),

stationarity test (Augmented Dicker Fuller test), co-integration test (ARDL Bounds test) and optimal lag length determination.

3.4 Normality test (Jarque-Bera Test)

The basic assumption that sampled data are normally distributed is what many methods of time series analysis depend on (Thode, 2002). This assumption is very vital for the reliability of parametric tests results.

3.5 Stationary test (Augmented Dicker Fuller) (ADF)

Time series data is said to be stationary when its value tends to revert to its long-run average value and its other properties like the variance and co-variance of the data series are not affected by the change in time (i.e. time invariant) (Shrestha and Bhatta, 2018). The most common method for testing unit root for parametric analyses is the Augmented Dickey Fuller (ADF) test. Let's assume we have a series y_t for testing unit root. ADF model tests unit root as follows:

$$\Delta y_t = \alpha + \beta_t + \gamma y_{t-1} + \delta_1 \Delta y_{t-1} + \cdots\cdots + \delta_{p-1} \Delta y_{t-p+1} + \varepsilon_t \quad (3.4)$$

Where α is a constant, β_t is the coefficient on a time trend and $p\ is$ the lag order of the autoregressive process. Imposing the constraints $\alpha = 0$ and $\beta = 0$ corresponds to modeling a random walk and using the constraint $\beta = 0$ corresponds to modelling a random walk with a drift. And t is time period (1981 to 2019)

The test statistic value is calculated as:

$$\tau = \frac{\hat{\gamma}}{\sigma_{\hat{\gamma}}} \quad (3.5)$$

Where:$\hat{\gamma}$ is the estimated coefficient and $\sigma_{\hat{\gamma}}$ is the standard error in the coefficient estimate

The null-hypothesis for an ADF test is

$H_0: \gamma = 0$ vs $H_1: \gamma < 0$

Where H_0: is the null hypothesis (has unit root) and H_1: Does not have unit root. The test statistics value τ is compared to the relevant critical value for the Dickey Fuller Test. If the test statistic is less than the critical value, we reject the null hypothesis and conclude that no unit-root is present. We can also judge presence of unit root using p-value; we reject the null hypothesis if p-value is less than the level of significant of the study (α). The ADF Test does not directly test for stationarity, but indirectly through the existence (or absence) of a unit-root. Decision rule:

If t* > ADF critical value, ==> Do not reject null hypothesis, i.e., unit root exists.

If t* < ADF critical value, ==> reject null hypothesis, i.e., unit root does not exist.

Using the usual 5% threshold, differencing is required if the p-value is greater than 0.05.

3.6 Co-integration test (ARDL Bounds test)

There is co-integration between two or more variables if there exist a form of equilibrium relationship spanning the long-run (Shrestha and Bhatta, 2018). The Bounds test is guided by the assumption of stationary variables at level I(0), at first difference I(1) and never at second difference I(2) (Giles, 2013). To perform the bounds test for co-integration, the conditional ARDL (p, q_1, q_2, q_3) model with 4 variables. This will be the hypothesis for the bounds test:

$H_0: b_{ji} = 0 \qquad where\ j, i = 1,2,3,4$

$H_1: b_{ji} \neq 0$

i.e. The null hypothesis is saying that the coefficient of the long-run equation are all equal to zero which implies there is no co-integration against the alternative hypothesis which say the coefficient of the long-run equation are all not equal to zero, which implies there is co-integration. If we are unable to reject the null hypothesis, then we can only specify the short-run model otherwise we go ahead to specify a standard ARDL model. If there is no co-integration, the ARDL (p, q_1, q_2, q_3) models will be specified as:

$$\Delta In(GDP)_t = a_{01} + \sum_{i=1}^{p} a_{1i}\, \Delta In(RGDP)_{t-1} + \sum_{i=0}^{q1} a_{2i}\, \Delta In(Agriculture)_{t-1} + \sum_{i=0}^{q2} a_{3i}\, \Delta In(Industry)_{t-1} + \sum_{i=0}^{q3} a_{3i}\, \Delta In(Constructiony)_{t-1} + \sum_{i=0}^{q4} a_{4i}\, \Delta In(Trade\ and\ Servicesy)_{t-1} + \varepsilon_t \quad (3.6)$$

If there is co-integration, the error correction model (ECM) representation is specified as:

$$\Delta In(GDP)_t = a_{01} + \sum_{i=1}^{p} a_{1i}\, \Delta In(RGDP)_{t-1} + \sum_{i=0}^{q1} a_{2i}\, \Delta In(Agriculture)_{t-1} + \sum_{i=0}^{q2} a_{3i}\, \Delta In(Industry)_{t-1} + \sum_{i=0}^{q3} a_{3i}\, \Delta In(Constructiony)_{t-1} + \sum_{i=0}^{q4} a_{4i}\, \Delta In(Trade\ and\ Servicesy)_{t-1} + \lambda(ECT)_{t-1} + \varepsilon_t \quad (3.7)$$

