Public Sector Education Investment and Manufacturing Output in Nigeria: Empirics and Policy Options

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Abstract
Given the importance of manufacturing sector as a key driver of economic growth, this paper examines public sector education investment and manufacturing output in Nigeria. The study employed Augmented Dickey Fuller (ADF) unit root test and Ordinary Least Square (OLS) technique to analyse the relationship between public educational spending, primary school enrolment rate, per capita income, exchange rate, foreign direct investment and manufacturing output growth. The study revealed that that public education spending has a positive but insignificant effect on manufacturing output growth in Nigeria. The study recommends among other things, that government should target education spending in ways that favour manufacturing industry growth.
Keywords: Education spending, manufacturing output, economic development
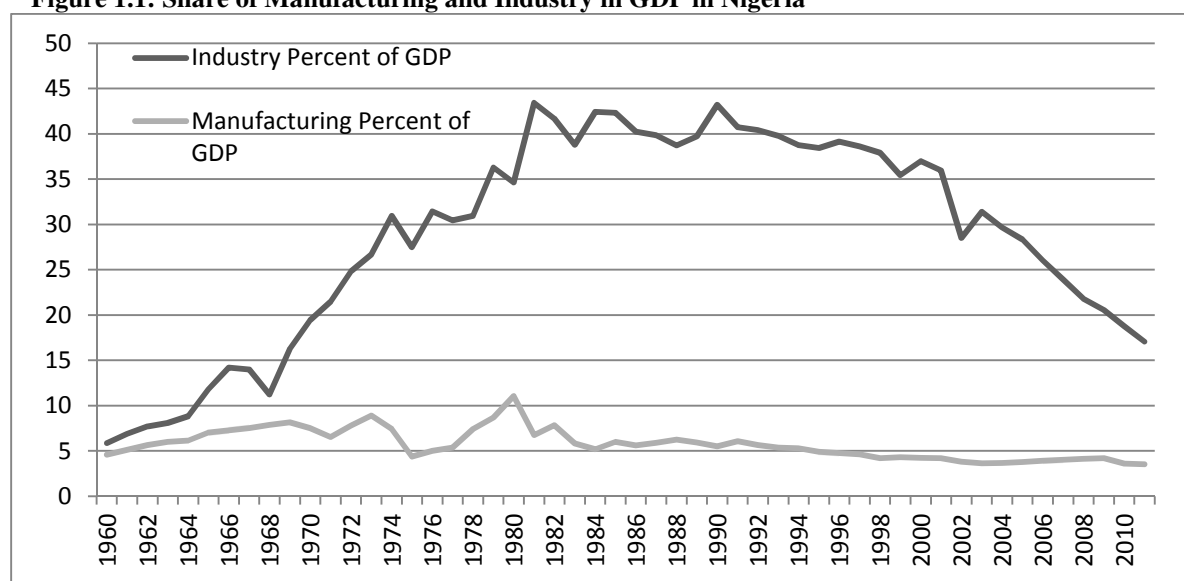
1. Introduction

Education is highly linked with labour productivity and high degree of manufacturing output. The manufacturing outputs of developed nations are far ahead of the developing nations due to the specific attention they pay to their educational sector (Idrees & Siddiqi, 2013). As pointed out by Idrees and Siddiqi (2013), education is a merit good and is considered as a driver of individual and society's well being. Education not only facilitates the adoption of new technology but also helps to develop innovative capacity which results into improved manufacturing output and economic growth of any economy. However, there are great variations across countries in education investment and education outcomes. In terms of the education spending as percentage of gross domestic product, developing countries like Nigeria lag behind the developed ones (Idrees & Siddiqi, 2013). Education expenditures are also very crucial for human capital formation and hence economic growth. It not only raises the demand for education by
lowering the costs of education attainment but also plays an important role in raising its quality. Thus, government education spending is an important determinant of manufacturing output and economic growth of any economy (Idrees & Siddiqi, 2013).

Education has been argued to have positive impacts on the economy and so, investment in education and training is imperative if the aim is to propel the economy to higher level of productivity and income and thereby accelerate the rate of economic growth (Olayemi, 2012). Education increases the number of knowledgeable workers by improving their skills and enabling them to engage in new challenges. In addition, education enhances their occupational mobility, reduces the level of unemployment in the economy, increases the earning capacity and productivity of the country's work force, improves access to health information which will increase life expectancy and, at the same time lower the fertility rate. Therefore, education is capable of enhancing the efficient production of goods and services by ensuring thorough screening that the best people are selected and made available for the world of research (Olayemi, 2012).

