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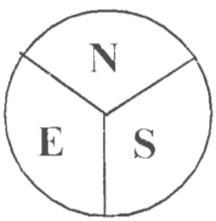
Challenges of Nigerian Industrialization: A Pathway To Nigeria Becoming A Highly Industrialized Country In The Year 2015

SELECTED PAPERS FOR THE 2004 ANNUAL CONFERENCE

The Challenges of Industrialization:

A Pathway to Nigeria Becoming a Highly Industrialized Country in the Year 2015



Selected Papers for the 2004 Annual Conference of the Nigerian Economic Society

CONTENTS

9

Exploring Globalization-Industrialization Nexus for Economic Development: A Case of Nigeria

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ABSTRACT

In the light of the wind of globalization blowing across the globe, several countries have embraced globalization policies. Since globalization connotes a nexus of relations, the expected overall effect of its policies is to boost economic growth and development, thereby improving welfare. Upon the recent World Bank report proclaiming the

manufacturing sector as the most dynamic component of the industrial sector, this study examines the globalization-industrialization nexus by focusing on the manufacturing sector in Nigeria. In establishing the globalization-industrialization nexus in Nigeria, the augmented Solow model was adopted and annual data covering 1970-2001 were employed. This study finds that openness to trade and increased Information and Communication Technology (ICT) has significantly influenced the level of manufacturing output in Nigeria. In fact, technology and degree of openness were found to have positive impact on aggregate manufacturing output. The policy implication of this study is that the degree of openness and adoption of globalization, ceteris paribus, could stimulate manufacturing production. This study also notes that sound policies that promote technical capacities or specific knowledge and outward trade relations between countries, need to be adopted to enhance the competitiveness of Nigeria's manufactured exports in the world market.

1. Introduction

DEVELOPMENT economists have greatly emphasized industrialization as a *sine qua non* for breaking the vicious circle of poverty and the realization of a dynamic and self-reliant economy. Thus, in developing countries, Nigeria inclusive, industrial policy has been accorded a prominent position among the list of economic policies aimed at the structural transformation of an economy, such as a shift from agriculture to manufacturing.

As Thirlwall (1979) observes, the attached importance to industrialization in developing countries could be ascribed to two

reasons. First, there is the view that a close relationship exists between industrialization and real income per head on the one hand, and between the growth of industry and the growth of output in these countries on the other. A second explanation for greater emphasis on industrialization is that it is believed that the faster the growth in the industrial sector, the higher the rate of transfer of surplus labour from other sectors of the economy.

Moreover, industrialization as Yesufu (1996) noted, has been a central economic policy that has been pursued in the Nigerian economy since the attainment of political independence. The author maintains that in developing countries the word "industry" is used essentially as a synonym for manufacturing industry. As such, industrialization "is the process of accelerated institutionalization of the manufacturing process or techniques in an otherwise predominantly rural and technological backward economy".

In considering the importance of the manufacturing sector in Nigeria, the first, second, third and, in particular, the fourth national development plan (1981-85) strongly emphasized industrialization in form of manufacturing and craft activities. The various industrial development policies, perspective plans and the medium-term economic plan identified the position of the manufacturing sector in the economy. Manufacturing, as stated in the Fourth National Development Plan, is capable of sustaining a minimum growth rate of 15 per cent per annum, contributes over 7 per cent to the gross domestic product (GDP), promotes employment and enhances the value of natural resources to mention but a few.

The need for further intensification of manufacturing production as a catalyst for growth and development in the Nigerian economy is further strengthened by the World Bank Report (1985) that identifies the manufacturing sector as the most dynamic component of the industrial sector. For instance, if the manufacturing industry is operating below capacity, the performance of the electricity industry as well as other industries that depend on this sector will be

affected. It is also observed from a sample of different economies with different per capita incomes that countries with the highest per capita incomes are those in which their industrial sector accounted for the highest percentage of GDP.

Although industrialization (with special emphasis on manufacturing) is vital in the process of economic development, the experience in Nigeria is not quite impressive. Two main strategies have been put in place to correct this anomaly. The first is the import substitution strategy while the second is the export promotion strategy. The second strategy, which has been in vogue since the adoption of the Structural adjustment programme (SAP) in Nigeria in 1986, emphasized the promotion of value-added non-oil exports, especially manufactures, and has not actually achieved significant result (Uniamikogbo 1996).