Where:

i λ is the speed of adjustment parameter with a negative sign which shows convergence in the long-run else the model is explosive

ii ECT is the error correction term, the ordinary least squares (OLS) residuals series from the long-run co-integrating regression

iii $a_{1i,}a_{2i,}\ a_{3i,}\ a_{4i,}$ are the short-run dynamic coefficients of the model's adjustment long-run equilibrium

Where we have the differences (Δ), it captures the short-run and where we have the ECT, it captures the long-run. The short-run causal effect is represented by the statistical significance of the t-statistic on the explanatory variables (short-run coefficients). If the t-statistic of the coefficients is significant, then we can know the direction of causality from the regressor to the dependent variable (Giles, 2013). The long-run causal effect is captured by the significance of the λ, which is the parameter for the error correction term (ECT). If λ is significant then it tells us that there is long-run causality among the variables.

3.7 Optimal lag length determination

The choice of appropriate lag length is very key in autoregressive modeling because we want to have Gaussian error terms (i.e. standard normal error terms that do not suffer from non-normality, autocorrelation, heteroscedasticity etc.) (Nkoro and Uko, 2016). The selection of optimal number of lags can be determined using proper model order selection criteria such as the Akaike Information Criterion (AIC), Schwartz Bayesian Criterion (SBC) or Hannan-Quinn criterion (HQC). The value of the general ARDL (p, q_1, q_2, q_3) model is given by:

$$AIC_P = (1 + log2\pi) - \frac{n}{2} log\delta^2 - P \quad (3.8)$$

$$SBC_P = log(\delta^2) + \left(\frac{logn}{n}\right) P \quad (3.9)$$

$$HQC = log\delta + \left(2log\frac{logn}{n}\right) P \quad (3.10)$$

Where δ^2 is the Maximum Likelihood (ML) estimator of the variance of the regression disturbance, n is the number of estimated parameters and P = 0, 1, 2, … P where P is the optimum order of the model selected (Nkoro and Uko, 2016).

3.8 Post Estimation Tests

3.8.1 Autocorrelation test

One of the assumptions of the classical model is that the disturbance term relating to any observation is not influenced by the disturbance term relating to any other observation; however, if there is such dependence, there exist autocorrelation Gujarati (2005). Symbolically $E(\varepsilon_i, \varepsilon_j) \neq 0$

With the advantages of the Breush-Godfrey test (also known as the LM test) over the Durbin-watson d test, we shall employ the use of the Breush-Godfrey test to check for the presence of autocorrelation in our disturbance term in this study.

3.8.2 Heteroscedasticity test

An important assumption of the classical linear regression model is that the variance of each disturbance term ε_t, conditional on the chosen values of the explanatory variables, is some constant number equal to σ^2 (Gujarati 2005). This assumption is known as homoscedasticity or equal variance. Symbolically,

$$E(u_i^2) = \sigma^2 \qquad i = 1, 2, \ldots n$$

For the purpose of this study, we shall be employing the Breusch-Pagan-Godfrey test to check for heteroscedasticity in our disturbance term.

3.8.3 Normality test for residuals (Histogram and Jarque-Bera test)

In order to ensure that our model satisfies the assumption of classical normal linear regression model, it is important to check one of the assumptions known as the normality of the disturbance

term, ε_t. The Jarque-Bera (JB) test of normality is an asymptotic test based on OLS residuals. It computes the skewness and kurtosis measures of the OLS residuals and uses the following test statistic:

$$JB = n\left[\frac{S^2}{6} + \frac{(K-3)^2}{24}\right] \quad (3.11)$$

Where:

n = sample size

s =skewness coefficient

k =kurtosis coefficient

The null hypothesis states that the residuals are normally distributed. If the p-value of the JB statistic in the application is sufficiently low, which can occur if the value of the statistic is very different from zero, one can reject the hypothesis that the residuals are normally distributed but with a reasonably high p-value, which will occur if the value of the statistic is close to zero, we do not reject the normality assumption (Gujarati, 2004).