Several investigations over time have revealed that adequate investment in human capital serves as catalyst for improved productivity and economic growth (Olayemi, 2012). For instance, Bakare (2006) noted that poor investment in human capital in Nigeria has been found to be consistent with a higher level of illiteracy and a low rate of economic growth. This is particularly worrisome as several questions begging for answers have been raised on the situation such as how the government expenditure on education has impacted on education and if there is any significant relationship between government education expenditure and manufacturing output in Nigeria? In the past, much of the planning in Nigeria was centred on accumulation of physical capital for rapid growth and development without recognizing the important role played by human capital in the development process. Another area of concern as identified by Sanusi (2003) is the effect of low investment in human capital on the competitiveness of Nigerian labour force in the production of goods and services, bearing in mind the fact that low level of skills and knowledge will certainly reduce the quantity and quality of individual output.

The contribution of the manufacturing sector of the economy cannot be overemphasized when considering its role in the process of economic growth and development (Loto, 2012). It is hard for any country to witness significant growth in its economy without a well-developed and dynamic manufacturing sector. Manufacturing sector serves as the vehicle for the production of goods and services, the generation of employment and the enhancement of incomes (Olorunfemi, et al., 2013). Kayode (1989) and Libanio (2006) opine that industry, particularly the manufacturing sector, is the heart and engine of growth of the economy. This assertion is supported by evidence from developed countries as virtually all of them are industrialized with the manufacturing sector leading the process (World Development Indicators, 2014). It should be expected that better education outcome in developing nations, like Nigeria, which could be considered as a reflection of the allocative efficiency of inputs, mainly education spending, would translate to higher technological skills, knowledge transfer and assimilation, as well as increased capability to produce manufactures for domestic, and possibly, international consumption. However, in Nigeria, education spending has slightly increased, literacy level has improved (Ude & Ekesiobi, 2014), yet the share of manufacturing and industry – sectors that are skill and knowledge intensive – in GDP has, contrary to expectation, worsened over time, see figure 1.1 below.

Figure 1.1: Share of Manufacturing and Industry in GDP in Nigeria

Source: World Development Indicators Database

It then follows that over time, despite Nigeria's investment in education, the economy continues to fall deeper in dependence on traditional sectors as the major source of earning and long term means of livelihood. Much of the expectations from education attainment – higher skills, higher productivity levels and increased ability to participate in the modernized economic sector – are seemingly not being achieved, as the share of manufacturing and industry in gross domestic product in the region have declined over time. These are suggestive of at least two crucial points: either better education outcome in Nigeria is not a function of higher education spending, in which case higher public spending in education would imply less allocative efficiency; or that the effect of education spending on education outcome in the country is limited mainly to just learning. This implies that what is learnt does not translate to real economic enterprise or higher productivity in the knowledge intensive sectors.

There is no gainsaying that education is sine qua non for the development of Nigeria. However, there are some debates about how much education spending matters for the achievement of the education goals necessary for the emancipation of the developing nations. The concern on education spending follows from the limited public revenue of developing countries, and the numerous competing ends to which this revenue could be directed. This therefore raises the issue of allocative efficiency in education spending. This allocative efficiency is reflected on the performance of the manufacturing sector which is knowledge based, It then becomes necessary to ask whether higher spending on education in Nigeria is warranted.

The broad objective of this paper is to examine public sector education investment and manufacturing output in Nigeria. In a bid to achieve this, the paper is structured in five sections. Following the introduction is section 2 which focuses on the review of related literature review, section three presents the methods and procedures while the analysis of data and presentation of findings is done in section four. Section five contains policy recommendations and conclusion.

2. Review of Related Literature
2.1. Conceptual Literature Review

Manufacturing is simply defined as the transformation of materials and information into goods for the satisfaction of human needs. Manufacturing is one of the primary wealth-generating activities for any nation around the world (Chryssolouris, 2005). Anyanwu, Oaikhena, Oyefusi and Dimowo (1997) see manufacturing as a sub-set of the industrial sector which involves the conversion of raw materials into finished consumer, intermediate or producer goods. Similarly, manufacturing sector refers to those industries and activities which are involved in the manufacturing and processing of items and indulge in either the creation of new commodities or in value addition (Adebayo, 2011).