Towards the end of the last century and the tail end of the second millennium, the drumbeat of globalization became deafening worldwide. If the term, at a given point in history, became the order of the day, it is nothing but a continuous historical process in which capitalism through variety of ways has engulfed the whole universe, including the so-called third world.

According to Bourouch[1], globalization simply connotes the "historical process of the internationalization of manufacturing, trade and services led by transnational corporations. It is a process driven by the pursuit of cheaper labour, raw materials and less government regulation." The avenues to globalization undoubtedly include international trade, capital flows, advances in telecommunication and transportation, etc. This consists in demystifying our traditional ways of producing goods and services to make us the latest consumerist society. In this respect, the role of international capitalism in the industrialization process of the LDCs cannot be overemphasized. The structure and mode of operation of the various international finance institutions in second half of the last century are eloquent testimonies to this.

Indeed, the developed economies have been constantly involved in the development process of the LDCs. In this regard, the role of international capitalism in the industrialization of these countries is made pervasive.

From the foregoing, it is pertinent to review the issue of Nigeria's industrialization vis-à-vis the phenomenon of globalization. Nigeria is increasingly launching herself into the globalization train in the expectation of addressing the current economic problems of unemployment, price instability, balance of payments disequilibrium, poverty and income inequality, to mention a few. Thus far, public enterprises are being privatized. In addition, deregulation of the key sector of the economy, and financial and trade liberalization are means of adapting to globalization to "find a place in the new global system". However, internationalization of the Nigerian economy can only be meaningful if it is supported by a solid and sound industrial sector, which can only be achieved through sound policy formulation and implementation.

In this paper, we opine that the issue of industrialization is no longer a controversy between the "free-traders" and the "interventionist" nor between the import substitution industrialization and outward looking strategies. It is that of realizing that no nation can survive on its own. The challenge is, therefore, that of objectively analysing our macroeconomic strength and identifying our weaknesses with a view to optimizing available opportunities given the existing and foreseeable threats. This is the way to the new drive towards industrialization and the maximization of social welfare function.

Consequently, this paper goes beyond reviewing the performance of the manufacturing sector or the advantages and disadvantages of globalization. We identify the major measures or indices of globalization that have greater implications for the growth and development of the manufacturing sector and, consequently, the industrialization of Nigeria.

Therefore, in this paper, we examine the link between globalization and industrialization, exploring the explanatory and predictive power of the main national and international macroeconomic variables. We shall focus our analysis on the manufacturing sector, which, according to Egbon (1995), "is the most favoured sector in the Nigeria economy, especially as the main instrument of rapid growth, structural change and self-sufficiency". Specifically, the study seeks to establish the relationship between degree of openness, increased volume of trade, better advances in technology and greater inflow of direct foreign investment on manufacturing output in Nigeria. Given this objective, the rest of the paper is organized as follows: Section 2 examines the performance of the manufacturing sector in Nigeria. In section 3, a review of relevant literature on the globalization-growth nexus is carried out. The theoretical framework and the model for this study are examined in section 4 while section 5 deals with data analysis and discussions. Section 6 concludes the study.

2. Industrialization in Nigeria: The Manufacturing Industry Perspective

In the light of the great expectation from industrialization, manufacturing has been mostly favoured in the blueprint of various industrial policies that have been put in place so far in Nigeria. Industrial policies are geared towards improving the economic performance of individual agents, firms and industries on the supply-side of the economy (Egbon 1995). However, in the face of these policies, the performance of the manufacturing sector has not been impressive.

Table 1 presents the various indices that measure the performance of the manufacturing industry in Nigeria. It is apparent that the average capacity utilization for the manufacturing industry in 1975 was 76.6 per cent. In the 1980s, the average capacity utilization fell from 70.1 per cent in 1980 to 43.8 per cent in 1989. The capacity utilization of the manufacturing industry further dwindled in the

1990s and ranged between 29.3 per cent and 42.0 per cent; while 36.1 and 39.6 per cent were recorded in 2000 and 2001, respectively.