3.8.4 Parameter stability test (CUSUM Graph)

The check for the stability of the estimated parameters from the regression model in the study is an important post-estimation check. Cumulative Sum (CUSUM) test is employed to help check if the coefficients of the regression are changing systematically or changing suddenly respectively (Bhatti *et al*., 2004). The Hypothesis is:

H_0:Parameters are stable (which is desirable)

H_1:Parameters are not stable (which is not desirable)

The decision rule states that if we find the blue line between or within the red line in our CUSUM, we accept the null hypothesis (H_0) and reject the alternative hypothesis (H_1). Alternatively, if the blue line crosses the red line in our CUSUM graph, we reject the null hypothesis (H_0) and accept the alternative hypothesis (H_1)

CHAPTER FOUR

4.0 RESULTS AND DISCUSSION

This chapter deals with data presentation, description and methods of analysis. The study utilizes autoregressive distributed lag (ARDL) cointegration technique. STATA, GRETL and Eview statistical software was utilized for the analysis.

4.1 Result from unit rest

The variables studied in this work is subjected into test for stationarity using the Kwiatkowski-Phillips-Schmidt-Shin (KPSS). The null hypothesis for the KPSS test are opposite of the ADF test. The null hypothesis states that the process is trend stationary. And the alternative hypothesis is that the series has a unit root (series is not stationary).

Table 4.1: Unit Root Test using KPSS

T = 40 Lag truncation parameter = 3

Variables	**Test statistic**	**10%**	**5%**	**1%**	**P-value**
Agriculture	0.954218	0.352	0.462	0.719	0.01
Industry	0.957844	0.352	0.462	0.719	0.01
Construction	0.81846	0.352	0.462	0.719	0.01
Trade	0.87806	0.352	0.462	0.719	0.01
Services	0.864408	0.352	0.462	0.719	0.01
Nominal GDP	0.905999	0.352	0.462	0.719	0.01

Null Hypothesis for KPSS state that the series is stationary.

A pre-condition for ARDL modelling is to carry out a unit root test to ensure the time series is stationary. For this purpose, the study uses Kwiatkowski-Phillips-SchmidtShin test (KPSS) method to conduct the test for unit roots. The stationarity test reported in Table 4.1 showed that

the time series variables studied did not attain stationarity at levels since the p-values = 0.01 are all less than 0.05, we reject the null hypothesis. The variables may become stationary after first difference.

4.2 Lag length selection for ARDL model

For annual data, one or two lags usually suffice for the determination of optimal lag length (Jeffrey, 2012). The outcomes of the optimal lag length determination from lag one (1) and lag two (2) and their corresponding Akaike information criterion (AIC), Schwarz Criterion (SC), Hannan-Quinn Criterion values and selected ARDL models are presented in table 4.2. The decision for the selection of the optimal lag length lies on the lag length with the minimum AIC value.

Table 4.2: Optimal Lag Length Determination for the ARDL model

lags	loglik	p(LR)	AIC	BIC	HQC
1	-1663.96881		92.214530	94.043140	92.859201
2	-1583.05971	0.00000	89.787012	93.183001	90.984257
3	-1302.87151	0.00000	76.587649*	81.551018*	78.337469*

The asterisks in the table indicate the best (that is, minimized) values of the respective information criteria, AIC = Akaike criterion, BIC = Schwarz Bayesian criterion and HQC = Hannan-Quinn criterion. This is used to select the appropriate lag for the model.

From the table, we observed that lag order 3 have a minimal information criterion. The decision for the selection of the optimal lag length lies on the lag length with the minimum AIC, BIC and HQC value. Thus, the autoregressive distributed lag of order three (3) is selected based on the minimum AIC =76.587649*, BIC = 81.551018* and HQC =78.337469*