Mbelede (2012) adds that manufacturing sector is involved in the process of adding value to raw materials by turning them into products. The final products can either serve as finished goods for sale to consumers for final use or as intermediate goods used in the production process (Falade & Olagbaju, 2015). Activities in the manufacturing sector cover a broad spectrum which includes; agro processing, metal/plastic, ICT/electrical, textile, clothing, footwear, cement and building (Falade & Olagbaju, 2015). These activities contribute to the economy as a whole in terms of output of goods and services, provide a means of reducing income disparities, develop a pool of skilled and semi-skilled labour for the future industrial growth, improve forward and backward linkages within the value chain and between socially and geographically diverse sectors of the country, offer an excellent breeding ground for entrepreneurial and managerial talent and serve as a source of foreign exchange for the economy (Imoughele & Ismaila, 2014).

Government spending or public expenditure or public sector investment on the other hand is the outflow of resources from government to the various sectors of the economy (CBN, 2003). Public expenditure has become an important tool in the stimulation of economic activities. It is majorly concerned with the utilization by government of the nation's resources with regards to the rules, regulations and policies that shape the planning, budgeting, forecasting, coordinating, directing, influencing and governing the inflow and outflow of funds in order to maximize the objective of the institution (Yelwa, Danlami & Obansa, 2014). Sharp and Slunger (1970) as noted in Yelwa et al., (2014) opines that public expenditure deals with government spending and the level of liquidity in the economy in order to achieve some stated objectives. Yelwa et al., (2014) further stressed that the role of public expenditure cannot be overlooked and for a successful operation of the economy, there must be a government spending. Government expenditure which are majorly financed through government revenue, public borrowing, grants and aids refer to the expenses which the government incurs for its own maintenance, for the society and the economy as a whole (Falade & Olagbaju, 2015). It is an important instrument which the government can influence to achieve its macroeconomic objectives. Components of government expenditure include capital expenditure and recurrent expenditure (Mansouri, 2008).

2.2. Theoretical Discussions

a. Musgrave and Rostow theory of public expenditure: Musgrave and Rostow put forward a development model under the causes for growth in public expenditure. They argue that public expenditure is a prerequisite of economic growth. The public sector initially provides economic infrastructure such as roads, railways, water supply and sanitation. As economic growth takes place, the balance of public investment shift towards human capital development through increased spending on education, health and welfare services (Taiwo, 2011 as cited in Edame & Eturoma, 2014). They assume that the state grows like an organism making decision on behalf of the citizens, while society demand for infrastructure facilities such as education, health, electricity, transport etc, grows faster than per capita income.

b. Bowen's Model of Public Expenditure: Bowen (1943) stated that social goods are not equally available to all voters. According to this theory, since social goods are consumed by all individuals in a community, each of them needs to contribute for the social goods. But as Bowen also pointed out, we must in the case of public goods add different individuals' curves vertically. This is so because the capacity to enjoy the social goods is different for different individuals. Since each of the individuals have different valuation of the social goods, it is expected of them to contribute different amounts. Thus, the government will produce an amount of social goods equal to the marginal cost of supplying that good, to be equal to the marginal utilities received by the community (Okeke, 2014).

c. Wagner's law of increasing public expenditure: Wagner's Law is named after the German political economist Adolph Wagner (1835-1917), who developed a "law of increasing state activity" after empirical analysis on Western Europe at the end of the 19th century. The law states that there are inherent tendencies for the activities of different layers of governments to increase both intensively and extensively. It assumes the existence of an economy and the growth of the government activities in which the government sector grows

faster than the economy (Edame & Eturoma, 2014). Wagner (1893) outlined three focal bases for the increased in state expenditure. First, during industrialization process, public sector activity will replace private sector activity. In that case state functions like administrative and protective functions will increase. Second, governments needed to provide cultural and welfare services like education, public health, old age pension or retirement insurance, food subsidy, natural disaster aid, environmental protection programs and other welfare functions. Third, increased industrialization will bring out technological change and large firms that tend to monopolize. Governments will have to offset these effects by providing social and merit goods through budgetary means.

d. Peacock and Wiseman Theory of Public Expenditure: In 1961, Peacock and Wiseman elicited salient shaft of light about the nature of increase in public expenditure based on their study of public expenditure in England (Okeke, 2014). Peacock and Wiseman (1967) suggested that the growth in public expenditure does not occur in the same way that Wagner theorized. Peacock and Wiseman choose the political propositions instead of the organic state where it is deemed that government like to spend money, people do not like increasing taxation and the population voting for ever-increasing social services. This theory deals with the growth of public expenditure. It emphasizes the recurrence of abnormal structures which cause sizable dumps in public expenditure and revenue. Public expenditure should not be expected to increase in a smooth and continuous manner, but in jerks or a stop-like fashion to accommodate special needs, such as natural disaster, war, epidemics etc (Edame & Eturoma, 2014).

