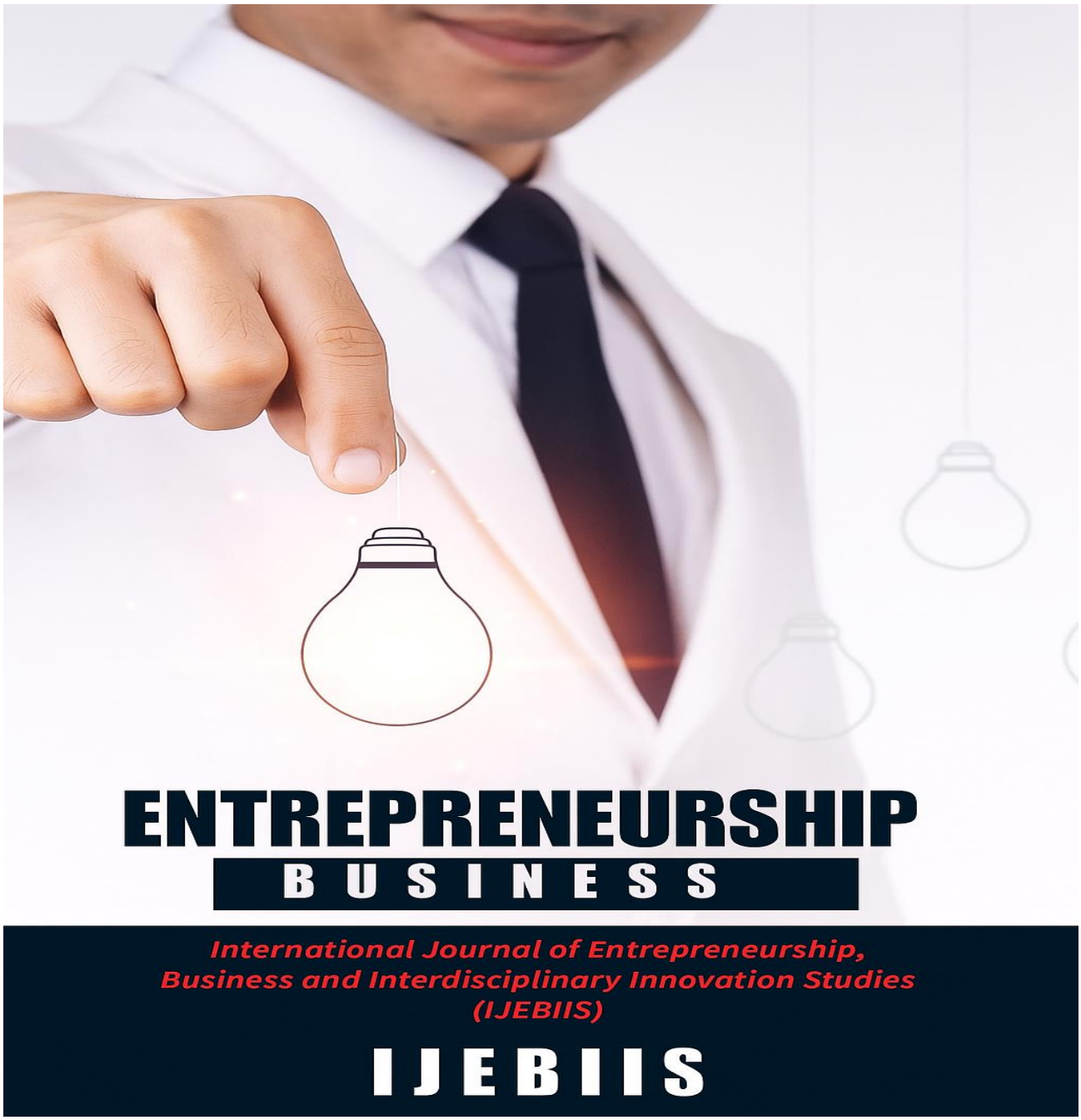

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IMPACT OF EXCHANGE RATE ON MANUFACTURING SECTOR OUTPUT IN NIGERIA: VAR APPROACH

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Abstract

The study examined the impact of exchange rate on manufacturing sector output in Nigeria for the period 1990 to 2024.Data were generated from the database of National Bureau of Statistic (NBS) and Central Bank of Nigeria (CBN) 2024 Statistical Bulletin. The research design adopted was the ex-post facto. The analysis was carried out using Vector Auto regression (VAR) method. Results of the analysis showed that real exchange rate (RER) has positive and significant impact on manufacturing sector output. Nominal exchange rate (NER) also has a positive and significant impact on manufacturing sector output during the period under study. While floating exchange rate (FER) have a positive and insignificant impact on manufacturing sector output (MSO) in Nigeria. The study concluded that the performance of the manufacturing sector output is found to be in great need of reforms and improvement because its contribution to the economic growth in Nigeria is low. Consequently, the study recommended Based on the findings, that Nigeria government should come up with a feasible and regulated real exchange rate policy so that the Naira exchange can be effectively advantageous above any foreign currency. It also recommends that government should adopt realistic approach in management of exchange rate policies in a well monitored way to improve the value of our domestic currency in Nigeria. The study further recommends pragmatic changes in floating exchange rate regulatory framework to focus more on Naira and de-dollarized the economy for the better strive of the Naira. The study therefore recommends generally that the government should focus on placing priority where it's needed by giving subsidies for exchange rate to the manufacturing industries for the betterment of manufacturing sector output in Nigeria.

