

The Determinants of Output Expansion in the Nigerian Manufacturing Industries

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Abstract

The study investigates the determinants of output expansion in the Nigerian manufacturing industries between 1980-2010. OLS method was adopted and important determinants were detected. One of the important findings of the preceding analysis is that inflation rate plays the highest significant role in explaining manufacturing output expansion between 1980 -2010. Any policy measure that can curb inflation will surely increase output. Real GDP and per capita real GDP have positive and significant roles to play in the manufacturing output expansion. The inverse relationship between output expansion and capacity utilization in manufacturing is not surprising. Low demand due to ineffective purchasing power caused by inflation will result into excess capacity. A negative relationship between this variable and manufacturing output expansion is not surprising, simply because, if inflation is growing there will be higher prices which could increase the value of output at the expense of lower capacity and lower demand. The significance of the study lies on the fact that if the determinants of output expansion in the manufacturing industries are known, then, policies could be introduced to take care of them and thereby strengthened the position of the manufacturing sector. This could lead to output expansion and employment generation

Keywords: manufacturing, capacity utilization, labour supply, export, competitiveness

INTRODUCTION

Manufacturing plays a dominant role among other sectors of the economy. It signifies modernization in terms of production and distribution. This singular sector has many dynamic benefits that are crucial for economic transformation. It is one of the sectors where forward and backward linkages can effectively take place. According to Ogwuma (1995), the manufacturing sector has a wider and more effective linkage among different sectors. This sector also create investment capital at a faster rate than any other sector of the economy. In terms of its contribution to GDP, the manufacturing sector is very important.

Early effort in the manufacturing sector were actually oriented towards the adoption of an import substitution strategy in which light industries and assembly related manufacturing ventures were embarked upon by the former colonial masters companies. Being a leading sector in any economy, this position must be maintained. To maintain it will depend on the productivity of this sector, the level of output and its competitive position. The focus of this study is on the determinants of output expansion in the Nigerian manufacturing sector. The objective is to determine those factors that the determine output expansion, whereby improvement could be recommended for greater output in this sector. The whole essence is to promote economic development at national level.

The structural Adjustment Programme (SAP) which was introduced in 1986 by the Nigerian government was partly designed to address some of the problems of the manufacturing sector. The aim was to revitalize the manufacturing sector by shifting emphasis on the domestic sourcing of inputs by this sector. A way of motivating the sector to adopt this strategy, incentives were given to firms that comply. These incentives included monetary and fiscal incentives. Looking at the manufacturing sector over the years, it could be seen that the contribution of the sector in terms of its shares in GDP has been relatively low recording in 1970 (9%) in 1980 (10%) in 1990 (8%) in 1998 (6%) in 2004 (3.7), in 2008 (4.9).The capacity utilization fell below 54% in 2008 and 2010 respectively. (CBN documents).

OBJECTIVE OF THE STUDY

The main objective of this study is to establish those determinants of manufacturing output expansion and also to determine the extent of the impact of each of the determinants of manufacturing output performance.

LITERATURE REVIEW

The importance of manufacturing can be examined from various angles. The Government of Nigeria has in recent years been pursuing several policy initiatives to facilitate the process of industrialization in the country. It is of considerable importance both for the policy makers as well as researchers to take stock of the impact of these policy measures on the

performance of the industrial sector. The dynamics of manufacturing sector can be assessed in terms of its size, composition, contribution and growth. Zaid Bakitt and Debauiya Bhattacharya (1991) stressed that investment; employment and value added are the three critical performance indicators of manufacturing sector.

Papanek (1962) noted that changes in the economic environment would stimulate the successful transfer of Nigerian entrepreneurial talent into a large scale-manufacturing sector. Manufacturing industries have been growing slowly and the value added of Nigerian industries has increased slightly over the years. The contribution of the Nigerian manufacturing sector to gross domestic product is still very insignificant.