e. Human capital investment theory: Becker (1975) developed the human capital investment theory in which he outlined the various interactions paths between income expenditure and human capital development. According to the theory, high income allows people invest more financial resources in the quantity of education. Money can also be used to buy better educational quality, which may affect both current educational performance and future demand for education. Moreover, low income parents might push their children towards work in the labour market in order to contribute to family finances; in the absence of sufficient money transfers from their parents, children from low income families may decide to work while studying (Dustmann & Micklewright, 2001), with possible negative effects on their school performance, or decide to quit education at the minimum leaving age to earn money and finance their own consumption.

2.3. Empirical Literature Review

Corvers (1996) discussed the effects of human capital on both the level and growth of labour productivity in manufacturing sectors in seven member States of the European Union. The study divided the manufacturing into three classes of sectors which are low-skill, medium-skill and high-skill sectors. The estimation results show that both intermediate and highly-skilled labour have a positive effect on the sectoral labour productivity level, although the effect is only significant for highly-skilled labour. Ogujiuba and Adeniyi (2004) examined the impact of government education expenditure on economic growth and their result showed a statistically significant positive relationship between economic growth and recurrent expenditure on education, while capital expenditure is not significant in its contributions. Babatunde and Adefabi (2005) discovered a long run relationship between human capital development and economic growth measured by output per worker. Their result showed that education has a statistically significant positive relationship with economic growth. A study conducted by Lamartina and Zaghini (2007) analysed the joint development of government expenditures and economic growth in 23 OECD countries and their results showed that there is a structural positive correlation between public spending and per capita GDP thereby inferring than an increase in government spending on human capital development is expected to culminate in an increase of per capita output.

Omitogun and Ayinla (2007) attempted to establish whether there is a link between fiscal policy and economic growth in Nigeria and they found that fiscal policy has not been effective in the area of promoting sustainable economic growth in Nigeria. Chih-hung Liu, Hsu and Younis (2008) investigated the relationship between economic growth and public expenditures for US federal government covering the time series data 1974-2002, they found in the study that total expenditure does cause the growth of gross domestic product. Mansouri (2008) looked at the relationship between fiscal policy and economic growth in three North African countries of Egypt, Morocco and Tunisia. The study shows positive correlation between the two variables, and also that 1 percent rise in public expenditure increases the real GDP by 1.26 percent in Morocco, 1.15 percent in Tunisia and 0.56 percent in Egypt. The results also affirmed existence of long-run relationships for all the three countries. Maku (2009) sought to understand the connection between total government spending and economic growth in Nigeria over 30 years (1977-2006). Real GDP was regressed with private investment, human capital investment, government investment and consumption spending. Result showed that human capital investment as a share of real output has positive but statistically insignificant effect on the growth rate of real GDP. Lawanson (2009)

studied human capital investment and economic development in Nigeria. After regressing GDP with related predictors- government expenditure on education, government expenditure on health and the enrolment rates, the paper reported that a clear relationship exists between human capital development and economic growth.

Nurudeen and Usman (2010) analysed the impact of government expenditure on economic growth in Nigeria and found that government total capital expenditure has negative effect on economic growth. Sikiru and Umaru (2011) studied the causal link between fiscal policy and economic growth in Nigeria, using Engle-Granger approach and error correction models and their result indicates that productive expenditure positively impacted on economic growth during the period covered. Mwafaq (2011) investigated the impact of public expenditures on economic growth using time series data on Jordan for the period 1990-2006 and found that government expenditure at the aggregate level has positive impact on the growth of GDP which is attuned with the Keynesian theory. Olayemi (2012) tried to establish the relationship between human capital investment and industrial productivity in Nigeria using secondary data spanned through 1978 to 2008. Co-integration and Error Correction Mechanism (ECM) were employed in the study which found that government expenditure on education maintained a positive long run relationship with index of industrial production while government expenditure on health and gross capital formation exhibited long run negative relationship with the dependent variable.