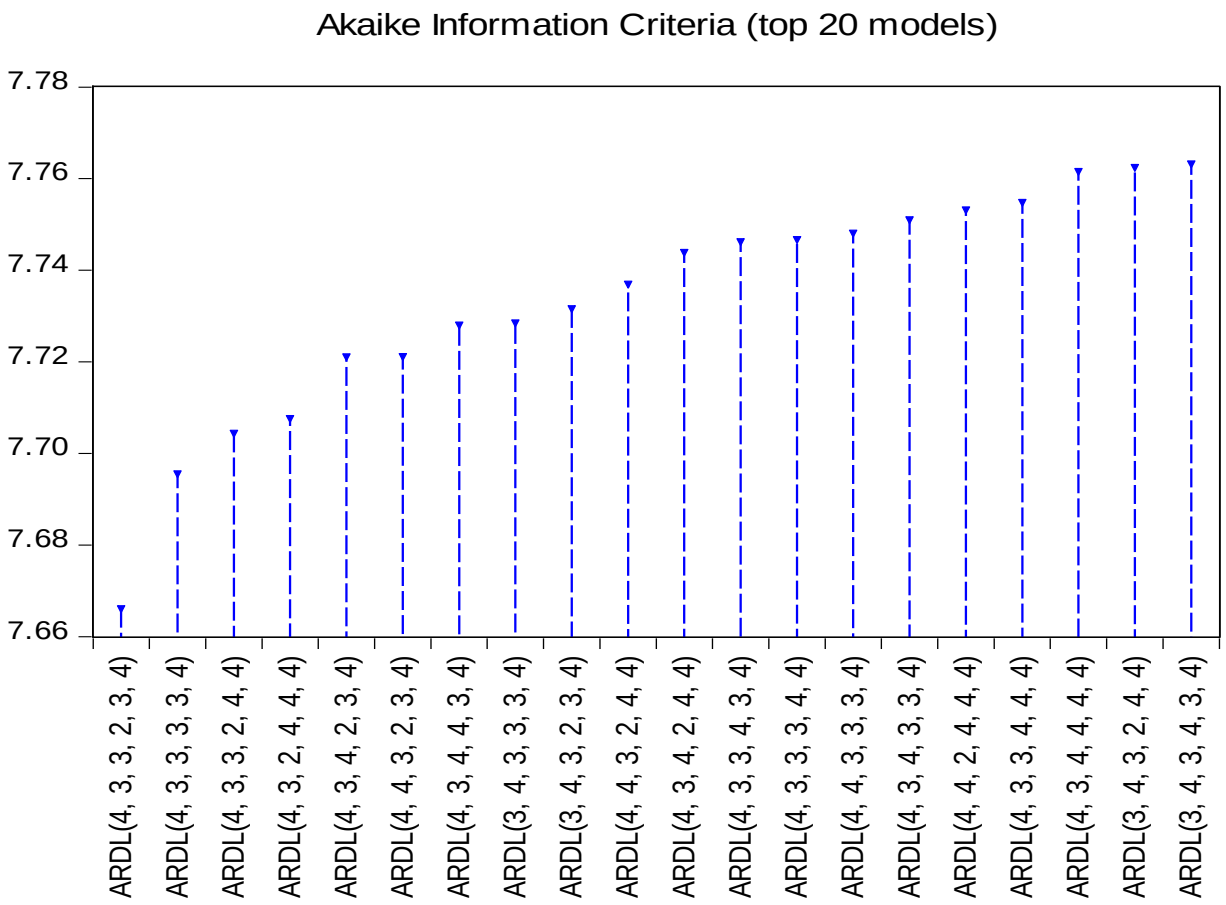

Figure 4.1 Model selection using Akaike information criterion for top 20 models

The result from the graph shows the output of twenty ARDL models using Akaik information criterion. From the figure we observed that ARDL of order (4, 3, 3, 2, 3, 4) was the best model with the least error bar. This model is therefore utilized to model the studied variables.

4.3 Result from the ARDL Estimation

Table 4.2 shows the result of the ARDL model which allows the simultaneous estimation of the short-run and long-run coefficients of the model. With the discovery of long-run relationship among the variables, the study proceeds with estimating ARDL model to investigate the long-run relationship and short-run dynamics among gross domestic product and its focus variables which are Agriculture, Construction, Industries, Trade and Services.

Table 4.3: Autoregressive Distributed Lag (ARDL) Model

Dependent Variable: GDP
Method: ARDL
Maximum dependent lags: 4 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Selected Model: ARDL(4, 3, 3, 2, 3, 4)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
GDP(-1)	-0.273420	0.137860	-1.983310	0.0729
GDP(-2)	0.397764	0.128249	3.101504	0.0101
GDP(-3)	0.293433	0.033855	8.667322	0.0000
GDP(-4)	-0.046401	0.022709	-2.043282	0.0657
CONSTRUCTION	-2.059905	0.419023	-4.915969	0.0005
CONSTRUCTION(-1)	0.755676	0.559020	1.351788	0.2036
CONSTRUCTION(-2)	0.431486	0.125487	3.438488	0.0055
CONSTRUCTION(-3)	4.539178	0.447168	10.15094	0.0000
INDUSTRY	0.855115	0.017694	48.32703	0.0000
INDUSTRY(-1)	0.313800	0.137196	2.287247	0.0430
INDUSTRY(-2)	-0.929415	0.128329	-7.242421	0.0000
INDUSTRY(-3)	-0.194115	0.056385	-3.442662	0.0055
SERVICES	0.873399	0.016738	52.17970	0.0000
SERVICES(-1)	-0.118447	0.103294	-1.146695	0.2758
SERVICES(-2)	-0.473978	0.088884	-5.332568	0.0002
TRADE	0.492442	0.053548	9.196300	0.0000
TRADE(-1)	0.871510	0.158134	5.511211	0.0002
TRADE(-2)	-0.005741	0.103527	-0.055453	0.9568
TRADE(-3)	-0.852657	0.092134	-9.254512	0.0000
AGRICULTURE	1.222431	0.018580	65.79154	0.0000
AGRICULTURE(-1)	0.186320	0.154678	1.204571	0.2536
AGRICULTURE(-2)	-0.111260	0.143237	-0.776756	0.4537
AGRICULTURE(-3)	-0.224514	0.051607	-4.350442	0.0012
AGRICULTURE(-4)	0.321090	0.045453	7.064264	0.0000
C	-18.83507	4.853618	-3.880625	0.0026