Keywords: *Exchange Rate, Real Exchange Rate, Manufacturing Sector Output,*

INTRODUCTION

The desire of every developing country like Nigeria is to ensure rapid industrialization. It is logical to say that industrialization if correctly harnessed can transform and stabilize a country structurally. For these developing economics, industrialization is seen as a conscious effort of growing the manufacturing sector of the economy. Hence, industrial reforms and policies are tailored to have a strong impact on manufacturing outputs, Lawal (2016) stated that in Nigeria, the government and economic experts have emphasized the role that industrialization and manufacturing can play in the structural transformation of the economy. The industrial policy for Nigeria launched in 1988 opined that its major goal is to achieve an accelerated pace of industrial development for the nation making the industrial sector the main source of strength for the economy.

The manufacturing sector is an avenue for trade expansion, and it is a vital source of innovation and competitiveness, and it makes outsized contributions to exports and productivity growth. Even though the tertiary sector in most economies is currently dominant as a percentage of the economy and employment creation, most of these economies were built from a strong manufacturing base (Seda, 2020). The manufacturing sector, thus, provides a channel for stimulating the growth of other activities, such as tertiary services, and achieving specific outcomes, such as employment creation and economic empowerment. The manufacturing sector has the highest economic multipliers because of its value addition, linkages to the upstream production sectors of the economy (mining and agriculture) and the downstream service sectors (DTI, 2017).

The development of a viable manufacturing sector is often seen as the key to self-sustaining development through the export of primary products (Schneider, 2000). The manufacturing sector is a very prominent and valuable industry and can contribute immensely to economic growth, job creation and export earnings. It can thus be said that the manufacturing sector is a wealth-producing or wealth-creating sector in the economy. However, it must be noted that for the manufacturing sector to bring positive outcomes, manufacturing firms should adopt strategies that make them competitive. For manufacturing firms to achieve a competitive standing, there must be enabling an environment that gives manufacturing firms a competitive edge both locally and globally.

A strong and healthy manufacturing sector requires a strong and positive approach to bring about an environment conducive for manufacturing investment to grow and create jobs (Manufacturing Circle, 2014). There are several macroeconomic factors that can influence the performance of the manufacturing sector. These include, among other things, the value of the exchange rate. Stats SA(2016) concurs and states that the state of the local and global economy and the exchange rate are some of the factors that are watched closely when assessing the performance of manufacturing production. These include, among other things, the value of the exchange rate.

David et al (2010) held that in macroeconomic management, exchange rate policy as an important tool derives from the fact that changes in the rate of exchange have significant implications for a country's balance of payment position and even its income distribution and growth. A competitive currency is one factor which largely determines the presence and development of the manufacturing sector in any economy. Söderling (2000) concurs and asserts that adequate management of the real exchange rate is a crucial factor for the promotion of manufacturing exports. A competitive exchange rate is an important factor to boost a country's manufacturing sector. In other words, the value of the exchange rate is a contributing factor to the performance of any economy. It plays a significant role in determining the competitiveness of the economy.

Globally, the US exchange rate has had both negative and positive impacts on the manufacturing sector output in the US over the years. Some positive impacts includes that; A weak US dollar makes US exports cheaper and more competitive. A weak dollar also boost the US exports particularly in the aerospace, automotive and agriculture. It also helps with job creation as a result of increased exports and production. Whereas a strong US dollar makes imports more expensive and increases production inputs. It also reduces competition in foreign markets leading to reduced demand (Jiawen 2018).In 2010 – 2012, the US dollar weakened significantly during this period, leading to a surge in US exports and a boost to manufacturing output. In 2014 – 2016, the US dollar strengthened significantly, making the US exports more expensive and leading to reduced demand and lower output. In 2018 – 2019, the US – China trade tensions and tariffs led to a strengthening of the US dollar which negatively impacted US exports and manufacturing output (Martin 2020).

Exchange rate in China has had a significant impact on the manufacturing sector as it made the Chinese exports cheaper and more competitive in the global market, boosting manufacturing output when the Renminbi (RMB) is undervalued. Also, when the RMB is strong, it increases the cost of imports, making it more expensive for the Chinese manufacturers to import raw materials and machinery. Overall, the exchange rate has generally influenced structural adjustments in China's manufacturing sector with industries like textiles benefiting from an undervalued RMB while others like high-tech industries have faced challenges as a result. The Chinese economy also experienced exchange rate volatility which has caused supply chain disruptions, impacting manufacturing output and efficiency. In response to exchange rate fluctuations, the government introduced policies such as managed float regime to minimize the impact on manufacturing output (Richard 2024).

During the 1990s, China had a fixed exchange rate and experienced an undervalued RMB which improved the manufacturing sector leading to an increased export making China the world's factory. In the 2000s, there has been gradual appreciation of the RMB leading to the rapid growth of the manufacturing sector and increase in trade surplus. In 2010, there was introduction of managed float regime which made the RMB appreciates making the manufacturing sector to face many challenges. From 2015-2016, the RMB devalued which made MSO slows down due to economic downturn making the government to implement stimulus packages to boost growth. The RMB gradually stabilizes in 2017 through 2018 till 2019 when China experienced trade tensions with US and COVID-19 leading to depreciation of the RMB (Ping Hua 2020).

The importance of the manufacturing sector is acknowledged by regional bodies such as the Southern African Customs Union (SACU). According to SACU (2019) regional industrialization is expected to lead to the growth of the region's industrial base, creation of employment opportunities for the people of the region, and establishment of sectoral complementarities in production. The Southern African Customs Union (SACU), comprising four small members—Botswana, Lesotho, Namibia, Swaziland (BLNS)—and South Africa, is the world's oldest customs union (it was formed in 1905) and arguably the most successful scheme of regional integration (RI) in sub-Saharan Africa (SSA) Harvey2019).

