E-ISSN: 1115 - 8530 P-ISSN: 3026-8958
MPRI-JFRBD | INTERNATIONAL JOURNAL OF FINANCIAL RES. AND BUSINESS DEVELOPMENT
VOL. 06 NO. 7 – OCTOBER, 2024

ASSESSING THE IMPACT OF MACROECONOMIC VARIABLES ON MANUFACTURING SECTOR IN WEST AFRICA REGION

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DOI Unique ID: 10.70382/mejfrbd.v6i7.016

Abstract

The West African manufacturing grew immediately after post-independence period, which was largely shaped by state-led and protectionist policies. The structural adjustment reforms of the state-owned enterprises and trade liberalization, along with foreign aid, restarted West African manufacturing in the 1990s. However, the increased competition from foreign products and pressures on its currencies, such as devaluations, made these gains to be short-lived. The study examined the macroeconomic variables and industrial output in West African region using cross session approach between 2008 and 2020. Contribution of industrial output to Gross Domestic Product (GDP), External Debt, Lending Rate and Inflationary Rate were used as variables. It was found that industrial output contribution to GDP estimate shows that there exist an inverse relationship between Industrial output and Lending Rate, Inflationary rate, while Industrial output and External Debt are positively related. It is recommended that a conducive macroeconomic policy should be operated to curb inflationary rate within the country so that raw materials for production would be cheap which will result to a continuous generation of output.

Keywords: Macroeconomic Variables, External Debt, Industrial Output, Lending Rate, Inflationary Rate.

Introduction

Industrialization is an engine of economic growth in developing countries when the most dynamic industries are targeted and investment in skills is undertaken (Tregenna, 2007). The situation is, however, different in developed countries. So, industrial sector mostly referred to as the manufacturing sector is the engine of economic growth. Since manufacturing has the largest multiplier of all sectors of an economy, this calls for a scientific investigation, hence, the need for this study. In the West African sub region the economy is made up of three main sectors; they are the agriculture, the industry and the services sectors.

EDITOR-IN-CHIEF
Prof. R. Rena [South Africa]

In Nigeria for example money supply, Lending rate, inflation rate and exchange rate affect manufacturing sector output. Loto (2012) examined the determinants of output expansion in the Nigerian manufacturing industries between 1980 and 2010. He used the OLS method and discovered that the rate of inflation is critical in explaining manufacturing output expansion in Nigeria. The research found a positive relationship between output expansion and real GDP and per capita real GDP, while gross domestic capital formation, inflation, capacity utilization had a negative influence on output expansion in the manufacturing industry.

In Ghana, the services sector is the engine of the economy based on its contribution to gross domestic product (GDP). In 2013 it contributed about 49.5% of GDP. The question is, why not the manufacturing sector which has been proven to be an engine of growth (Tkalec (2009). The performance of the industrial sector in Ghana (comprising manufacturing, mining and quarrying, utility services and construction) in 2000 was not impressive.

The West African manufacturing grew immediately after post-independence period, which was largely shaped by state-led and protectionist policies, by the mid- 1980s, couple with a series of external shocks such as the oil price increases, commodity price decreases, real interest rate rises, withering public resources, and the limitations of domestic markets which were major factors in industrial decline in the region. The structural adjustment reforms of the state-owned enterprises and trade liberalization, along with foreign aid, restarted West African manufacturing in the 1990s. However, the increased competition from foreign products and pressures on its currencies, such as devaluations, made these gains to be short-lived. By 2006 the share of manufacturing in GDP had declined to roughly 10 percent the same as it had been in the mid-1960s. According to Adegbemi (2018) there is no short run association among manufacturing output and GDP, exchange rate, broad money supply and unemployment rate. Negative relationship existed amongst inflation rate, interest rate, exchange rate, broad money supply on one hand, and manufacturing output. The inflation rate and interest rate were statistically insignificant. The manufacturing sector being one of the traditional sectors that existed in a macroeconomic environment is most likely to be affected by changes in macroeconomic conditions. The aim of this paper is to determine which macroeconomic factors drive industrial output in some selected countries in West African sub region. To be more specific, the study seeks to find answers to the following research questions. To what extent do macroeconomic variables such as external debt, inflationary rate, lending rate influence the industrial output in the West Africa sub region. Hence proffer policy recommendations. The paper is structured into introduction followed by literature review, Challenges of manufacturing industries in West African sub region, Macroeconomic indicators performance in some selected West African countries, research methodology and model specification, regression analysis and lastly will be conclusion and recommendations.