One of the main reasons for industrialization is the expansion and generation of employment. According to Olalokun et al (1979), the proportion of labour employed in manufacturing has slowed down greatly. This according to them may be due to the under-utilization of capacity. In the manufacturing industry, the capacity utilization in 1980 was 70.1% and by 2000, it was below 35% (CBN Publication).

Kayode (1987), observed that the industrial sector and in particular, the manufacturing sub-sector is the heart of the economy. He went further to confirm that faulty or poor industrial development policies have long been recognized as major factors that adversely affect the well being and socio-economic improvement of the people in developing countries. He stressed that such policies are the major contributing factors to low value added and low economic growth. Uzaoga (1981) threw more light on the low performance of the manufacturing sector in Nigeria. He noted that Nigeria, being a colony of Britain, has to specialize on the production of raw materials while Britain serves as the main supplier of manufactured goods. According to him, this unfortunate pattern of investment promoted specialized manufacturing based on a static scheme of comparative advantage whereby diversifying the Nigerian economy into activities that offered little opportunity for technical progress. The few industries established depended on foreign inputs. All these distortions according to him affected the performance of the industrial sector in terms of its contribution to the gross domestic product, employment generation; capacity utilization and value added which are indices for measuring the performance of the manufacturing sub-sector.

Investment structure in the manufacturing sector also affected the performance of the sector from the point of view of aggregate investment behavior in the sector. Value added is a crucial indicator in measuring the significance of manufacturing in an economy. Zaid and Debauiya (1991) made us to believe that if

the share of manufacturing in total GDP of an economy is low, the value added will surely correspondingly be very low. Low share according to them is associated with low value added. Industrialization is essential if it is to achieve rapid economic and social development.

Manufacturing in Nigeria, however is still at an infant stage. It accounted for only about 6.18% of the Gross Domestic Products in 1998. The industrial base is small, but there is great scope for expansion. Nigerian Industries are concentrated in light consumer goods. There is hardly any production of capital and intermediate goods. Another feature of the manufacturing sector is its over-dependence on imports for the supply of raw materials and spare parts. There is no single industrial product in which the country is entirely self-sufficient. Nigeria's import bill is dominated by the cost of raw materials and spare parts. This explains why in the 1980's the economic stabilization measures designed to conserve foreign exchange affected industries most adversely. As a result of this, many factories reduced their scale of operations significantly while some closed down completely leading to increase in unemployment rates.

Many literatures confirmed the insignificant nature of the Nigerian manufacturing industries in terms of its contribution to economic development Enisan Akinlo (1996) also confirmed this by saying that the industrial sector of the Nigerian economy was relatively insignificant starting from independence in terms of contribution to the Gross Domestic Product (GDP). Most of the earliest manufacturing industries, established by the colonial trading companies and a handful of other international firms, concentrated on the production of light industrial commodities such as detergents soft drinks, leather work, textiles and confectionery (Olukoshi 1991). He went further to point out that the pre-owned post-colonial production policy caused distortions in the sector, which was as a result of neglecting research and an excessive reliance on foreign input. The manufacturing sub-sector is still characterized by distortions despite the adjustment programme. This needs to be eliminated according to him if the sector is to experience substantial growth. The industrial development survey published by the United Nations pointed out the factors that determine the growth of manufacturing output. These are called growth factors. They include:

1. The growth rate of GDP
2. The growth rate of per capital GDP
3. The level of per capital GDP
4. The growth rate of total export
5. The growth rate of gross capital formation
6. The level of investment.

METHODOLOGY

This study examines the output expansion capacity of the manufacturing sub-sector of the Nigerian economy. The study relies on secondary data from the Federal Office of Statistics (FOS) and Central Bank of Nigeria (CBN) for the period 1980-2010 for analysis. The study is actually concerned with identifying the determinants of the expansion of output in the manufacturing sub-sector as well as assessing their magnitude and relative impact. It is in response to the challenges posed by the country's output expansion problem (capacity under-utilization) that this study attempts a crucial diagnosis of the output expansion capacity of the manufacturing sub-sector of the economy. Determinants of outputs expansion in manufacturing will be identified and the way each of them affects the ability to expand output will be reviewed. The magnitude and relative impact of these factors in determining output in the manufacturing sub-sector would be assessed using econometric analysis.