R-squared	1.000000	Mean dependent var	28864.47
Adjusted R-squared	1.000000	S.D. dependent var	32237.31
S.E. of regression	10.09954	Akaike info criterion	7.666122
Sum squared resid	1122.008	Schwarz criterion	8.765788
Log likelihood	-112.9902	Hannan-Quinn criter.	8.049935
F-statistic	14858367	Durbin-Watson stat	2.266984
Prob(F-statistic)	0.000000		

*Note: p-values and any subsequent tests do not account for model selection.

Table 4.3 shows the result of the Autoregressive Distributed Lag (ARDL) model. The result from the table shows that GDP (-2) and GDP (-3) have significant influence on GDP since their p-values = 0.0101 and 0.0000 are less than 0.05. The result also shows that constructions also have significant

influence on GDP at its level and at lag order 2 and 3 since their p-value = 0.0005, 0.0055 and 0.0000 are less than 0.05 respectively. Result based on industry shows that, industries have significant influence on GDP at its level and at lag order 1, 2 and 3 since their p-values = 0.0000, 0.0000 and 0.0055 are less than 0.05 respectively. We also observed that services have significant influence on GDP at its level and at lag order 2 since their p-values = 0.0000 and 0.0002 are less than 0.05. The result from the table also shows trades have significant influence on GDP at its level and at lag order 2, since the p-values = 0.0000, 0.0002 and 0.0000 respectively are less than 0.05 significant level. Finally, it is shown in table that shows that Agriculture also has significant influence on GDP at its level and at lag order 3 and 4, since the p-values = 0.0000, 0.0012 and 0.0000 less than 0.05.

Table 4.4: ARDL Error Correction Regression

Dependent Variable: D(GDP)
Selected Model: ARDL(4, 3, 3, 2, 3, 4)
Case 2: Restricted Constant and No Trend

ECM Regression
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GDP(-1))	-0.644796	0.034580	-18.64673	0.0000
D(GDP(-2))	-0.247032	0.009762	-25.30423	0.0000
D(GDP(-3))	0.046401	0.006447	7.197682	0.0000
D(CONSTRUCTION)	-2.059905	0.097632	-21.09860	0.0000
D(CONSTRUCTION(-1))	-4.970665	0.226171	-21.97746	0.0000
D(CONSTRUCTION(-2))	-4.539178	0.225397	-20.13863	0.0000
D(INDUSTRY)	0.855115	0.007754	110.2764	0.0000
D(INDUSTRY(-1))	1.123530	0.051137	21.97110	0.0000
D(INDUSTRY(-2))	0.194115	0.015790	12.29367	0.0000
D(SERVICES)	0.873399	0.005758	151.6934	0.0000
D(SERVICES(-1))	0.473978	0.030611	15.48402	0.0000
D(TRADE)	0.492442	0.020246	24.32347	0.0000
D(TRADE(-1))	0.858398	0.036516	23.50747	0.0000
D(TRADE(-2))	0.852657	0.030857	27.63243	0.0000
D(AGRICULTURE)	1.222431	0.006916	176.7416	0.0000
D(AGRICULTURE(-1))	0.014684	0.016851	0.871424	0.4021
D(AGRICULTURE(-2))	-0.096576	0.016121	-5.990693	0.0001
D(AGRICULTURE(-3))	-0.321090	0.009008	-35.64613	0.0000
CointEq(-1)*	-0.628624	0.025462	-24.68844	0.0000

R-squared	1.000000	Mean dependent var	1987.321
Adjusted R-squared	0.999999	S.D. dependent var	10760.28
S.E. of regression	8.124068	Akaike info criterion	7.332789
Sum squared resid	1122.008	Schwarz criterion	8.168535
Log likelihood	-112.9902	Hannan-Quinn criter.	7.624487
Durbin-Watson stat	2.266984		

* p-value incompatible with t-Bounds distribution.