Literature Review

The manufacturing sector being one of the traditional sectors that exist in a macroeconomic environment is most likely to be affected by changes in macroeconomic conditions. According to (Sundararajan, 1987; Schatz, 1964; Diaku, 1972) and many other researchers, macroeconomic conditions can affect manufacturing production either positively or negatively and for that matter policy makers should pay particular attention to macroeconomic changes and how they affect

EDITOR-IN-CHIEF
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manufacturing production. Imoughele (2014) examined the effectiveness of monetary policy on Nigeria's manufacturing sector output. The study covered the period 1986 to 2012. The results indicated that growth in Nigeria's manufacturing sector is highly responsive to exchange rate, external reserve and inflation. A long-run relationship was also found to exist between manufacturing sector output and monetary policy variables. The study also found that the manufacturing sector contribute insignificantly to the Nigeria economy. In this case therefore, the monetary authorities should create and implement monetary policies that favored efficient provider of favourable investment climate by facilitating the emergency of market based interest rate and exchange rate regimes that attract both domestic and foreign investment to the manufacturing industrial sector so that it will encourage them to increase their output.

Odior (2013) opined that credit to the manufacturing sector in the form of loans and advances and foreign direct investment have the capacity to sharply increase the level of manufacturing productivity in Nigeria, while broad money supply had less impact. He recommended that government must create enabling environment for manufacturers in the area of infrastructure, financial, legal, cut margin between lending and deposit rates. However, efforts be made to achieve a more realistic and stable trade balance through liberalization that will guarantee output growth in both the short run and long run. Eze, Onyekachi and Ogiji (2013) identified that government tax revenue had a significant negative impact on manufacturing sector output in Nigeria and that government expenditure appeared to have a significant and positive impact on manufacturing sector output in Nigeria. Charles (2012) investigated the performance of monetary policy on manufacturing sector in Nigeria, using econometrics test procedures. The result indicated that money supply positively affect manufacturing index performance while company lending rate, income tax rate, inflation rate and exchange rate negatively affect the performance of manufacturing sector output in Nigeria. Loto (2012) assert that there exist a positive relationship between output expansion and real GDP and per capita real GDP, while gross domestic capital formation, inflation, capacity utilization had a negative influence on output expansion in the manufacturing industry.

Anaman and Osei-Amponsah (2009), opined that there is a long-run relationship between manufacturing output and the level of per capita real gross domestic product (GDP), the export-import ratio and political stability. In the short run, their study revealed that the level of output of manufacturing was driven by export-import ratio and political stability and thus stressed the importance of the growth of export-based manufacturing firms in stimulating manufacturing output in Ghana. Ahmed (2012) analyzed the drivers of total factor productivity growth in the Malaysian food industries using a parametric statistical method. The analysis found that output growth in Malaysian food industries are affected by individual contribution to capital, labour and materials, as well as the combined contribution of the quality of these inputs expresses as total factor productivity growth (TFPG).

Khan, Imran & Raza (2019) investigate the impact of macroeconomic variables on industrial output: Evidence from Pakistan using the Vector autoregressive VAR model and Vector error correction VEC model find that gross domestic product, inflation, interest rate and exchange rate significantly affect industrial output. Also, Ahmed (2019) examines the impact of macroeconomic variables on industrial output in Pakistan. Using the Vector autoregression (VAR) and Vector error correction

EDITOR-IN-CHIEF
Prof. R. Rena [South Africa]

(VEC) models finds that inflation and exchange rate volatility negatively impacts industrial exports while GDP positively impacts industrial output.

Kumar, Kumar & Kurma (2020) study the macroeconomic determinants of industrial growth in India using a VAR model revals that GDP growth rate, inflation, interest rate, exchange rate and money supply significantly affect industrial output. They conclude that policy makers should focus on maintaining economic stability and promoting export – led growth. Also, Singh, Aggarwal & Sharma (2020) examines the macroeconomic determinants of industrial output in India using VAR model. The analysis reveals that GDP, inflation, interest rate, exchange rate and money supply significantly affect industrial output. Ray (1997) measured Malmquist productivity index for manufacturing sector in the different states in India for the period 1969-84 using a non parametric method of Data Environment Analysis (DEA). The measured Malmquist productivity index is decomposed to separate the contribution of technical change, change in technical efficiency and change in scale efficiency. The analysis depicted that in most of the states productivity decline is due to technical regress. In macroeconomic terms, a strong manufacturing sector provide and improve a country's external account balance by decreasing imports and diversifying exports, so increasing resilience to external shocks as compared to reliance on primary commodities.