With respect to the output of the manufacturing industry, measured by the index of manufacturing production, Table 1 shows that, using 1985 as the base, manufacturing production increased from 1970 to 1982. This is indicated by the increase in the index of manufacturing production from 24.1 per cent in 1970 to 128.6 per cent in 1982. A decline in manufacturing production was, however, witnessed from 1983 to 1984. During this period, the index of manufacturing production was only 94.8 per cent in 1983 and 83.4 per cent in 1984. This decline could be attributed to the downturn of the Nigerian economy, resulting from the collapse of the international oil market in the 1980s. In the wake of the adoption of SAP in 1986, manufacturing production increased as indicated by the movement in the index of manufacturing production, which stood at 130.8 per cent in 1987 and reached a peak of 182.7 per cent in 1992. Since 1992, the manufacturing production has not been steady; this is indicated by the index of manufacturing production which ranges between 133.1 per cent (in 1998) to 145.5 per cent (in 1993). Between 2000 and 2001, manufacturing production witnessed only marginal increase. The index of manufacturing production, in this period stood at 138.2 per cent and 142.2 per cent, respectively

Another indicator of the performance of manufacturing industry is its share in the gross domestic product, which was 7.2 per cent in 1970. It fell to 5.2 per cent in 1975 before increasing gradually to 11.2 per cent in 1982. Following the depressing state of the economy in the 1980s, manufacturing share in the GDP fell and remained in the range of 7.8 to 8.4 per cent. With the unsteady growth in manufacturing production since 1992, the contribution of the manufacturing industry to the GDP fell. For instance, between 1993 and 2001, it ranged between 3.4 and 7.2 per cent. This is a strong indication that the manufacturing industry in Nigeria has been dwindling.

Table 1. Selected Indices of the Manufacturing Sector in Nigeria

Year	Average Capacity Utilization in Manufacturing	Index of Manufacturing Production (1985=100)	Index of Industrial Production (1985=100)	Share of Manufacturing in GDP (%)
1970	85.2	24.1	41.3	7.2
1975	76.6	43.9	71.8	5.6
1980	70.1	102.4	119.0	8.1
1981	73.3	117.3	115.6	9.9
1982	63.6	128.6	122.9	11.2
1983	49.7	94.8	96.4	8.4
1984	43.0	83.4	91.6	7.8
1985	38.3	100.0	100.0	8.6
1986	38.8	78.2	103.5	8.0
1987	40.4	130.8	122.1	8.4
1988	42.4	135.2	108.8	8.7
1989	43.8	154.3	125.0	8.2
1990	40.3	162.9	130.6	8.2
1991	42.0	178.1	138.8	8.3
1992	38.1	182.7	136.2	7.9
1993	37.2	145.5	131.7	7.3
1994	30.4	144.2	129.2	7.2
1995	29.3	136.3	128.8	6.6
1996	32.5	138.7	132.5	6.5
1997	30.4	138.5	140.6	6.3
1998	32.4	133.1	133.9	5.9
1999	34.6	137.7	129.1	6.0
2000	36.1	138.2	138.9	5.9
2001	39.6	142.2	143.5	3.4

Source: CBN. *Statistical Bulletin* (various issues).

Table 2. Structure of Employment in the Manufacturing Sector

Year	No. Employed in Manufacturing Sector	Index
1970	129032	28.4
1975	244243	53.8
1980	453632	100.0
1982	357164	78.7
1984	344609	76.0
1985	335179	73.9
1986	n.a	n.a
1987	n.a	n.a
1988	26601	5.9
1989	27102	6.0
1990	25900	5.7
1991	27130	6.0
1992	20153	4.4

Sources: Federal Office of Statistics *Annual Abstract of Statistics and Industrial Survey of Nigeria* (various issues).

One of the crucial drives for industrial policy in Nigeria is derived from the notion that the growth of industries would provide the avenue for employment of labour, thereby reducing poverty to the lowest level. In assessing the performance of the manufacturing sector in this direction, Table 2 shows the number of people employed in the manufacturing industry from 1970-1992. It can be observed that the number of people employed in this subsector increased in 1975 when compared to the 1970 level. This is evident from the index of the number of people employed, which rose from 28.4 per cent in 1970 to 53.8 per cent in 1975. As from 1982, the rate of employment in manufacturing dwindled. The index of the number of people employed in this subsector was 78.7 per cent in 1982 but fell to

73.9 per cent in 1985. From 1988 to 1992, the number of people employed in the manufacturing industry in Nigeria further reduced drastically. This is indicated by the index of the number of people employed, which remained in the neighbourhood of 4.4 per cent to 5.9 per cent using 1980 as a base.