Hussin, Muhammad, Abu and Razak (2012) focused on the long-run relationship and causality between government education expenditure and economic growth in Malaysia from 1970 to 2010. Employing Vector Auto Regression (VAR) method, findings from their study show that economic growth (GDP) is positively cointegrated with selected variables which are fixed capital formation (CAP), labour force participation (LAB) and government expenditure on education (EDU). The findings of the study proved that human capital such as education variable plays an important role in influencing economic growth in Malaysia. Ishola (2012) examined government expenditure in the manufacturing sector and economic growth in Nigeria using a time series data from 1981 to 2010 sourced from the Central bank of Nigeria. The study found that a significant relationship exist between government expenditure in the manufacturing sector and the economic growth of Nigeria. Idrees and Siddiqi (2013) examined the long-run relationship between public education expenditures and economic growth. They employed heterogeneous panel data analysis and panel unit root tests are applied for checking stationarity. The single-equation approach of panel cointegration and Pedroni's residual-based panel cointegration test was applied to determine the existence of long-run relationship between public education expenditures and gross domestic product and the result indicates that the impact of public education expenditures on economic growth is greater in the case of developing countries as compared to the developed countries.

Eze and Ogiji (2013) examined the impact of fiscal policy on the manufacturing sector output in Nigeria. The study revealed that government expenditure significantly affects manufacturing sector output. The implication of their finding is that if government did not increase public expenditure and its implementation, Nigerian manufacturing sector output will not generate a corresponding increase in the growth of Nigerian economy. Employing three-stage-least square (3SLS) technique and macro-econometric model of simultaneous equations, Onakoya and Somoye (2013) examined the impact of public capital expenditure on economic growth in Nigeria. The study revealed that public capital expenditure contributes positively to economic growth in Nigeria as it promotes the output of oil and infrastructural sectors but it is directly harmful to the output of manufacturing and agricultural sector. Yelwa, Danlami and Obansa (2014) examined the sectorial analysis of public expenditure and economic growth in Nigeria. They employed ordinary least square approach with time series data for the period   1982-2012.
The results shows that agriculture, health, defences, transportation are positive and statistically significant determinants of economic growth in Nigeria while expenditure on education is negative and not significant. Njoku, Okezie and Idika (2014) investigated the relationship between Nigeria's capital expenditure and the growth of the manufacturing sector. The ordinal least square method was used to show the relationship between capital expenditure and manufacturing output. The results suggest that there is a positive relation between rate of growth of GDP, capital expenditure, money supply, openness of the economy, recurrent expenditure and manufacturing output in the country.
Mussagy and Babatunde (2015) focused on the effect of government education expenditure and economic growth in Mozambique using quarterly data. The Johansen cointegration technique was used to examine the long run relationship among the variables and error correction was applied to evaluate the short run adjustment dynamics. The study found out that government expenditure on education in Mozambique was quite low with a weak effect. Falade and Olagbaju (2015) investigated the relationship between government expenditure and manufacturing sector output in Nigeria. Government expenditure is disaggregated into capital and recurrent with a view to analyse the relative effect of these categories of government expenditure with emphasis on the capital

component. They employed time series data from 1970 to 2013 and the study revealed that while government capital expenditure has positive relationship with manufacturing sector output in Nigeria, recurrent expenditure exerts negative effect on manufacturing sector output. Osinowo (2015) investigated the effect of fiscal policy on sectoral output growth in Nigeria for the period of 1970-2013. Employing autoregressive distributed lag and error correction model, the study revealed that total fiscal expenditure have positively contributed to all the sectors output with an exception of agriculture sector, manufacturing sector has a positive relationship with all the determinant variables, while inflation rate has negatively impacted output growth of the various sectors with an exception of manufacturing sector. Uzoka and Eze (undated) investigated the effect of government capital expenditure on the manufacturing sector output in Nigeria. The study indicates long run relationship between dependent and independent variables. It also reveals that capital expenditure on road infrastructure (CEXR) and telecommunication (CEXT) affects the manufacturing sector output in Nigeria significantly while government capital expenditure on power has insignificant effect on manufacturing sector in Nigeria. The implication of this is that manufacturing sector output is clearly affected by factors both exogenous and endogenous to the government capital expenditure in Nigeria.

3. Methodology
3.1. Theoretical Framework
This study adopts the Human capital investment theory of Becker (1975) as framework on which the empirical analysis is based. Becker (1975), in the theory, outlined the various interactions paths between income, expenditure and human capital development. High income is believed to allow people invest more financial resources in the quantity and quality of education. On the other hand, low income might lead to suboptimal investment in education leading to low human capital development. Low income families are believed to have characteristics that may leave children more prone to low educational achievement. Such characteristics would include low parental education or other less easily observed adult heterogeneity, which leads to lower home-based child development. Examples of this are poorer innate ability, a lower emphasis on educational achievement in parenting or a reduced ability to translate parenting time into educational development. Also in this category would be a shock leading to both low attainment and low income, such as a family break-up. In all these scenarios it is not low income itself that causes reduced attainment.