F-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	56.34211	10%	2.08	3
k	5	5%	2.39	3.38
		2.5%	2.7	3.73
		1%	3.06	4.15

Table 4.4 shows the result of the Autoregressive Distributed Lag (ARDL) and Error Correction Regression model. This allows the simultaneous estimation of the short-run and long-run coefficients of the model. With the discovery of long-run relationship among the variables, the study proceeds with estimating ARDL model to investigate the long-run relationship and short-run dynamics among gross domestic product per capita (GDP) (proxy economic growth) and its focus variables which are Agriculture (AGR), Industries (IND), Constructions (CON), Trades (TRD) and Services (SER). The estimation results indicated that the negative coefficient value of Coint Eq(-1)* = -0.628624 with p-value = 0.0000 signifies a long run co-integrating relationship among the variables studied.

4.4 Bound testing

The ARDL Bound test for Co-integration compares the F-statistic value to the upper I(1) and lower I(0) critical bound values as shown in table 4.5, to determine the existence of co-integration among the variables. There exist no presence of co-integration among the variables if the F-statistic is less than the lower critical bound I(0), there is co-integration if the F-statistic value is greater than the upper critical bound I(1) and the result is inconclusive if the F-statistic value falls in between the lower I(0) and upper I(1) bound critical value.

Table 4.5 Bound Test

F-Bounds Test			Null Hypothesis: No levels relationship	
Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	56.34211	10%	2.08	3
k	5	5%	2.39	3.38
		2.5%	2.7	3.73
		1%	3.06	4.15
Actual Sample Size	36		Finite Sample: n=40	
		10%	2.306	3.353
		5%	2.734	3.92
		1%	3.657	5.256
			Finite Sample: n=35	
		10%	2.331	3.417
		5%	2.804	4.013
		1%	3.9	5.419

The result from table 4.5 shows that the F-statistic value = 56.34211 is greater than the upper critical bound value at all the significance levels, and thus, it was concluded that there exists a unique long-run relationship among the variables.

Table 4.6: Johansen test of Cointegration:

Number of equations = 5 Lag order = 1
Exogenous regressor(s): NominalGDP
Log-likelihood = -1263.71 (including constant term: -1374.38)

						Corrected for sample size (df = 32)	
Rank	**Eigenvalue**	**Trace test**	**p-value**	**Max test**	**p-value**	**Trace test**	**p-value**
0	0.99832	319.20	0.0000	249.21	0.0000	319.20	0.0000
1	0.56197	69.982	0.0000	32.193	0.0093	69.982	0.0005
2	0.41713	37.789	0.0043	21.052	0.0497	37.789	0.0084
3	0.29217	16.738	0.0306	13.476	0.0486	16.738	0.0387
4	0.080223	3.2613	0.0709	3.2613	0.0709	3.2613	0.0834

Table 4.6 shows the test of Cointegration. From the table we observed that there exists Cointegration between the endogenous variable (GDP) and the exogenous variables (Agricultural production, Industries, Constructions, Trade and Services). By using the approach presented by Johansen and Juselius (1990), the Max-Eigen and Trace statistic were utilized in evaluating the number of possible cointegrating vectors. The test statistics however validated the null hypothesis of no cointegration at rank 4 in the Trace and Max test. In a nutshell, the co-integration results reveal evidence of cointegrating relationships as shown by the significance of the Trace test and that of Max-Eigen test results at lag 0, 1, 2, 3. While at lag 4 it shows no co-integrating relationship as shown by the non-significance of the Trace test and that of Max-Eigen test result. Thus we conclude based on the presence of cointegration that, there is a long-run relationship among the variables. Thus the study will employ

Table 4.7 Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.428990	Prob. F(2,9)	0.6638
Obs*R-squared	3.133228	Prob. Chi-Square(2)	0.2088

The result from Table 4.7 shows the test of serial correlation of the studied variables using ARDL (4, 3, 3, 2, 3, 4) model. From the table P-value = 0.6638 greater than 0.05 significant value infers that the model is not serially correlated.

Table 4.8 Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.606013	Prob. F(24,11)	0.8527
Obs*R-squared	20.49752	Prob. Chi-Square(24)	0.6682
Scaled explained SS	3.488480	Prob. Chi-Square(24)	1.0000

Null hypothesis: Homoskedasticity present
Alternative hypothesis: Heteroskedasticity present

The Breusch-Pagan-Godfrey test creates a statistic that is Chi-squared distributed. From the table we observed that the probability values associated with the F-statistic (Prob. F (24,11) = 0.8527

and F-statistic = 0.606013) are both greater than the significant value 0.05, this infers not significant. Thus, we fail to reject the null hypothesis and conclude that heteroskedasticity is not present.