Table 3. Distribution of the Labour Force in the Industrial Sector

Year	Total Labour Force (in million)	% of Labour Force in Manuf. Industry (million)	% of Labour Force in Mining & Quarrying (million)	% of Labour Force in Electricity (million)
1977	30.5	16.8	–	–
1980	32.2	17.0	0.4	0.2
1981	33.2	17.3	0.4	0.2
1982	24.0	17.7	0.4	0.2
1983	34.9	18.0	0.4	0.2
1984	35.5	18.1	0.5	0.2
1985	36.1	18.2	0.4	0.2
1986	37.2	13.6	0.4	0.6
1987	38.4	10.3	0.5	1.2
1988	39.3	10.5	0.5	1.3
1991	43.7	25.8	0.1	0.4

Sources: National Population Commission 1991. Federal Office of Statistics, *Economic & Social Statistics Bulletin*. 1988.

With respect to the sectoral distribution of the labour force, Table 3 shows that the percentage of labour force engaged in manufacturing, increased marginally from 16.8 per cent in 1977 to 18.2 per cent in 1985. However, the percentage of labour force in manufacturing diminished greatly in the 1990s. The beauty of Table 3 is that it further shows that the manufacturing sector provides the greatest avenue for the employment of the labour force relative to the electricity and the mining subsectors of the industrial sector in Nigeria.

The analysis conducted so far indicates that the manufacturing sector in Nigeria has not actually improved in the light of the various industrial policies that have been adopted. It, therefore, implies that policies that are more vibrant are needed to transform the industry from its present state to be able to contribute substantially to the growth and development of the Nigerian economy.

3. Literature Review: Globalization-Growth Nexus

One major implication of the new globalization strategy is that no single nation can survive on its own without collaborating with other nations of the world. This is necessitated by the growing integration of national economies through trade in goods and services, financial transactions and movement of human capital. This intensification of international competition reduces national sovereignty and the ability of national government to deal with major domestic economic issues without recourse to international institutions.

Consequently, whatever the objective of the government, which includes reducing unemployment, curtailing inflation, promoting economic growth and ensuring balance of payments equilibrium or industrialization, nations have to give serious considerations to international macroeconomics.

In this study, our major concern is to examine the implications of globalization for economic development through industrialization. In this context, it is our view that globalization provides the enabling environment for industrialization, the latter being a desired goal in ensuring greater welfare for the country.

Globalization is the increasing interaction and integration of the economic activities of human societies around the world. The process of globalization seeks to integrate national economies through trade, capital flows, and harmonization of economic rules governing sovereign nations, creation of structures to support and facilitate dependence, and creation of a global market place.

In the literature, the process of globalization has been conceptualized as embracing a nexus of relation. It is believed that free trade and interaction among global economies will push economies towards higher levels of performance and growth in output. The basic link is that openness and trade liberalization encourage the inflows of foreign direct investment (FDI), transfer of technology, increase in productivity, international competitiveness, and efficiency in domestic production. Following this argument, Sachs and Warner (1995) observe that countries that were open grew at a rate of 4.5 per cent annually in the 1970s and 1980s while countries that were closed barely managed to grow at a rate of 0.7 per cent. As the World Bank (1992) observes, the global integration of markets could turn developing countries with labour cost advantages into low-cost suppliers of certain manufactured products. This, in fact, happened in the case of East Asia in the 1980s as evidenced by the phenomenal growth in its labour intensive manufactures, which include clothing, footwear, and furniture.

Globalization, as Daouas (2001) observes, is multidimensional, affecting all aspects of life-economic, cultural, environmental and social – as well as relations between governments and nations on the five continents. Levine et al. (1992) and Xavier, Sala-i-Martin (1997) further confirm the positive relationship between openness to trade (brought about by globalization) and economic growth. According to them, international trade is just one of the two variables that consistently explain growth. This means that a significant relationship exists between globalization and economic growth. Moreover, in an attempt to investigate the authenticity of earlier findings, Edwards (1998) using 10 different definition of openness in his study found that international trade and economic growth are positively related.