The aspect of this theory that is most relevant to this study is the idea that spending on education affects human capital development, as well as has potential impacts on the income earning ability of individuals. Following this, we would model public education spending on manufacturing output growth in Nigeria to see if the potential benefits of human capital investments are being observed in the sector.

3.2 Model Specification
The study adopts the model of Corvers (1996) with some modifications and specify manufacturing sector output as a function of public education spending as a percentage of GDP, GDP per capita, primary school enrolment rate, exchange rate and foreign direct investment. Consequently, the following model is specified to examine the effect of public educational spending on manufacturing sector output in Nigeria.

$$MSO = f(PEX, PSE, PCI, EXR, FDI) \qquad \dots\dots\dots\dots\dots\dots\dots (1)$$

Where,

MSO is manufacturing output growth

PEX is public educational spending as a percentage of GDP

PSE is primary school enrolment rate

PCI is GDP per capita

EXR is exchange rate, and

FDI is foreign Direct Investment.

Assuming a linear relationship amongst the above variables, model 1 can be re-specified in the estimable form below:

$$MSO_t = \alpha_0 + \alpha_1 PEX_t + \alpha_2 PSE_t + \alpha_3 PCI_t + \alpha_4 EXR_t + \alpha_5 FDI_t + U_t \qquad \dots\dots (2)$$

Where t represent the time periods over them which data is collected for the country, and U represent the error term.

3.3. Justification of Variables of the Model
As stated earlier, equation 2 is informed by earlier work of Covers (1996) with some modifications. In the following paragraph, a briefly explanation is presented on how each of the explanatory variables interacts with the dependent variable.

Manufacturing sector output is given as a function of public education spending as a percentage of GDP, GDP per capita, primary school enrolment rate, exchange rate and foreign direct investment. Following the endogenous growth theory, since human capital is an input in the production process, an increase in education spending which raises education outcome (human capital) would also have an effect on manufacturing growth, since the manufacturing sector largely is human capital intensive. More so, rising GDP per capita means rising

standard of living and also possibly a rise in savings and consumption. This higher income levels again could enable higher investment in both human and physical capital which could raise manufacturing sector dynamism. Exchange rate and FDI are the channels through which external forces influence manufacturing in the economy. Depreciation of the currency for instance could either trigger rising inflation in an economy (if the economy is largely import-dependent) or stimulate export of manufactures (since domestically manufactured goods would become relatively cheaper for foreign nations). The converse also holds true when exchange appreciates. This potential stimulating or dampening impact of exchange rate on manufacturing sector justifies its inclusion in the model. Finally, FDI is always seen as a driver of national manufacturing capabilities. It could lead to quick technology transfer, and also allows nations to take advantage of other nations expertise in raising its manufacturing output. Thus higher FDI inflow is often associated with higher manufacturing sector.

A Priori Expectations

This shows the theorized relationship between the modelled regressors and regressand. It also serves as a basis for evaluating our estimated model to ensure conformity with economic theory. Table 3.1 below shows the a priori expectations for the variables in the model earlier specified.

Table 3.1: A priori Expectations

Regressand	Regressor	Relationship
MSO	PEX	+
MSO	PSE	+
MSO	PCI	+
MSO	EXR	+
MSO	FDI	+

Source: Authors Computations

3.4. Data Sources

Time series data over the period 1970 to 2013 is used for analysis in this study. All data used are obtained from the World Bank's World Development Indicators database, and the central bank of Nigeria statistical bulletin

3.5. Method of Data Analysis

Augmented Dickey Fuller (ADF) unit root test and Ordinary Least Square (OLS) technique are employed to estimate the model of the study. The choice of OLS is mainly because it minimizes the error sum of squares and has a number of advantages such as unbiasedness, consistency, minimum variance and efficiency. On the other hand, ADF test is applied to ensure that the time series data used in the analysis have constant mean and variance. The motivation is to hedge against spurious regression that may result from applying OLS to non-stationary time series data. Also, the ADF test addresses a shortcoming of the Dickey Fuller test – its lack of consideration of autocorrelation in the error term – by adding lagged difference terms, thereby correcting for serial correlation.