4.5 Major Findings

The purpose of this study was to examine the effects of some macroeconomic variables: services, industries, agriculture, constructions and trade, premised on the gross domestic products in Nigeria, from 1981-2019 (38 years) using an ARDL model. Based on the findings, it was found that:

i. construction had negative and significant effect on economic growth in the short-run and a positive and insignificant effect (at other lag 1) on the economic growth in the long-run in Nigeria. More so, coefficient of industry revealed a positive and significant impact on economic growth in the long-run.

ii. The study also revealed a positive and significant effect of services on economic growth in Nigeria on the long-run. Also the coefficient of trade reveals positive and significant effect of trades on economic growth in Nigeria on the long-run.

iii. The result from the graph in figure 1 (Appendix 1) shows the variation in the series. From the graph we observed that there is an upward trend of the studied variables (GDP, Agriculture, Services, Trade and Constructions).

iv. Finally, the study also revealed a positive and significant effect of agriculture on economic growth in Nigeria on the long-run. The finding of this study is in accordance with the findings of Mounir Belloumi (2015), Adenomon M.O (2019), Olumuyiwa Olamade (2021) who investigated the long-run equilibrating relationship between the value-added growth of services and manufacturing, and found that a strong performing services sector has a

large negative impact on manufacturing performance, whereas capital accumulation and income growth have positive effects. Moreover, to achieve an all-inclusive economic growth in Nigeria, policies geared towards the increase in the level of output in other sectors of the economy with a labour intensive technique of agricultural production should be adopted. Policy makers should also focus on maintaining and improving services, industries, constructions and trades.

CHAPTER FIVE

5.0 CONCLUSION AND RECOMMENDATION

5.1 Conclusion

A pre-condition for ARDL modelling was tasted by unit root test using the Kwiatkowski-Phillips-Schmidt Shin test (KPSS) to ensure the time series is stationary. The result showed that the time series variables studied did not attain stationarity at different levels.

The optimal lag length selection for ARDL was estimated. The decision for the selection of the optimal lag length lies on the lag length with the minimum AIC, BIC and HQC value. From the result, the autoregressive distributed lag order of three (3) is selected based on the minimum AIC, BIC and HQC. In addition, the result from Figure 4 was used to select the best ARDL model. It was shown in the graph that ARDL (4,3,3,2,3,4) is the best, since it has the least AIC value. Underlying the result of the ARDL model it was observed that there is a dynamic relationship between GDP with its lagged values (previous values in the time past of GDP) and the studied variables at different lags. From the ARDL model, it was shown that industries and the service sectors seems to be the largest contributing sectors to the economic growth as it was observed from the table that the present and lagged values of industrial and the services sector are all significant. Thus, the economy major growth factor is predominantly powered by personal services and industrial sectors in Nigeria. The result from the Bound test and cointegration test shows that the studied variables (constructions, industries, services, trade and agriculture) have a long run relationship with Nigeria GDP. This research advocate for policy frameworks that support the efficient supply of business services, constructions, industries, trade and agriculture as manufacturing input and a productivity enhancer for the entire economy in Nigeria.

Therefore, we conclude that the use of Autoregressive Distributed Lag (ARDL) in this study is narrative to the subject area in Nigeria. And it reveals the relationship among the variables (constructions, industries, services, trade, agriculture and GDP) under consideration at long-run.

5.3 Recommendation

The study recommends that, there should be an improved policy framework that support the efficient supply of business services, constructions, industries, trade and agriculture as manufacturing input and a productivity enhancer for Nigeria gross domestic product. It also advocates that future researchers should consider the use of ARDL modeling using quarterly or monthly data as more data becomes available.

5.3 Contribution to Knowledge

The study identified that, a lot of studies have looked at the macroeconomic determinant of economic growth, effects of monetary policy on economic growth, monetary policy and economic growth in Nigeria (Adigwe *et al*., 2015; Ismaila and Imoughele 2015; Udeaja and Onyebuchi, 2015). However, there is dearth of research on contributions of real sector to economic growth in Nigeria. In view of above, the research looked at the contribution of real sectors of; Agriculture, Industry, Construction, Trade and Services to economic growth in Nigeria using Autoregressive Distributed Lag Cointegration technique which determine few components of real sector that can bring about greater economic growth in Nigeria. The research was able to show that there is a long-run relationship among the studied variables. The study proceeds with estimating ARDL error correction model. The estimated results identified that the negative coefficient value of Coint Eq (-1)* = -0.628624 with p-value = 0.0000 signifies a long run co-integrating relationship among the

variables studied (gross domestic product per capita (GDP), Agriculture (AGR), Industries (IND), Constructions (CON), Trades (TRD) and Services (SER)).