In analyzing the manufacturing performance, we specified a production function (the linear production function) in which the output level of the manufacturing constitutes the dependent variable. The various factors assumed to influence output expansion in manufacturing were identified and the nature of a prior relationship between each of these factors and increase in output were reviewed. These expected or a prior patterns of relationship constitute the various hypothesis tested.

MODEL SPECIFICATION

Determinants of Manufacturing Performance:

The important factors assumed to affect the expansion of output in the manufacturing sub-sector includes:

1. **Per Capita Level of Real GDP:** if the per capital level of real GDP is high, there is tendency for the purchasing power of the people to increase (i.e. effective demand) if this happens, a high demand for output leads to expansion in order to meet demand, and this will in turn lead to increase in demand of the inputs needed to produce the required increase in output.
2. **Capacity Utilization:** A positive relationship is expected. If there is increase in demand for manufactured goods, the production capacity must be increased to meet the increase in demand and at the same time will increase output.
3. **Rate in Inflation:** a negative relationship is expected. An increase in inflation rate will dampen output expansion, since inflation reduces the purchasing power of the people.
4. **Export of Manufacture:** a positive relationship is expected. Increase in manufacturing exports will generate needed

foreign exchange to pay for imports especially raw material to improve capacity.

5. **Political Stability:** this is a dummy variable that can also affect output expansion. When the country is stable politically, there is tendency for increase in investment especially from outside the country to take place. This will also promote output expansion.
6. **Real GDP:** growth in GDP is associated with efficient performance in manufacturing sub-sector. A positive relationship is expected.
7. **Domestic Capital Formation:** a positive relationship is expected between manufacturing output and domestic capital formation.

In order to assess the relative impact of each of the factors that have been identified to affect output expansion in the manufacturing industry, the techniques of multiple regressions was used. Other tests were also performed, such as unit root, cointegration, and error correction. The whole aim was to bring about stability in the model and also in the results. The model was specified as follow:

$$Y_t = \alpha_0 + \alpha_1 RGGR + \alpha_2 PCGDP + \alpha_3 GDCF + \alpha_4 RIF + \alpha_5 CU + \alpha_6 EXPM + e \quad 2$$

Where

Y_t = manufacturing Output

RGGR = Real GDP Growth Rate

PCGDP = Per Capita Level of Real GDP

GDCF = Gross domestic Capital Formation

RIF = Rate of Inflation

CU = Capacity Utilization

EXPM = Export of Manufactured goods

e = Dummy variable for political stability

The variables were expressed in logarithmic form; such that equation (i) now becomes:

$$\text{Log} Y_t = \alpha_0 + \alpha_1 \log RGGR + \alpha_2 \log PCGDP + \alpha_3 \log GDCF + \alpha_4 \log RIF + \alpha_5 \log CU + \alpha_6 \log EXPM + e \quad (2)$$

EMPIRICAL FINDINGS

Time series data spanning from 1980 – 2010 were used for the regression analysis. The method of analysis was the OLS method. Since in the literature, it has been shown that the regression analysis through OLS could be spurious, it is very important to check the variables used of stationarity. The long-run stability of the variables used was tested by making use of the Unit-root test. The co-integration test was also performed to detect whether the variables moves along the same path in the long-run. The error correction test was also performed to detect the speed of adjustment to equilibrium in the case of sudden shock. All these are presented in tables 1 – 5 below. Equation (2) was used to test for the determinants of output expansion in the Nigerian manufacturing industries between 1980 and 2010.