With respect to developing countries, it has been greatly emphasized that one of the main reasons why growth has eluded them is their failure to embrace the wave of globalization blowing across

countries. Ajayi (2001), therefore, maintains that the overriding reasons why many analysts advocated African's greater integration with the global economy are poor overall economic performance and advantages that could be derived from globalization. According to Ajayi, the appeal for a more open economy is based on a single but powerful premise: economic integration will improve economic performance and offer new opportunities (such as expanded market and the acquisition of new technologies and ideas). In assessing how developing countries fare in the light of globalization, Phasad et al. (2003) found that the average income per capita for some developing countries that are more financially open grows at a higher rate than that of other less financially opened economies. The basic issue, however, about this finding is whether this study reflects a causal relationship or a mere correlation which is robust enough to control for other factors.

Uwatt (2003) further examines the link between globalization and growth using panel data for 41 African countries over 1980-1999. His study finds a mixed result and suggests that African countries have to brace-up to the challenges of globalization by embarking on policies that promote increased trade and capital flows to the region. With respect to Nigeria, Ndiyo and Ebong (2003) empirically investigated the dynamic influence of trade openness, FDI and other macroeconomic influence on growth. Using VARs model, the study revealed a negative influence of openness, exchange rate, fiscal deficit, average world prices and balance of payments disequilibria on economic growth in Nigeria. The result further confirmed that external reserves, net foreign indebtedness and FDI exerted positive impact on growth during the period under study.

The motivation for this study is to investigate the relationship between various indices of globalization, such as degree of openness, volume of trade, inflow of direct investment, and technological innovation, on the growth of the manufacturing sector in Nigeria. This exercise becomes crucial in an attempt to provide insight into

the policy measures that could mitigate the existing ailment of this crucial sector of the economy.

4. Theoretical Framework and the Model

4.1 Theoretical Framework

Developing countries have attached great importance to industrialization as a catalyst in the growth process. This association, as Thirwall (1979) notes is due to technical progress which appears to be more rapid in industry as well as greater economies of scale arising from higher income elasticity of demand for industrial goods both domestically and internationally. The author also maintains that the way industry develops in different countries is a function of several factors. These include resource endowments, transport costs and degree of contact with outside world.

The main implication of the above exposition is that one expects a systematic link between industrial growth and the globalization indices. These include foreign trade (FT), degree of openness (OPN), foreign direct investment (FDI), information and communication technology (ICT), and migration of labour. Needless to restate, globalization is rooted in neoclassical doctrine of laissez-faire, no government intervention, and deregulation of all markets according to World Trade Organization (WTO) and other international multilateral organizations documents.

Let us assume a simple neoclassical Solow (1957) growth model which has become a benchmark framework for analysing long-run evolution of the macroeconomy. The basic Solow model describes a closed economy and consists of two equations as follows:

$$Y_t = f(A_t, K_t, L_t) \quad \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots (1)$$

where equation (1) describes the relationship between aggregate output, Y_t, and aggregate inputs: capital, K_t, labour, L_t, and where A_t represents the " effectiveness of labour"; and

$$\dot{K}_t = sY_t - \delta K_t \quad \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \quad (2)$$

Equation (2) is the law of motion of capital where $\dot{K}_t$ is the rate of growth of capital stock as a function of time, s is the proportion of output that is saved, and ä denotes the physical depreciation rate. The main assumption of the model is that the production function exhibits constant returns to scale. The second assumption is that technical progress represented by increments in A_t is considered to be labour augmenting (Harrod neutral) . Third, labour grows exponentially.

The above model can be represented in an intensive form as follows. Suppose the production function is of the Cobb-Douglas (CD) form, then:

$$Y_t = AK_t^{\alpha} L_t^{\beta} \quad \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \quad \ldots(3)$$

where α and β are capital and labour share in output respectively. By dividing equation (3) by L, the intensive form of the equation becomes:

$$y_t = Ak_t^{\alpha} \quad \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \quad (4)$$

where y_t is the output per worker and k_t is capital per worker and such that the "inada conditions" are satisfied. That is:

$$f(0) = 0, \quad f'(k) > 0, \quad f''(k) < 0 \quad \ldots \ldots \ldots \ldots \ldots \ldots \ldots \quad (5)$$

and

$$\lim_{k \to 0} (f'(k) = \infty \quad and \quad \lim_{k \to \infty} f'(k) = 0$$

The predictions of the Solow model are such that (i) the economy will move towards a steady-state equilibrium; (ii) there will be no growth in output or the capital stock when the economy reaches its steady state; (iii) when the economy moves from one steady state to another, medium-term growth in per capita output and the per capita stock will occur; and (iv) the transition from the steady state to another generates only medium-term growth, not permanent growth.