Research shows that South Africa is operating at 7.4% less of its manufacturing output in 2008 (Head 2018) and manufacturing outlook remains gloomy. In Botswana, the manufacturing sector remains at an "infancy stage", contributing significantly less to the economy, compared to other sectors (Letsididi2014 and Keineetse Motlhanka 2018). In Namibia, the manufacturing sector has seen very little growth over the years and its contribution to GDP has remained stagnant between 1990 and 2015 (Nakale,2015&Nambinga, 2017). Over the past five years, Lesotho's manufacturing sector has been in decline, leading to job losses (UNDP,2017). In Eswatini, economic growth is being dampened by decelerating manufacturing resulting from shrinking external demand, notably an underperforming textile industry and the September 2017 European Free Trade Association ban on selected Eswatini exports (Africa Development Bank, Citation2019). Manufacturing in SACU countries is hampered by similar structural shortcomings such as the exchange rate and other factors (Nambinga, 2017).

Rwanda's exchange rate has had a significant impact on the manufacturing sector output in various ways such as impacting competitiveness. A stable and competitive exchange rate has made Rwandan exports more attractive in the regional and global markets, boosting manufacturing output. Also, A strong Rwandan franc (RWF) has increased the cost of imports, making it more expensive for manufacturers to import raw materials and machinery. Furthermore, Rwanda's manufacturing sector has been driven by export-led growth, and a favorable exchange rate has enabled manufacturers to maintain a competitive edge. A stable exchange rate has attracted foreign investment in the manufacturing sector, boosting output and capacity. Specifically, the RWF has appreciated against the USD from 2010 to 2015, making exports more expensive. It has also depreciated against the USD from 2015 to 2018, making exports cheaper. From 2019 till date, the RWF has stabilized against the USD (kabayiza 2022).

Hence, several fiscal, monetary, exchange rate and commercial policies and measures have been adopted to encourage industrialization within the ambit of available resources. The manufacturing sector plays a catalytic role in a modern economy and has many dynamic benefits crucial for economic transformation. Nelly (2016) and Udude chinyere and Mbam (2018) stress that the manufacturing industry has, traditionally,

been one of the key drivers in most national economies. The DTI (2017) and Bhorat (2017) concur and assert that very few if any cases, anywhere in economic development, which has not been led by manufacturing.

Analysis of Nigeria's exchange rate movement from 1986-2019 showed that there exists a causal relationship between the exchange rate and manufacturing sector. Consequently, the persistent depreciation of the exchange rate trended with GDP. Looking at the trend of the exchange rate, available statistics in CBN (2021) and Ajidani (2021) revealed that foreign exchange rate of naira to a US dollar which stood at ₦1.11 to $1.00 in 1982 persistently fell to ₦720.11 to $1.00 in 2021 (CBN 2021). This has positive impact on the prices of especially imported commodities. In addition, Central Bank reported that imports in Nigeria fell 16% year on year to ₦637.4 Billion in December 2017 (CBN 2021). Imports in Nigeria averaged ₦196,784.42 million between 1981-2007, reaching an all-time high of ₦1,554,732.90 million in 2011 after recorded all-time low of ₦167.88 million in 1984. Similarly, export from Nigeria which stood at ₦322.93 million in 1983 rose continuously to all time high of ₦2,648,881.76 million in 2011. It averaged ₦695,166.47 million during the 1981-2020 central Bank 2021).

The Manufacturers Association of Nigeria (MAN) (2012) in a survey carried out as part of its membership operational audit in January 2010, recorded that of the 2780 registered members, a total of 839 (30.2%) manufacturing firms closed their factories in 2009. This is due to their inability to cope with the challenges posted by the harsh operating environment in Nigeria; which include the exchange rate management problems and infrastructural decay. In the annual report of MAN for 2006, it was also claimed that the job loss in the sector between 1983 and January 2006 was estimated at 4.2 million. In addition, in the Newsletter edition of the Association for March, 2010, it was reported that one million jobs have been lost in the sector between 2006 and 2010.

Several studies like that of Gonenc and Gogruelhave highlighted that product differentiation, wage moderation and productivity gains are important channels in the manufacturing sector through which the industry responds to the competitiveness pressures which are caused by currency movement. Gonenc and Yilmaz (2008) established that

imported inputs costs do act as a natural hedge against exchange rate movement, and this has an effect on competitiveness. This becomes important considering countries like Nigeria greatly rely on imported materials for the production process.

But the Nigerian economy is under-industrialized, and its capacity utilization is also low. This in spite of the fact that manufacturing is the fastest growing sector since 1973/74 (Obaden, 1994). The sector has become increasingly dependent on the external sector for the import of non-labor input (Okigbo, 1973). In the ability to import; therefore, can impact negatively on manufacturing production. Oyejide (1985) posited that the breakdown of the Brelton woods system induce variability in the rate of exchange worldwide, Nigeria inclusive. Umubanwer (1995) has noted that three adverse consequences of this on ability to import. Devaluation which further aggravates the situation has not significantly affected economic performance in the positive direction in Nigeria (Ojo, 1990). The researcher seeks to examine the impact of the exchange rate on manufacturing performance in Nigeria since it has not received adequate attention.

Statement of the Problem

The Exchange rate of the Naira was relatively stable between 1975 and 1979 during the oil boom or (regulatory require). This was also the situation prior to 1990 when agricultural products accounted for more than 70% of the nation's gross domestic product (GDP) (Ewa, 2011:78). However, as a result of the development in the petroleum oil sector in 1970, the share of agriculture in total export declined significantly while that of oil increased. Furthermore, more manufacturing companies are faced with the problem, not recognizing the fact that fluctuation in exchange rate adversely affect output of the manufacturing sector, this is because Nigeria manufacturing sector is highly dependent on import of input and capital goods, this is in spite of the fact that manufacturing sector is the fastest growing sector since 1973 (Obaden, 1994), this sector has become increasingly dependent on the external sector for import of non-labor input. The impact of fluctuation in exchange rate on manufacturing output has not received adequate attention. Instabilities of foreign exchange rate is also a problem to manufacturing sector; however, instability to import therefore can impact negatively on manufacturing production.