Furthermore, before estimation the model is subjected to multicolinearity test. After estimation, the model is subjected to tests of heteroskedasticity and autocorrelation described in the next section. Both tests are crucial so as to prevent either serial correlation or heteroskedasticity from biasing the standard errors on which inferential decisions are based. Evidence of either heteroskedasticity or autocorrelation in the model will warrant re-estimating the model by the Newey-West method, which produces Heteroskedastic and Autocorrelation Consistent (HAC) standard errors.

3.6. Methods for Evaluation of Results

An evaluation of the model consists of deciding whether the estimated co-efficient are theoretically meaningful and statistically satisfactory. For this study there is need for all results to satisfy both statistical criteria (first order test) and econometric criteria (Second order test).

4. Data Analyses and Presentation of Findings

We begin with the result of the stationarity tests, since empirical analysis based on time series data would be biased if the underlying data are nonstationary. As noted earlier, the test used for observing the stationarity of the time series data used for analysis in this study is the Augmented Dickey-Fuller (ADF) test. The results are summarized in table 4.1 below.

Table 4.1: Summary of Stationarity Tests

Variable	ADF statistic	Level of Sig	Lagged diff	Critical Values	Order of Integration
PEX	-7.454	1%	3	-3.648	0
PSE	-3.120	5%	1	-2.955	1
PCI	-5.726	1%	1	-3.628	0
EXR	-4.019	1%	1	-3.641	1
FDI	-6.071	1%	1	-3.641	1
MSO	-5.069	1%	3	-3.662	1

Source: Authors Computations

Before conducting the ADF tests summarized in the table 4.1, tests for determining the number of lags to be included in the ADF test were carried out. The selection order criteria used for these tests are the Akaike Information Criteria (AIC) and the Schwarz-Bayesian Information Criteria (SBIC). The appropriate lags suggested by these tests are reported for each variable in the fourth column of table 4.1. The importance of choosing an optimal lag for the ADF test is to prevent the test result from being biased by correlation of the residuals.

From the table, it is observed that public education expenditure (PEX) and Per capita income growth (PCI) are both stationary at level. The implication is that for the subsequent analysis, these variables would not be differenced. All the other variables in the models of the study are not stationary at level, as can be seen from the table. However, after first differencing these variables become stationary. Aside primary school enrolment (PSE) which is stationary after first differencing at 5 per cent level of significance, all other variables are stationary at the 1 per cent level of significance. Following this result, all the variables would be applied in the model at their stationary orders, i.e., first differenced stationary variables would be introduced into the model after first differencing, while level stationary variables would be introduced into the model without differencing.

4.1. Estimated Model

The model of the study is estimated in line with the OLS method, as noted in section three. Before the estimation, the model was tested for multicolinearity, since in the presence of multicolinearity, OLS estimates tend to be biased. This study relied on pairwise correlation analysis of the respective variables in the model to judge the presence or otherwise of multicolinearity in the model. The summary of the multicolinearity tests is presented in tables 4.2

Table 4.2: Multicolinearity test for the Model

```
               |     D.                  D.                  D.         D.
               |    mso       pex       pse       pci       exr       fdi
---------------+------------------------------------------------------------------
           mso |
           D1. |  1.0000
           pex | -0.0844    1.0000
           pse |
           D1. | -0.0922    0.2577    1.0000
           pci |  0.4709   -0.1972   -0.2003    1.0000
           exr |
           D1. | -0.0578   -0.1365    0.2488   -0.0715    1.0000
           fdi |
           D1. | -0.1243    0.0177    0.0166   -0.1289    0.0368    1.0000
```

Source: Stata Output

Evident in the above table is that none of the correlation coefficients are beyond 0.61. Usually, concerns of multicolinearity arise when the correlation amongst regressors are up to around 0.7. We do not observe such high correlation in our model. Thus we can proceed to fit the specified models using OLS.