On the other aspect, this paper considers the augmented Solow model by including in the explanatory variables, factors that engender globalization. This made new variables to be included in equation (1). In this respect, we viewed international trade as an important factor for the effectiveness of globalization by encouraging freer movement of goods and services among nations as predicted by the comparative advantage doctrine.

Foreign trade (FT) promotes international specialization in the production of goods and services by exploiting increasing returns to scale to a greater degree. The latter enables countries to concentrate on doing what they can do best and allows producers to operate on a larger scale, thus reducing unit costs. The welfare of residents of participating countries in such exchange increases, particularly with the lower unit costs it engenders and increased variety of goods available for consumptions (Appleyard and Field 1998).

4.2 The model

Having looked at the theoretical underpinnings of the globalization-industrialization nexus, our task in this section is to construct a model relating the various variables identified as key factors within the context of globalization and industrialization.

Our model is centered on the manufacturing sector of the Nigerian economy. The need for this was explained in the introductory section. In general, industrialization has to do with production of goods and services in larger quantities and better

quality than before. Thus, the origin of our model to explain the relationship between globalization and industrialization is rooted in growth models.

From equation (3) we can estimate the growth rate of Y as:

$$r_Y = r_A + \alpha r_K + (1-\alpha) r_L \quad \ldots \quad (6)$$

Assuming the total factor productivity, A, grows at the rate ø, then equation (6) can be rewritten as

$$r_Y = \psi + \alpha r_K + (1-\alpha) r_L \quad \ldots \quad (7)$$

Equation (7) is usually referred to as source-of-growth equation (Berg 2001). It shows that the rate of growth of output is the weighted average of the growth rates of productivity of factors plus the rate of growth of total factor productivity, A. Where A represents technology with which we can convert inputs to output. In addition á and (1- α) represent shares of total output due to capital and labour respectively.

We can re-express equation (7) such that

$$\psi = r_Y - \alpha r_K - (1-\alpha) r_L \quad \ldots \quad (8)$$

This expresses rate of growth of technology as the rate of growth of real output less a weighted average of the rate of growth of the capital and the rate of growth of labour. The equation shows that technological progress is the part of economic growth not explained by the growth of the factors of production.

Many researchers have pointed out the possibility of incorporating additional explanatory variables in the classical Solow Model in other to capture the causes of economic growth. In particular, Mankiw, Romer and Weil (1992) alluded to this possibility, where it makes sense. In this paper, we formulate an augmented Solow model by hypothesizing an aggregate production

function in the manufacturing sector given by:

$$Q_{m(t)} = f(K_t, L_t, OPN_t, FDI_t, ICT; Z_t) \quad \ldots \ldots \ldots \ldots \ldots \ldots \ldots \quad (9)$$

where

$Q_{m(t)}$ = output of the manufacturing sector;

K_t = capital stock in the economy;

L_t = labour in the economy

OPN_t = degree of openness measured as the share of trade to GDP;

FDI_t = foreign direct investment;

ICT = information, communication and technology;

Z_t = other variables not explicitly included in the model.

or in its implicit form as:

$$Q_{m(t)} = K_t^{\alpha_1} L_t^{\alpha_2} OPN_t^{\alpha_3} FDI_t^{\alpha_4} ICT_t^{\alpha_5} v_t$$

$$v_t \sim N(0, \sigma^2) \quad \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \quad (10)$$

If we combine equation (4) with the various globalization indices, our augmented Solow model becomes:

$$q_t = \beta_0 + \beta_1(k_t) + \beta_2(vt)_t + \beta_3(opn_t) + \beta_4(fdi_t) + \beta_5(ict)_t + v_t \qquad (11)$$

where lower case letters are the logarithms of the respective variables, and *ict* is the Solow residual from equation (8). The expected signs are such that:

$$\beta_1, \beta_3, \beta_4, \text{ and } \beta_5 > 0; \beta_2 \gtrless 0$$

From equation (11), q_t denotes the manufacturing output per capita, k_t is the capital-labour ratio in the economy and other variables are as previously defined. The *a priori* sign of k_t is positive and this is derived from the capital-deepening hypothesis which maintains that the greater the stock of capital relative to labour, the greater the productivity of labour and output per capita. In essence, one expects a positive relationship between the capita labour ratio and manufacturing output per capita.