Tahma (1997) showed that while productivity growth in the Malaysian manufacturing sector was influenced positively by the rate of growth in output, exports and foreign direct investment, manufacturing sector productivity was negatively influenced by capital intensity. Rahman, Sadekin & Al-Mamun (2018) examines the impact of inflation on industrial output in Bangladesh using VAR model shows that inflation significantly reduces industrial output. They recommended that policy makers should focus on controlling inflation.

Challenges of manufacturing industries in West African sub region

The West African sub region is beseeched with several manufacturing industries challenges that includes;

Lack of infrastructural facilities: The West African region faces an acute infrastructural shortage which includes poor road network, poor communication, energy supply, water availability and other manufacturing logistics which imposes increasing costs of production on companies that resort to generator to run their machines.

***Skills gap*:** Lack of appropriate managerial skills is one of the major constraints West Africa faces arising from low income and lack of adequate resources for investing in human capital. The sub region has few scientists and engineers in sectors that drive economic transformation. Also, inadequate training, and brain drain.

Unfavorable business environment: The business environment needs to be improved considerably. There is much more to do in terms of regulation, multiple taxations, fund for financing, fighting corruption, and securing investments (terrorist, banditry, insecurity and political crisis) that drive away foreign investors.

Limited access to finance: Access to affordable credit is one major challenge West Africa manufacturers face mainly due to information asymmetries for project profitability and lack of collateral or credit history, underdeveloped financial market, low remittances. In the formal sector, micro, small and medium-sized enterprises face a lot of credit gap as loans in West Africa countries

EDITOR-IN-CHIEF
Prof. R. Rena [South Africa]

are majorly short-term. However, when finances do become available through bank loans, the interest rates are excessively very high. At such, a good amount of the profit made by manufacturers is used to pay debts to the banks.

Operations and Management Gap: Aluko (2016) opined that when running a business, you want to do two things – maximize your profit by increasing your revenue and minimizing your costs. To achieve this, a factory has to operate efficiently – maximize its production output and minimize the energy used for production. He further said that processes such as production forecasting, inventory management, and continuous process improvements are some of the practices that are not employed in Nigeria and other African countries.

Poor Distribution network and Logistics: Manufacturers in West Africa do not have well-established distribution channels and usually have difficulty selling their products. However, the retailers in West Africa will sometimes demand that manufacturers pay them ahead of time for raw materials used by the manufacturers thereby discouraging to the SMEs that are just starting their business.

Marketing & Branding: Consumers always see local product as inferior to foreign ones and this has constitute a problem since West African economies are largely import-dependent on manufactured products, ranging from apparel to shoes and electronics and the people that are supposed to be buying the goods do not see the product as standard.

Regulatory framework: Inadequate or inconsistent policies, laws and regulations do not mostly work in the West African countries due to favoritism.

Corruption and Bureaucracy: Complex regulatory environments, bribery and inefficient government processes.

Raw materials and input costs: High cost of inputs, unreliable supply and dependence on imported goods neglecting domestic production.

Country specific challenges are in Nigeria, it is face with security concerns and insurgency which drives away foreign investors. Also, energy sector challenges, foreign exchange fluctuations, high inflation rate. And macroeconomic instability does not give investor confidence. In Ghana, they are face with depreciation of the currency Cedi, high interest rate and energy sector challenges while in Benin, it is face with limited industrial base, dependence on cotton and textile industry and energy sector challenges.

Macroeconomic Indicators Performance in some selected West African countries

Table 1: Average Macroeconomic indicator between 2015 and 2019 for some West African countries

Year	Industrial contribution to GDP in billion	Lending rate in %	Inflation rate in %	Manufacturing value added % of GDP	External debt in billion
Nigeria	44.28	9.81	10.68	10.25	24.69
Ghana	5.32	20.14	14.2	10.04	17.44
B/Faso	1.26	5.58	0.96	10.85	2.62
Benin	1.07	3.52	1.96	10.39	2.04

EDITOR-IN-CHIEF
Prof. R. Rena [South Africa]

Cote d' Voir	4.43	5.32	1.26	11.77	10.40

Source: Authors computation from World development indicator; 2020

From tables 1 above, comparatively, industrial contribution to GDP in Nigeria on average between 2015 and 2019 is $44.26 billion which is higher than the rest countries in West African sub region. It was followed by Ghana with $5.32 billion. The performances of the other countries were not too impressive except for Cote d' Voire which was $4.43 billion. During the same period under review, external debt in Nigeria on the average is $24.69 billion which was also higher than the rest countries and was followed by Ghana with $17.44 billion. This was followed by Cote d' Voire with $10.40 billion.