Some factors that are responsible for the depreciation of the Nigerian exchange rate include weak production base, import dependent, production structure, fragile export base etc. Another problem that has effect on FER in Nigeria in the recent times has been increasing in spite of terrorist attacks which induce a higher level of insecurity, risks and uncertainty and has negatively affected foreign direct investment, as well as caused lack of domestic production and even exportation of manufactured commodities from the country. There has also been the problem of the collapse of international oil market, which saw Nigeria's foreign exchange earnings significantly fall relative to the imports demand. This has negative implication on Nigeria's FER as the foreign exchange intervention at the prevailing rate would only deplete the foreign reserves. Again, there has been the problem of inadequate public expenditure on industrialization leading to poor or non-existence of manufacturing commodities that can attract foreign buyers. It is in the light of the above problems, that the study seeks to investigate the impact of exchange rate on manufacturing sector output in Nigeria.

Despite efforts made, Nigeria's exchange rate position remains a challenge for the manufacturing sector. The exchange rate has fluctuated significantly over the years, affecting the competitiveness of Nigerian manufacturers. Presently, the Nigerian Naira (NGN) has experienced persistent depreciation against major currencies, particularly the US Dollar (USD). The exchange rate has fluctuated between in recent years, making it difficult for manufacturers to predict and plan.The high exchange rate has increased the cost of imports, including raw materials and machinery, making it challenging for manufacturers to maintain profitability, hence, my motivation for this study.

Objective of the study

The main objective of the study is to investigate how exchange rate impacted on manufacturing sector output from 1990 to 2024.

Literature Review and Theoretical Framework

Concept of Exchange Rate

Mlanbo (2020) conceptualized exchange rate to mean the price of one currency in terms of another. In a broader definition, Ugwu (2017) defined official exchange rate as the rate of exchange as determined by national authorities or to the rate determined in the legally sanctioned exchange market which is calculated as an annual average based on monthly averages.

In the Nigerian perspective, Campbell (2010) conceptualized exchange rate as the units of naira required to purchase a unit of another country's currency e.g. the United States dollar currency. Akinmulégun and Falana (2018) sees exchange rate as a crucial decision-making variable in every nation. This makes it a germane issue for any country which desires economic growth. Exchange rate reflects the strength of a country's currency when put against the currency of another country. This, however, is usually influenced by the interaction of demand and supply in a free market milieu. Monetary authorities of each country control their currency between the fixed and floating exchange rate systems and other regimes such as dual managed. This is done to prevent any currency from floating (Onyeizugbe and Umeagugesi, 2014).

In situations where exchange rate fluctuates, it weakens purchasing power. This in turn have negative impact on importation of inputs. Moreover, changes in industrial output level will also have effect on investment in import of inputs and consistently the exchange rate (Akinmulegun and Falana, 2018),Exchange rate fluctuations have the likelihood of increasing transaction risk and uncertainties (internal and external) and make a country vulnerable to exchange rate related risks. Theoretically, according to Aliyu, Yakub, Sanni, and Duke (2013), it is believed that fluctuation in exchange rate can have a negative or positive effect on output. A negative effect may surge directly from uncertainty and adjustment costs, and indirectly from its impact on resource allocation and government policies. In many developing countries, Nigeria inclusive, the role played by foreign exchange price is of critical significance. This is because it is very much linked to the ability of a country's economy in attaining optimum levels in production operation.

Following the policy change in July 1986, the introduction of structural adjustment programs (SAP) led to the adoption of the flexible exchange rate in place of the fixed exchange rate regime that had previously been practiced. This is because foreign exchange supply was largely subsidized, during the previous regime, through the overvaluation of domestic currency. Hence, the major objective behind the policy was to ensure a relatively cheaper importation cost for industrial raw-material and equipment. This was with hope of sustaining the import substitution industrialization strategy policy (Akinmulegun and Falana, 2018).

Adeniran, Yusuf and Adeyemi, (2014) in their disposition submits that exchange rate fluctuation significantly affects economic performance, because of the effect it usually has on macroeconomic variables like export prices, outputs, interest rate, imports, and inflation rate. The Nigeria government, in recent times, has implemented several strategies with an aim to improve industrial production and capacity utilization. In spite of this fact however, the Nigerian manufacturing sector is still experiencing a decline in output (Enekwe, et al, 201 3).

This unimpressive performance, according to Ogunmuyiwa and Adelowokan (2013), is largely attributed to colossal importation of finished goods which in turn have severe consequence on the country's exchange rate in addition to lacking financial support for industrial activities. This eventually has contributed to reduced capacity utilization in the country. More so, the exchange rate's constant depreciation has resulted in lack of foreign exchange to facilitate the import of the vital inputs for the manufacturing sector. This in turn has result in the burden of high costs of production bore by Nigerian manufacturing firms (Akinmulegun and Falana, 2018). The components of exchange rate include the following:

Concept of Real Exchange Rate (RER)

The real exchange rate of any country measures the competiveness of the country with its trading partners. It is often defined as the nominal exchange rate that takes the inflation differentials among trading partner countries into account (Ahmet and Mehtap, 1997). In view of its impacts on other macroeconomic variables, a number of researchers have investigated the factors that influence the real exchange rates of various countries.

To central banks, the study of real exchange rate is important because of its impact on the bank's balance sheet which also is significant in the central banks' ability to run a viable monetary policy (Arnold, 2004). In the recent past, a number of countries have suffered macroeconomic disruptions as a result of prolonged real exchange rates misalignment, a situation that has also led them to regularly assess the degree of misalignment of their currencies (Hinkle and Montiel, 1999).