Dependent Variable (MfgGDP)
Method: Lest Squares
Sample: 1980/2010
Included Observations: 31

Table 1

Variable	Coefficient	Std. Errors	t-statistics	Prob.
C	-5.1659	0.584	-8.8513	0.0000
PCLGDP	0.0124	0.00088	14.1445	0.0000
CU	0.00042	0.0084	0.05013	0.9604
In/ratio	-0.0032	0.00484	-0.6615	0.5146
Mfg Export	0.0118	0.01195	0.99347	0.3304
Real GDP	-0.069	0.01052	-6.5393	0.0000
GFDCE	0.0631	0.0059	10.6933	0.0000
R-Squared	0.98	Mean dependent Variable		5.11
Adjusted R.Sq.	0.97	S.D dependent var		1.63
S. E. of regression	0.43	Akaike info criterion		1.32
Sum of Squared Resid.	1.33	Schwarz Criterion		1.6
Log likelihood	-3.5	F-statistics		155.9
Durbin Watson stat.	2.01	Prob. (f-statistic)		0.0000

The coefficient of the multiple determination stood at 0.98 (98%). This shows that the explanatory variables accounted for 98% of the total change in the dependent variable.

The test for the presence of auto correction that is represented by the Durbin Watson statistics was found to be within the normal bound at 2.01. This result is shown in table one below.

Table 2 presents the results of the unit test.
Unit Root Test

VARIABLE	ADF VALUE AT FIRST DIFFERENCE	MACKINNON CRITICAL VALUE 5%	ORDER OF INTEGRATION
Mfggdp	-4.7662	-2.9705	1
Pclgdp	-8.9249	-2.9665	1
Cu	-4.5803	-2.9665	1
Infrate	-5.3350	-2.9665	1
Mfgexport	-5.2147	-2.9665	1
realgdp	-10.0684	-2.9665	1

After comparing the ADF value against the Mackinnon critical value at 5% and 1% respectively,

Table 4: Unnormalized Co Integrating Coefficients

MFGDP	PCLGDP	CU	INF RATE	MFG EXPORT	REAL GDP	GFDCE
-1.106	0.015	0.006	0.004	0.024	-0.243	0.226
-0.500	0.007	0.022	0.005	-0.005	0.014	-0.024
0.288	-0.006	0.002	0.010	0.032	0.099	-0.074
-0.171	0.002	-0.014	-0.005	0.002	0.071	-0.069
-0.341	0.0009	0.007	0.004	-0.004	0.076	-0.062
-0.736	0.0081	0.19	-0.005	0.027	-0.095	0.100
-0.182	0.0054	0.007	0.004	-0.017	-0.265	0.250

it was confirmed that all the variables were stationary at levels. The test for Johansen cointegration was also performed. These are shown in the tables below.

This test shows that at level, none of the variables was stationary. All the variables became stationary at first difference with real gross domestic product having the highest absolute value.

Since differencing produces stationarity, we conclude that each of the series is integrated of order one (i.e. 1(1)). The study now went further to perform the next operation which is the test of co-integration. This test will be useful in showing whether the time series keeps the same track or whether they could be used together to serve as a meaningful result in the long-run. To perform this test, the Johansen co-integration test developed by Johansen (1987) was proffered in the sense that the Granger procedure could be biased and also, the assumption of arbitrary normalization of the co-integrating vector.

Table 3: Present The Result Of The Johansen Co-Integration Test Series: MFGGDP, PCLGDP, CU, INF, MFG EXP, REAL GDP GFDCE

EIGEN VALUE	LIKELIHOOD RATIO	5% CRITICAL VALUE	HYPOTHESIZED
0.88067	189.6	124	None **
0.81651	128.0	94	At most 1
0.70442	78.7	69	At most 2
0.45473 6	43.4	47	At most 3
0.39950	25.8	30	At most 4
0.30349	11.0	15	At most 5
0.01740 6	0.6	4.	At most 6

*(**) denotes LR test rejection of the hypothesis at 5% significance level.