In the period under review 2015 and 2018, manufacturing value added percentage to GDP was on the average 11.77% in Cote d' Voire which was highest among the countries studied and was followed by Burkina Faso with 10.85% and Benin with 10.39%. Lending rate is highest in Ghana with an average of 20.14% which was extremely high and was followed by Nigeria with 9.81%. Inflation rate on the average in the period under review, Ghana has the highest inflationary rate with 14.2% while Nigeria followed with 10.68%. The other countries inflationary rate were lower.

Research Methodology and Model Specification

The study focused on the macroeconomic variables and industrial output in West African region. The cross section method is used using four countries in West Africa Region including Benin, Burkina Fasso, Cote d' Voire, Ghana, Guinea, Gambia, Guinea Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone, Togo. The secondary data will be obtained from World Bank Development Indicator and World Bank National Account from 2005 to 2017.

The model is specified using Cobb Douglas aggregate production function where output is expressed as a function of capital and technology, thus;

$$Y_t = AK_t^{\alpha}L_t^{1-\alpha} \quad 1.1$$

Where Y is output, A is technological progress which is exogenous and different across countries, K is capital stock and α and 1-α is the share of capital and labour on output.

Technological progress captures other factor inputs other than capital and labour to include, external debt and lending rate.

Given that technological progress evolution is;

$$A_t = A_o e^{\alpha t} \quad 1.2$$

Where A_o represents the initial capital stock and α is effect of growth with respect to other omitted trend variables. Hence, the variables of interest can then enter into the model as a shift parameters through technological progress i.e total factor productivity. This will lead to equation 1.3 below,

$$A_t = A_o e^{gT}\, EXDEBT_t^{\beta 1}, LRATE_t^{\beta 2} \quad 1.3$$

Where EXDEBT is external debt and LRATE captures lending rate.

Transforming and simplifying equation 1.3 above results in a compact form of equation specified as;

$$ICGDP_{it} = \beta_o + \sum_{j=1}^{n} \beta_j ICGDP_{i,t-j} + \beta_{it}X'_{it} + \varepsilon_{it} \quad 1.4$$

EDITOR-IN-CHIEF
Prof. R. Rena [South Africa]

Where; ICGDPit is industrial contribution to gross domestic product, $ICGDP_{i,t-j}$ is lagged of industrial contribution to gross domestic product, X'_{it} is a vector of the explanatory variables, β_o is the overall intercept term, ε is error term, i and t are country index (countries in West African sub region) and time in years (2008 – 2020).

The model is specified based on the literature reviewed above; we adopt the pool least square method. Variable used are Industrial contribution to GDP (ICGDP) which is the dependent variable while External Debt (EXDEBT), Lending rate (LRATE) and Inflationary rate (INFRATE) are the independent variables. The independent variables are to have an inverse relationship with industrial contribution to GDP of the various countries this is because as external debt is increasing there will be fewer funds for investment purpose and this would have the effect of reducing output. Also, if the lending rate is high it become expensive for investors to borrow money to increase output and if the cost of materials used by industries/manufacturers is high, cost of production will increase and thus has the effect of reducing industrial output.

Thus the model is specified as;

$ICGDP_{i,j} = f(EXTDEBT_{i,j}, LRATE_{i,j}, INFRATE_{i,j})$ 1.5

Equation 1.5 shows the functional relationship between Industrial Contribution to Gross domestic product (ICGDP) and External debt, Lending rate and Inflationary rate. The operation form of (1.5) is:

$ICGDP_{i,j} = \alpha_o + \alpha_1 ln EXDEBT_{i,j} + \alpha_2 ln LRATE_{i,j} + \alpha_3 ln INFRATE_{i,j} + U_j$ 1.6

Apriori $a_1, a_2, a_3 < 0$

Where i = cross sections

J = time series

Regression Analysis

Dependent Variable: LOG(ICGDP)
Method: Pooled Least Squares
Date: 02/23/23 Time: 09:01
Sample: 2008 2020
Included observations: 195
Cross-sections included: 4
Total pool (balanced) observations: 780