The real exchange rate measures the cost of foreign goods relative to domestic goods. It gives a measure of competitiveness, and it is a useful variable for explaining trade behavior and national income. It is thus calculated as a nominal exchange rate adjusted for the different rates of inflation between two currencies. On the other hand, REER reflects on a particular currency's relative value compared to a basket of other currencies that are weighted according to the volume of trade occurring between the countries.

Nominal Exchange Rate (NER) the nominal cxc liange rate is the value that is used when exchanging the currency of a country with the currency of another country. Thus, the Naira value of exchange rate is the value of a Naira currency that is exchanged into other countries' currencies. For example, the Naira exchange rate against the US dollar the Naira exchange rate against the yen and others (Mankiw, 2006).

Concept of Manufacturing Sector Output

The Nigerian manufacturing sector is an economic division that contributes about 10 percent of the country total GDP (Gross Domestic Product) each year (Proshare, 2020). Manufacturing activity in Nigeria is concentrated in large cities like Lagos, Port Harcourt, and Ibadan, in the south of the country. Relatively large number of individuals is involved in the production of consumer products, cement, household goods, building materials, automobiles, agriculture, and mining among others. However the sector is largely dominated by the production of cement and building materials, food, beverages and tobacco; textile, apparel, and footwear; wood and wood products; pulp paper and paper products; chemical and pharmaceutical products; non-metallic products, plastic and rubber products; electrical and electronic, basic metal and iron and steel; motor vehicles and assembly among others (Proshare, 2020).

Among all, three subsectors, namely the food and beverage subsector, the cement subsector and the textile subsector, accounts for 77% of production output in the country coming up with the greatest value alongside breweries and flour mills in the Nigerian manufacturing sector (Proshare, 2020).

As earlier stated, industrial development and manufacturing in Nigeria, historically, has suffered from series of policy inconsistencies and distractions majorly due to the discovery of oil (Mohammed, 2015). Even though there are claims that the sector, in recent years, has been performing well comparatively, it is still obvious that the sector has, for a long time, been constantly faced with numerous challenges chief among which is power supply, deficiencies in the country's physical infrastructure, uncertainties in the cost of importing raw materials due to constantly fluctuating exchange rate among others.

Moreover, recently observed deep disruption in the global supply chain attributable to China's emergence as a major supplier of manufacturing inputs for production companies in Nigeria and around the world, a lot of Nigerian manufacturing companies are currently experiencing acute shortage of raw materials and intermediate inputs (Proshare, 2020). This is because of the high cost of foreign goods resulting from Nigeria's constantly fluctuating exchange rate coupled with [he events that trailed the outbreak of the 2019 corona virus pandemic (Select Global Solutions, 2020). The result of this culminated in shortages in capacity utilization, employment creation, adequate supply of product to the domestic market partly due to increase in cost of majorly imported production inputs prompted by the fluctuating increase in the country's foreign exchange rate. This constitutes a daunting risk to Nigerian manufacturing firms, especially that of increase in operational cost as sales continues to dip following the Nigerian masses' focus on staying alive during these trying times (Proshare, 2020).

Empirical Literature

Pulicherla, (2022) examined the role of the manufacturing sector output in transiting the Indian economy from a self-reliant-based economy to an export-oriented "Make-in-India" economy. Using time series data 1998 to 2020. The study employed ARDL estimation technique and noted that macroeconomic variables, research and development (R&D), and

technology are key to achieving the objectives of the transition policy. Therefore, the study recommended that federal government should increase funding to the manufacturing sector of India to be able to impact positively on the economic growth.

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

Amir, Azam, Syed, and Hinda, (2021) investigated the nexus between exchange rate and manufacturing sector in Malasia economy by using over period of (2001-2021). The study used multiple regression equation in order to explore the causal relationship between exchange rate with interest rate, inflation rate, and MOT. The result showed how these determinants fluctuate exchange rate, inflation differential, and interest rate differential are most important determinants which have major impact on exchange rate and the result is statistically significant in the overall. The study recommends that the regulatory authorities should ensure the sustainability in exchange rate.

Abubakar, (2021) examined the nexus between exchange rate and manufacturing sector of Malasia. Using the ARDL model. From 1989 to 2020. And noted that manufacturing sector responds to both positive and negative oil rent asymmetrically in the long run across all sectors of Malaysia. The study further noted that while the agriculture and transportation sectors respond positively to shocks, the response of manufacturing sector and wholesale was negative. The results of the non-linear autoregressive distributed lag suggest that understanding sectorial variation induced by the role of oil rent shocks on each of the sector is key to formulating an effective diversification policy. The study recommends among others that, there is great need to improve significantly government budget allocation to manufacturing sector. Policy makers are encouraged to develop better monetary frameworks that enhance more funds appropriated to development of the sector.

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

Gaps in the Literature

Available literature reveals that various studies have been conducted on the impact of exchange rate fluctuation on economic growth as a whole and only few studies are on the manufacturing sector in Nigeria. It has been observed that aside Isbor, (2020) who made effort to discuss the implications of exchange rate management on the manufacturing sector output performance in Nigeria, very few studies, has been conducted to check the current impact of exchange rate fluctuations on the performance of Nigerian manufacturing firms given the magnitude of clampdown inflict on the Nigerian economy. These observed shortcomings have created a knowledge gap in the literature.

Theoretical Framework

Optimal Currency Area (OCA) Theory

The Optimal Currency Area (OCA) theory as developed by Mundell (1961) has formed the theoretical groundwork for this study. This theory has been the choice of exchange rate regimes in many countries. The idea revolves round business cycle stabilization and trade. The determination of exchange rate hangs on the concept of trade openness, labour market mobility and symmetry of shock, the theory shows that increase in trade and output can be achieved when there is reduction in exchange rates' uncertainty. It posits that the cost of hedging, in a fixed exchange rate regime, is reduced thereby encouraging investment through the take down of currency premium from interest rates,

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However, due to the delay in the modification of necessary relative prices, reduction in trade can be triggered which in turn, can stopped, delayed or slowed down output growth.