With respect to the variable v_t (i.e., volume of trade), the theoretical sign can either be positive or negative. For instance, when the proportion of export in the volume of trade is higher than import, we expect v_t to have a positive impact on the output of the manufacturing sector. The reverse holds if imports are the dominant component of the volume of trade.

Moreover, the variable, *opn,* which denotes the degree of openness of the economy due to globalization influence, is expected to have a positive impact on manufacturing production. The *a priori* sign attached to this variable is, on one hand, due to the theory that openness encourages specialization in the production and marketing of certain goods in which we can establish comparative advantages. Therefore, relative lower labour cost advantages, availability of resources, and free and unconstrained access to international markets is expected to enhance "low-cost supplier of certain manufactured products"(Nemedia, 1998). As efficiency increases, production of manufactured goods will also increase. On the other hand, freer movement of goods and services as contained in globalization and WTO documents should enable Nigeria to procure the much needed capital goods and raw materials for effective industrialization. In turn, the same global freer environment should also enable her to export to other countries of the world. This should result in improvement in the welfare of Nigerians.

It is our contention that a freer Nigerian economy is not in doubt. Since the introduction of SAP in 1986, the trend has been, on the

average, toward an increasing openness. Actually, the thrust of SAP was guided by trade liberalization and market deregulation. Since then, the main thrust of macroeconomic policy has not shown a major shift. Hence, our guided optimism toward greater openness.

Other factors that could positively affect the manufacturing sector in Nigeria are the inflow of foreign direct investment (*fdi*) and the degree of information and communication technology (*ict*). Globalization has brought with it an enhanced portfolio of capital flows in the form of foreign direct investment, FDIs, bonds and equity. In particular, FDIs include "transfer of technology through research and development, upgrading of domestic human capital through managerial capacity building and enhanced access to industrial countries market for their emerging manufacturing industries"(Nemedia 1998). FDIs also promote local productivity through linkages to services suppliers and the labour force as well as by serving as models of working practices and managerial techniques.

In tandem with the above is the opportunity offered diversified international investors in bonds and equity issues in developing countries. Such flow of funds has a positive impact on volume and cost of international and domestic capital with a spillover effect of international competition on the pricing of domestic financial assets. Furthermore, with financial integration comes higher capital mobility and increased risk sweeping, which reduces consumption risk. The consequence of this is that there will be an increase in the supply of risk capital. This will in turn cause a higher rate of industrialization in Nigeria.

Information and communication technology (ICT) has greatly enhanced the globalization of the world economy. The rate of advancement in technology has facilitated communication of financial, trade and other business information. In fact, ICT is the source of the seemingly triumphalist globalization. In effect, a Japanese, Asian or European investor through modern technology

collects necessary data on opportunities in Nigeria through the internet. He analyses it and takes pertinent decisions on whether or not to invest in Nigeria, and this within the shortest possible period of time.

In Nigeria, there is evidence of increasing wave of culturalizing ICT in business, schools, offices, etc. The World Bank report indicates that this has greatly enhanced operations and performance. It has also served as support services and created jobs for several others. It goes without saying that this aspect of globalization will positively impact on the Nigerian quest for industrialization come 2015.

5 Estimation and Results

5.1 Data

In estimating our model, data covering 1970-2001 were obtained from the Central Bank of Nigeria *Annual Report and Statement of Accounts* (various issues) and *Statistical Bulletin* (2001). All variables are in real terms having adjusted them for inflation using the consumer price index (1985=100). However, data on labour force (1970-1997) were obtained from the World Bank as published in Iyoha (2002: 264). The remaining data for 1998-2001 was estimated using the average growth rate over the period 1970-1997. Similarly, data on manufacturing output were available for the period 1981-2001. We therefore carried out a backward estimation to cover the period from 1970-1980, using the average growth rate in the subsector for 1981-2001. The Solow residuals retrieved from the estimation of equation (4) is used to mimic technological progress. It should be noted that, though in the real sense, other factors such as human capital, state of infrastructural development in the economy, etc., could be embedded in the technological progress variable, this residual is, however, used in our model as a proxy of ICT.