LR test indicates one co-integrating equation at 5% significance level

Looking at the likelihood ratios as compared to the critical values at 5%, we reject the hypothesis that there is no co-integration vector. The results show that there is at least one co-integrating equation (vector).

As shown in table 3, it is revealed that there is existence of equilibrium condition that keeps the variables in proportion to each other in the long-run.

The error correction result as shown in table 4 below tested the degree of dynamism in the model.

TABLE 5: ERROR CORRECTION MODEL

Dependent Variable: mfggdp; Method: Least Square

Sample Adjusted 1983: 2010; Included observations: 28 after adjusting end points

VARIABLE	COEFFICIENT	STD ERROR	T-STATISTICS	PROBLEM
C	-2.612	0.598	-4.368	0.000
PCLGDP	0.008	0.003	2.728	0.0163
CU	-0.034	0.0192	-1.730	0.106
Infl. Rate	-0.014	0.005	-2.682	0.0179
Export (Mfg)	-0.004	0.015	-0.268	0.793
Real GDP	+0.103	0.029	+3.554	0.329
GFDCE	-0.028	0.053	-0.526	0.607
ECM (-1)	-1.0063	0.3027	-3.32	0.000
R-squared	0.98	Mean dependent variable		7.75
Adjusted R-Sq.	0.97	S. D. dependent variable		1.96
S. I. of regression	0.323	Akaike Inf. Criterion		0.88
Sum Squared resid.	1.464	Schwarz criterion		1.47
Log likelihood	0.508	F-statistic		62.17
Durbin Watson Statistic	2.010	Prob (f-statistic)		0.0000000

The ECM coefficient carries the correct sign and it is also statistically significant, with the speed of convergence to equilibrium of 100% of the past years deviation from equilibrium. This particular adjustment is very crucial for keeping the long-run equilibrium and for reducing the existing disequilibrium over time.

DISCUSSION OF RESULTS

The study modeled the manufacturing industry's by making use of a time series data from 1980 – 2010 to analyze the determinants of output expansion in the manufacturing sector in the Nigerian economy. The result of the regression shows that manufacturing output expansion is positively related to real GDP growth rate and also to the per capita level of real GDP. This association is expected in the sense that if there is increase in real GDP, per capita real GDP will surely increase. If there is increase in per capita real GDP, there is tendency for consumption of manufactured goods to increase which will lead to increase in demand. In order to meet this increase in demand, output must expand.

Manufacturing output expansion is inversely related to Gross domestic capital formation; rate of inflation, capacity utilization, export of manufactured. The results are expected in the sense that if for example, the domestic rate of inflation is increasing, it will reduce the purchasing power of the people. Demand for manufactured will reduce, which will also affect capacity utilization. Domestic capital formation will also be impaired. Based on the magnitude of the coefficient of inflation in the regression equation and

the small standard error of the coefficient, inflation rate is very significant and negative in explaining variations in the manufacturing output expansion. With the positive association of real GDP growth rate to output expansion, a 1% increase in the rate of growth of real GDP will bring about 10.3% increase in manufacturing output. A 1% increase in the rate of growth of per capita real GDP is associated with a 0.8% of increase in the rate of manufacturing output.

RECOMMENDATIONS AND CONCLUSIONS

One of the important findings of the preceding analysis is that inflation rate plays the highest significant role in explaining manufacturing output expansion between 1980 -2010. Any policy measure that can curb inflation will surely increase output. Real GDP and per capita real GDP have positive and significant roles to play in the manufacturing output expansion. The inverse relationship between output expansion and capacity utilization in manufacturing is not surprising. Low demand due to ineffective purchasing power caused by inflation will result into excess capacity. A negative relationship between this variable and manufacturing output expansion is not surprising, simply because, if inflation is growing there will be higher prices which could increase the value of output at the expense of lower capacity and lower demand.

LIMITATION OF THE STUDY

The major limitation of the study is paucity of data. A primary data at firm or industry level would have been ideal. This would have given room to knowing the peculiarities of individual firm or industries.

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