METHODOLOGY

This study adopts ex-post facto method to investigate the impact of Exchange rate on manufacturing sector in Nigeria during the 1990-2024. To this end, the study used secondary source of data on included variables and the method of cointegration analysis based on Vector Autoregression (VAR) techniques to carry out the analysis. The error correction mechanism (ECM) was carried out to check the speed of adjustment of error in the short run and Granger Causality test was employed to determine whether there is causality among the variables. The data used in the study were collected from various sources including Central Bank of Nigeria (CBN) and World Development Indicators (WDI).

Empirical Model Specification

The functional form of the model is informed by prior empirical studies, adopted from the work of Onwuka et alin 2020,examined the impact of currency exchange rate volatility on the manufacturing sector production in Nigeria from 1981 to 2018. His model is stated as:

$Yt = \beta 0 + \beta_i + \beta_2 + \beta_3 + \mu$ ……...(3.1)

MOT = f (MOT, RER, INF, TRD)…… ……(3.2)

The econometric equation takes the following dynamic form:

$MOTt = \beta 0 + \beta 1RERt + \beta 2INFt + \beta 3TRDt + \mu t$…….....…(3.3)

Where:

$\beta ostandsfor$ Intercept, $\beta 1$-$\beta 3$ = Slope parameters or coefficients of the independent variables

MOT = manufacturing output (Proxy for manufacturing sector),

RER= real exchange rate,

INF = inflation rate,

TRD= trade openness,

μt = Error term,

t = time period.

The VAR model is specified as follows;

$X_t = \sum_{i=1}^{n} \beta_i X_{t-i} + \mu_t$ ……(3.4)

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

$MSO_t=\alpha_{10}+\sum_{i=1}^{n}\alpha_{11i}MSO+\sum_{i=1}^{n}\alpha_{12i}RER_{t-i}+\sum_{i=1}^{n}\alpha_{13i}NER_{t-i}\sum_{i=1}^{n}\alpha_{14i}FER_{t-i}+\mu t_1$……(3.5)

$RER_t=\alpha_{20}+\sum_{i=1}^{n}\alpha_{21i}MSO_{t-i}+\sum_{i=1}^{n}\alpha_{22i}RER_{t-i}+\sum_{i=1}^{n}\alpha_{23i}NER_{t-i}+\sum_{i=1}^{n}\alpha_{24i}FER_{t-i}+\mu t_2$...(3.6)

$NER_t=\alpha_{30}+\sum_{i=1}^{n}\alpha_{31i}MSO_{t-i}+\sum_{i=1}^{n}\alpha_{32i}RER_{t-i}+\sum_{i=1}^{n}\alpha_{33i}NER_{t-i}-\sum_{i=1}^{n}\alpha_{34i}FER_{t-i}+\mu_{3t}$……(3.7)

$FER_t=\alpha_{40}+\sum_{i=1}^{n}\alpha_{41i}MSO_{t-i}+\sum_{i=1}^{n}\alpha_{42i}RER+\sum_{i=1}^{n}\alpha_{43i}NER_{t-i}-\sum_{i=1}^{n}\alpha_{44i}FER_{t-i}-+\mu_{4t}$…….(3.8)

In this study, equation 3.4 was modified to suit this study to have the following mathematical and econometric equation:

$MSO = a + \beta_1 RER + \beta_2 NER + \beta_3 FER$. ……(3.9)

Taking logarithms of equation 3.9 gives:

$LnMSO\ \beta_0 + \beta_1 InRER + \beta_2 1n\ NER + \beta_3 ln\ FER + \mu$ ……..…… (3.10)

Where:

MSO= Manufacturing sector output

RER = Real Exchange Rate

NER = Nominal Exchange Rate

FER = Floating Exchange Rate

β_0= Constant term

$\beta 1 + \beta 2 + \beta 3$= Parameters

A-Priori expectation becomes $\beta 1 > + \beta 2 > 0$ and $\beta 3 < 0$

If the p-value is less than 5%, the study should reject the hypothesis otherwise, the hypothesis should be accepted

Empirical Results and Discussion

Table 1: Summary Results of Augmented Dickey-Fuller (ADF) First Difference Test Results

Series	ADF Test Statistics	5% Critical Value	P—Value	Order of Cointegration	Remark	Decision
MSO	-3.576599	-2.957110	0.0121	I(1)	Reject H_0	Stationary
RER	-6.971385	-2.957110	0.0000	I(1)	Reject H_0	Stationary
NER	-4.082085	-2.957110	0.0034	I(1)	Reject H_0	Stationary
FER	-4.022265	-2.957110	0.0040	I(1)	Reject H_0	Stationary

Source: Author's calculation, 2025 using E-views 12.0

NOTE: Test was conducted at 5% Level of Significance

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

Table 2: Johansen co-integration test result

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Val.	Prob.**
None *	0.775015	75.61807	40.17493	0.0000
At most 1 *	0.416929	29.37471	24.27596	0.0105
At most 2 *	0.239127	12.65190	12.32090	0.0440
At most 3 *	0.126142	4.179950	4.129906	0.0485

Trace test indicates 4 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

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

An examination of table 2 showed that the Eigen value statistics shows existence of four unique co-integrating equations between the variables; MSO, RER, NER and FER at 5 percent level. Thus, it can be concluded that there is long-run relationship between exchange rate and manufacturing sector output during the period of 1990-2024 under study. Since there is at four co-integrating equation found in the model, the study concludes that significant long-run relationship exists among the variables. Also, since all the variables were found to be stationary and co-integrated, the study can now perform VAR estimate.