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APPENDIX: 1

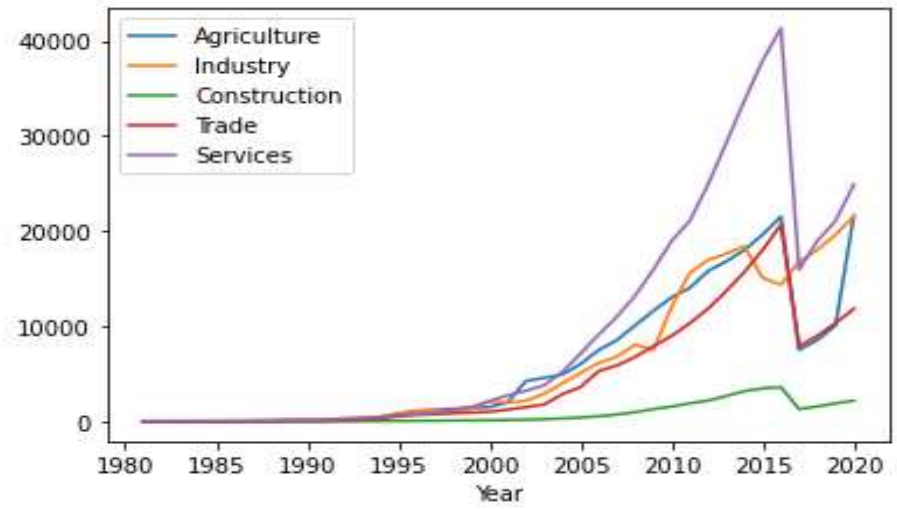

Fig 4.2: Time Plot to Examine the Variation in Agriculture, Industries, Construction, Trade and Services in Relation to Nominal GDP in Nigeria from 1980 – 2020

APPENDIX: 2

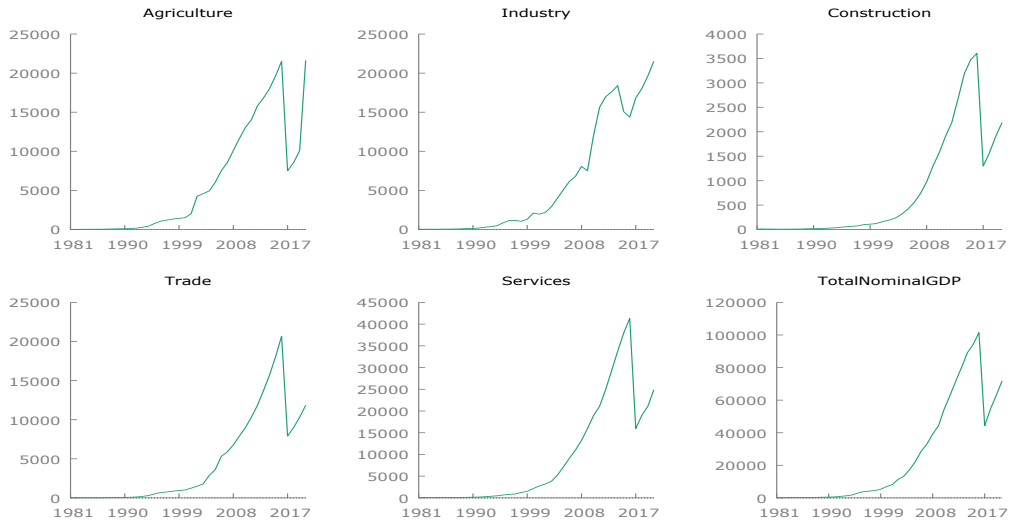

Fig 4.3: Time Series Plot of the six economic variables studied in Nigerian

APPENDIX: 3

Fig 4.4: Time Series Plot of the first Difference of Agricultural production, Industries, Constructions, Trade, Services and Nominal GDP in Nigeria

Levels Equation
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CONSTRUCTION	5.832481	1.175114	4.963332	0.0004
SUM_INDUSTRY	0.072199	0.089722	0.804696	0.4380
SUM_SERVICES	0.446967	0.066586	6.712603	0.0000
TRADE	0.804224	0.076189	10.55566	0.0000
AGRICULTURE	2.217649	0.103857	21.35294	0.0000
C	-29.96239	6.605469	-4.535997	0.0008

EC = TOTAL_NOMINAL_GDP - (5.8325*CONSTRUCTION + 0.0722
*SUM_INDUSTRY + 0.4470*SUM_SERVICES + 0.8042*TRADE + 2.2176
*AGRICULTURE -29.9624)