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	30.71304	0.285306	107.6494	0
LOG(EXDEBT)	0.095617	0.002863	33.39744	0
LOG(LRATE)	-8.5519	0.104326	-81.9727	0
LOG(INFRATE)	-0.30829	0.002204	-139.892	0
R-squared	0.996459	Mean dependent var		6.179957
Adjusted R-squared	0.99641	S.D. dependent var		0.113529
S.E. of regression	0.006803	Akaike info criterion		-7.12501

EDITOR-IN-CHIEF
Prof. R. Rena [South Africa]

Sum squared resid	0.009995	Schwarz criterion		-7.06331
Log likelihood	787.7512	Hannan-Quinn criter.		-7.10009
F-statistic	20260.36	Durbin-Watson stat		3.179423
Prob(F-statistic)	0			

The Pool Least Square (PLS) technique will be used to examine the determinants of industrial output in West African region. Thus, using the absolute values of all the variables, the estimated parameters of the pool regression model estimated shows that there exist an inverse relationship between Industrial contribution to output and Lending Rate, Inflationary rate and so follow our *apriori* expectation because as the cost of raw materials and fund becomes high it will negatively affect industrial output. Also Industrial contribution to output and External Debt are positively related. These estimated results do not follow *apriori* expectation. This is unusual because a country with high external debt profile will have less saving for investment and this would also result to increase in tax to augment the increase debt servicing and will result to investors moving their investment out of the country. The variables are statistically significant. The estimate show that a unit increases in external debt will result to an increase of 0.10 units in industrial output. Also, a unit increase in Lending rate will result to a decrease of 8.55 units in industrial output. Furthermore, a unit increase in inflationary rate will result to a decrease of 0.31 units in industrial output. However, these impacts are significant.

The coefficient of determination is 99.65 which imply that the independent variables (external debt, lending rate and inflationary rate) are able to explain 99.65% variation in the (determinant of industrial output) dependent variable. The D.W value of (3.19) revealed that there is no autocorrelation in the model and so will be relied upon for policy.

Conclusion

The West African manufacturing grew immediately after post-independence period, which was largely shaped by state-led and protectionist policies, by the mid- 1980s, couple with a series of external shocks such as the oil price increases, commodity price decreases, real interest rate rises, withering public resources, and the limitations of domestic markets which were major factors in industrial decline in the region. Macroeconomic conditions can affect manufacturing production either positively or negatively and for that matter policy makers should pay particular attention to macroeconomic changes and how they affect manufacturing production.

Conclusively, it is hope that when these policy measures are taken industrial output will increase and this will impact on the economic growth of the countries.

Recommendation

The West African manufacturing grew immediately after post-independence period, which was largely shaped by state-led and protectionist policies, by the mid- 1980s but this did not last long as the economies were distorted by susceptible international shocks and infrastructural decay which lead to the deterioration and collapse of the industries,

EDITOR-IN-CHIEF
Prof. R. Rena [South Africa]

On this note, policy- makers and the relevant authorities should pay more attention than ever to the issue of industrial output growth in order to stem its counter-productive effects on economic growth. The study recommends a need for change of attitude on the part of those who hold public offices that have access to foreign funds directly or indirectly taking loans since unproductive use of borrowed fund is reflected in embezzlement by political officeholders and subsequently amassing of debt for the country. In this case there should be prudent use of external loans to create investment opportunities for the country. It is of paramount importance for the government to create an enabling business environment and to ensure that lending rate is reduced to a level that will be conducive for investors. A conducive macroeconomic policy is operated to curb inflationary rate within the country so that raw materials for production would be cheap and will result to a continuous generation of output so that the price will be competitive in the international market.

In the foreseeable future, the potential for West Africa's manufacturing sector will be driven by the growing size of its low-cost workforce; its rapidly expanding and urbanizing consumer market; its untapped agricultural and resource endowments; growing economies of scale created by increasing integration of the region; and increasing public spending in education and infrastructure. In order to address the remaining, non-structural constraints that can be improved through political commitment, West African Union member states will have to commit themselves to substantial public investment in infrastructure, specifically a high-speed rail network, oil and gas pipelines, ICT broadband cables, and sea and air ports. All of this is part of the regional project to drive industrialization and to increase intra-African trade.

There should be a need for the diversification of the economy hence development of value chain (e.g textile, agro-processing) through promotion of entrepreneurship and innovation. Addressing these challenges and leveraging opportunities can help West Africa's manufacturing industries grow, become more competitive, and contribute to the region's economic development.

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