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Table 3: Granger Causality Test Results

Null Hypothesis:	Obs	F-Statistic	Prob.	Decision	Remark
MSO does not Granger Cause FER	32	1.51845	0.2372	Accept H_0	Unidirectional
FER does not Granger Cause MSO		3.44745	0.0464	Reject H_0	
NER does not Granger Cause FER	32	85.9720	2.E-12	Accept H_0	No Causality
FER does not Granger Cause NER		0.05583	0.9458	AcceptH_0	
RER does not Granger Cause FER	32	12.0517	0.0002	Reject H_0	Unidirectional
FER does not Granger Cause RER		0.21806	0.8055	Accept H_0	
NER does not Granger Cause MSO	32	3.18540	0.0573	Accept H_0	No Causality
MSO does not Granger Cause NER		0.75391	0.4802	Accept H_0	

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

The results of granger causality test presented on table 3 reveals that there is causality from (FER) to manufacturing sector output (MSO) since the p-value of floating exchange rate is less than 0.05% we reject H_0 and conclude that there is causality from FER to MSO. The p-value of MSO is greater than 0.05% we accept the H_0 and conclude that there is no causality from MSO to FER. This implies that there is a unidirectional relationship between manufacturing sector output (MSO) and floating exchange rate (FER) in Nigeria. This suggests that, to a large extent floating exchange rate tend to exhibit strong influence manufacturing sector output in Nigeria during the period of the study and not vice versa.

Similarly, it was revealed that there is no causality from nominal exchange rate (NER) to floating exchange rate (FER) since the p-value of nominal exchange rate is greater than 0.05% we accept H_0 and conclude that there is no causality from NER to FER. The p-value of FER is Greater than 0.05% we accept the H_0 and conclude that there is no causality from FER to NER. This implies that there is no relationship between nominal exchange rate (NER) and floating exchange rate (FER) in Nigeria.

Similarly, it was revealed that there is causality from real exchange rate (RER) to floating exchange rate (FER) since the p-value of real exchange rate is less than 0.05% we reject H_0 and conclude that there is causality from RER to FER. The p-value of FER is greater than 0.05% we accept the H_0 and conclude that there is no causality from FER to RER. This implies that there is a unidirectional relationship between real exchange rate (RER) and floating exchange rate (FER) in Nigeria. This suggests that, to a large extent real exchange rate tend to exhibit no influence on floating exchange rate in Nigeria during the period of the

study and not vice versa.

Furthermore, it was revealed that there is no causality from nominal exchange rate (NER) to manufacturing sector output (MSO) since the p-value of nominal exchange rate is greater than 0.05% we accept H_0 and conclude that there is no causality from NER to MSO. The p-value of MSO is greater than 0.05% we accept the H_0 and conclude that there is no causality from MSO to NER. This implies that there is a no causal relationship between nominal exchange rate (NER) and manufacturing sector output (MSO) in Nigeria. This suggests that, to a large extend nominal exchange rate tend to exhibit no influence on manufacturing sector output in Nigeria during the period of the study and vice versa.

Table 4: VAR Regression Results

Vector Autoregression Estimates				
	LMSO	LFER	LNER	LRER
MSO(-1)	6.90492	-0.80176	0.31280	-0.63884
	(0.17748)	(0.00083)	(0.00983)	(0.02231)
	[0.548686]	[0.122052]	[0.038453]	[0.522643]
FER(-1)	34.96097	0.019944	-1.093990	-2.302764
	(43.1283)	(0.20243)	(2.38760)	(5.42170)
	[0.81063]	[0.09852]	[-0.45820]	[-0.42473]
NER(-1)	0.064195	1.000226	1.348039	0.120296
	(4.02138)	(0.01888)	(0.22263)	(0.50553)
	[0.01596]	[0.99009]	[0.05520]	[0.23796]
RER(-1)	1.134651	-0.001057	0.147494	0.757238
	(1.61924)	(0.00760)	(0.08964)	(0.20356)
	[-0.70073]	[-0.13909]	[1.64537]	[0.72004]
C	304.3250	0.210592	-18.81913	47.89691
	(255.863)	(1.20096)	(14.1647)	(32.1649)
	[1.18940]	[0.17535]	[-1.32859]	[1.48911]
R-squared	0.964671	0.993974	0.907339	0.985556
Adj. R-squared	0.952383	0.990627	0.855860	0.977531
Sum sq. resids	0.107201	0.134762	0.076159	0.382197
S.E. equation	0.077173	0.086526	0.065046	0.145716
F-statistic	449.0701	296.9287	17.62557	122.8156
Log likelihood	40.05576	36.73817	45.01314	21.62295
Akaike AIC	-2.003846	-1.775046	-2.345733	-0.732617
Schwarz SC	-1.485216	-1.256417	-1.827104	-0.213988
Mean dependent	5.190590	3.833045	7.795630	4.098821
S.D. dependent	0.979288	0.893730	0.171329	0.972108
Determinant resid covariance (dof adj.)		1.78E-12		
eterminant resid covariance		1.64E-13		
Log likelihood		221.0952		
Akaike information criterion		-11.45484		
Durbin-Watson stat		1.815346		

Source: Author's Computation 2023, using E-view 12.0 version

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

The long-run regression results obtained are interpreted as follows:

$$\mathbf{LMSO_t = 1.18940\beta_{0t-1} + 0.548686MSO_{t-1} + 0.122052LFER_{t-1} + 0.038453LNER_{t-1} + 0.522643LRER_{t-1} + \mu} \quad \mathbf{(4.1)}$$

The results on table 4.5 revealed that manufacturing sector output at lag (-1) shows that MSO exhibit strong endogenous influence from own variable evidence from the coefficient of MSO (0.548686).