Table 4.3: Estimated Model

Variables	Dependent Variable: Manufacturing value added
Public Education spending	0.0243 (0.655)
Primary School enrolment	0.00591 (0.768)
Per capita income	0.000783** (0.0228)
Exchange rate	-0.00338 (0.454)
Foreign direct investment	0.0677 (0.487)
Constant	-0.874* (0.0738)
Observations	43
R-squared	0.513
F-statisitc	2.607 (0.0814)*
Durbin Watson Statistic	2.02
Heteroskedasticity test	0.04 (0.838)

Note: Robust p-values in parentheses *** $p<0.01$, ** $p<0.05$, * $p<0.1$
Source: Regression output

The coefficient of determination for the fitted model has a value of 0.513 as shown in table 4.3. This suggests that the estimated model explains about 51.3 per cent of the variation in manufacturing value added in Nigeria. The F-statistic for this model is 2.607, with a p-value of 0.0814. This F-statistic is significant, implying that the regressors in the model collectively have significant impacts on manufacturing value added in Nigeria. The Durbin Watson statistic for this model is 2.02. Since this statistic is approximately 2, we conclude that there is no problem of autocorrelation in the estimated model. More so, going by the result of the Breusch-Pagan Lagrange multiplier test for heteroskedasticity, we do not find evidence of heteroskedasticity in this model. The statistic for this test is 0.04, and the p-value is 0.838. Since this p-value is greater than the 5 percent and 10 per cent conventional significance levels, we do not reject null hypothesis that residuals of this model have constant variance. The variables of the model also met their respective a priori expectations aside exchange rate. Public education expenditure, primary school enrolment, FDI, per capita income and exchange rate are all expected to have positive impact on manufacturing growth in Nigeria. The estimated coefficients are positive for all these variables except exchange rate. Again, this does not present a problem, as this variable is not found to be significant in the model.

4.2. Discussion of Findings

From our findings above, the positive effect of government education spending does not end just in higher enrolment rate. Government education spending also has positive effects on manufacturing output growth. Although this effect is not significant, it suggests that indeed there are reasons to support more funding for human capital development in Nigeria. The intuition behind this is that when government spending makes it possible for people to attend schools, these people also acquire skills that make them more productive in the economy. They contribute to value creation in various sectors of the economy. Even if they are not employed directly in the manufacturing sector, through value chain linkages, their contribution to other sectors, say agriculture, eventually finds its way to the manufacturing industry thus contributing to the higher value creation in that sector.

More so, the need to encourage government spending on education in the light of this finding follows from Nigeria's quest for economic diversification. Diversification requires a workforce that is able to produce quality goods. The ability to produce quality and competitive goods requires skills. Skills do not fall from heaven. They are acquired either in specialized schools or through training. It therefore becomes evident that the quest for economic diversification in Nigeria suggests the need to invest more in education. By so doing, the non-significant effect of education spending on manufacturing value added in Nigeria may overtime become significant. This nonetheless requires that public spending on education be well targeted. There may be need to not just build new schools and employ teachers, but to build specialized training schools and centres that impart skills that can readily be applied to certain manufacturing industries. This would also require complementary spending on other aspects of the economy such as infrastructure which is believed to strongly hold back

manufacturing sector growth in Nigeria, due to the high cost of doing business associated with decrepit infrastructure level.

Other factors found to have positive effect on manufacturing sector growth in Nigeria include Primary school enrolment, Per capita income and foreign direct investment. Of these variables, only per capita income is significant. The implication is that as Nigeria is moving from a lower middle income country to high middle income country, the nation's manufacturing industry is also being positively affected by this income growth. An explanation for this is the bias the investing community has for large markets. As the living standards of Nigerians rise, investors find it viable to invest in Nigeria, due to her large market and increasing economic fortune.

In summary, it is noteworthy to point out that there is some form of synchronicity between government spending, better education outcome and manufacturing sector growth in Nigeria. Higher government spending improves education outcome. Higher education outcome on the other hand, together with higher government spending, improves manufacturing sector growth.

5. Recommendations and Conclusion

In the light of above findings, the following recommendations are derived. Government should target education spending in ways that favour manufacturing industry growth; this is very important because in Nigeria people tend to be biased towards finding jobs in this sector of the economy. This can be corrected by some re-orientation and establishment of vocational centres and specialized schools that would impart skills that are readily applicable in the manufacturing industry. Again, this requires appraisal to determine what kind of skills has the highest pay off for Nigeria, given her existing comparative advantage in production of goods and services. In addition, government should make concerted efforts to address the issues of corruption, inefficiency and wastages. There should be effective channelling of public funds in line with global best practices to the provision of infrastructure especially education, health, power, transportation and defence that enhance welfare and productive activities.

Finally, the findings of this study show that both education spending and primary school enrolments have positive effects on manufacturing value added growth. Some suggestions on the foregoing have been put forward, which if adhered to, have the potential of deepening the effect of government spending on education outcome for the better in Nigeria. It also has the potential of making school enrolment and education spending more beneficial to manufacturing industry growth in Nigeria.

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