A percentage change in the manufacturing sector output is associated with 54.9% increase on the lags of dependent variables in the long run.

$$\mathbf{LFER_t = 0.81063\beta_{0t-1} + 34.96097LMSO_{t-1} + 0.09852LFER_{t-1} - 0.45820LNER_{t-1} - 0.42473LRER_{t-1}} \quad \mathbf{(4.2)}$$

The results on table 4.5 revealed the coefficient (0.09852), of floating exchange rate (FER) at lag (-1) is positive, indicating positive impact between floating exchange rate and Manufacturing sector output (MSO) in Nigeria. This is not in line with the priori expectation. The coefficient of floating exchange rate implies that all things being equal proportionately a unit change in floating exchange rate tend to increase the MSO by 9.9%.

$$\mathbf{LNER_t = 0.064195\beta_{0t-1} + 0.01596LMSO_{t-1} + 0.\ 99009LFER_{t-1} + 0.05520LNER_{t-1} + 0.23796LRER_{t-1}} \quad \mathbf{(4.3)}$$

The coefficient (0.05520) of nominal exchange rate(NER) is positive; implying positive impact between nominal exchange rate and Manufacturing sector output (MSO) in Nigeria and this is in line with the apriori expectation. The coefficient of nominal exchange rateimplies that all things being equal proportionately a unit change in NER tend to increase the MSO by 5.5%, respectively, during the period under review.

$$\mathbf{LRER_t = 1.134651\beta_{0t-1} + 0.183311LMSO_{t-1} - 0.13909LFER_{t-1} + 1.64537LNER_{t-1} + 0.72004LRER_{t-1}} \quad \mathbf{(4.4)}$$

The results on table 4.5 revealed the following findings: real exchange rate (RER) at lag (-1) has positive coefficient (0.780965), indicating positive impact between real exchange rate and Manufacturing sector output (MSO) in Nigeria, and this is in line with the priori expectation. The coefficient of real exchange rate implies that all things being equal proportionately a unit change in RER tend to increase the MSO by 78.1%, respectively, during the period under review.

The adjusted (R^2) = 0.952383 indicates that the R^2 when adjusted for the degree of freedom associated with the sum of squares, the explanatory variables still explain about 95% of the variations in manufacturing sector output in Nigeria.The remaining 5% variations are unexplained due to other factors, which are affecting MSO but not captured in the model or due to the error of measurement (U_i). This is a good fit of the model and shows that the data collected is suitable for manufacturing sector output analysis in Nigeria.

Similarly, the Durbin Watson statistic = 1.815346 which is above its minimum table value of 1.50 provide the evident NOT to reject H_0 and conclude that the model is free of serial (autocorrelation) and can be confidently relied upon for hypotheses testing. This proved that there is absent of negative autocorrelation in the model above.

The coefficient (449.0701) of F-statistic implies that the model explained the included variables by 500% over the period under study. It shows that the model is of good fit.

Summary of Major Findings

The major findings of the study are summarized below:

It was found that real exchange rate (RER) has positive and significant impact on manufacturing sector output in Nigeria evident from the p-value that is less than 0.05% during the period under study. Considering the p-value for the coefficient of RER in table 4.9, which is 0.0049 the study discovered that 0.0049 < 0.05% level of significance.

It was found that nominal exchange rate (NER) has positive and statistically significant impact on manufacturing sector output in Nigeria evident from the p-value that is less than 0.05% during the period under study. Considering the p-value for the coefficient of NER in table 4.9, which is 0.0000 the study discovered that 0.0000 < 0.05% level of significance.

It was found that floating exchange rate (FER) has positive and insignificant impact on manufacturing sector output in Nigeria evident from the p-value that is greater than 0.05% during the period under study. Considering of the p-value for the coefficient of FER in table 4.9, which is 0.0003 the study discovered that 0.4003 > 0.05% level of significance. From the study we can reject the Null Hypotheses that Real and Nominal exchange rate has a significant impact on manufacturing sector while accepting the Null hypotheses that floating

exchange rate has an insignificant impact on manufacturing sector output in Nigeria.

Conclusion and Recommendations

Given the result of the unit root test and the co-integration test, it was revealed that the variables are co integrated. Consequent to the co-integration result, the model was analyzed using the VAR model. Based on the analysis, the long run estimate revealed that real exchange rate, nominal exchange rate, and floating exchange rate had positive impact and Real exchange rate and Nominal exchange rate are both statistically significant while Floating Exchange rate has insignificant impact on manufacturing sector output in Nigeria in the long run. It is important to recognize the critical role played by the government through its foreign exchange polices which has significant implication on Nigeria's economy. The manufacturing sector is expected to be the driving force in Nigeria's industrialization because Nigeria is dependent on its external sector for imports of inputs, hence the reason why exchange rate plays a key variable most especially in the manufacturing sector.

Based on the empirical results of the study, the following recommendations are considered:

i. The study therefore recommends that government should adopt realistic approach in management ofreal exchange rate policies in a well monitored way so as to improve the value of our domestic currency in Nigeria. This implies that the relationship between exchange rates, inflation and manufacturing sector needs to be analyzed to find a suitable approach to ensure a stable and favorable exchange rate.
ii. It also recommends that pragmatic changes in nominal exchange rate regulatory frame work to focus more on Naira and de-dollarized the economy for the better strive of the Naira. By reducing the use of dollar in the country, it will help to strengthen the value of the naira, hence promoting manufacturing sector through increased exports and increased competition.
iii. The study further recommends that the government should focus on placing priority where it's needed by giving subsidies for floating exchange rate to the manufacturing industries for the betterment of manufacturing sector output in Nigeria. here, the government offers financial support to help manufacturers manage risks associated with exchange rate fluctuations. These subsidies can take various forms such as direct grants, tax breaks, low interest loans and insurance schemes.

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