5.2 Estimation

We estimated equation (4), which is the intensive aggregate production function. The OLS technique of estimation was applied on this equation. Using Eviews Software package, the result is shown below:

$$q_t = 6.0870 + 0.3091k_t$$
$$(20.2085) \quad (5.9780)$$

$R^2 = 0.8194$; Adj. $R^2 = 0.8064$; F-statistic $(1, 30) = 57.9980$
RSS = 0.4045; SER = 0.1202; D.W-statistic = 1.9276

The figures in parenthesis in the equation directly above are the t-statistics. The first OLS estimation performed produced a D.W statistic of 0.7792. This is an indication of the presence of positive serial correlation. In correcting this problem, the two variables which entered equation (4) were transformed using Durbin -2-step procedure. The final results displayed above indicate a "good-fit" in the statistical sense, given the various statistics. It shows that a percentage increase in the ratio of capital stock to labour force in the production of aggregate output in the Nigerian economy will bring about 0.309 per cent increase in output per capita. This result seems reasonable and corroborates the theoretical view (see Begg et al. 2000: 516) that capital-deepening has the impact of increasing labour productivity.

Next, we estimate equation 11, which is the augmented Solow model. In our version of the model, both aggregate output in the manufacturing sector and aggregate capital stock were expressed in per capita terms. The result of the OLS estimation is shown in Table 4.

Four variants of equation 11 are reported in Table 4. In equation (1) the variable, *ict*, which is intended to capture technological progress, is not included. We observed that all coefficients were very significant except that for *fdi*. The sign of the coefficient of

opn is negative. This could be ascribed to the presence of autocorrelation and partly due to the nature of import which is finished goods biased. In addition, the absence of an important variable notably, *ict*, might explain the negative sign. This is also responsible for the significance of the significance of the constant term which we hypothesized should be insignificant in the statistical sense. In addition, the adj. R^2, the F-statistics, and the standard error of regression (SER) are plausible. However, there is the presence of positive serial correlation given by DW-statistic of 0.7925.

Equation 2 contains all the explanatory variables. Except the capital-labour ratio variable, which is significant at 5 per cent level, all the other variables are not significant in the statistical sense at 5 per cent level. The adj.R^2 and the F-statistics seem acceptable, yet there is the evidence of the presence of positive serial correlation given by the low DW-statistics. The signs on the coefficients of *vt* and *opn* seemingly contradict our theoretical predictions. The coefficient of the technological progress variable has the expected signs though it is insignificant at 5 per cent level.

In view of the presence of autocorrelation and being mindful of the fact that it could cause bias in our model, we therefore embarked on correction for serial correlation in equations 3 and 4. We use the Durbin 2 stage procedure. The estimated ñ is 0.62934 and this was used to transform the variables in our model. Equation 3 in which the technological progress variable has been eliminated seems to be poor statistically. Only the coefficient of *k* is significant at 5 per cent level and the alternative hypothesis that the error terms are autocorrelated cannot be rejected. Hence, equation 4 which is also transformed, included all the variables in the model. The Adj. R^2 is good, the standard error of regression is low and, given the value of DW-Statistics at 1.9567, the null hypothesis that the error term is not autocorrelated cannot be rejected. In this equation, except the coefficient of *fdi*, which is very low and insignificant, all other coefficients are statistically significant at 5 per cent level.

Table 4. Ordinary Least Squares Regression Results

Dependent Variable: Ln (Qm)

	Equation (1)	Equation (2)	Equation (3)	Equation (4)
Constant	-4.5694	2.7207	0.7519	6.0333
	(-2.1272)*	(0.4791)""	(0.7398)""	(3.4131)*
Ln(K)	0.3378	0.0354	0.4336	0.5355
	(6.8850)*	(7.1299)*	(5.3100)*	(7.1735)*
Ln(VT)	0.5962	-0.0343	0.0217	-1.2567
	(3.2666)*	(-0.0701)""	(0.0863)""	(-2.9368)*
Ln(OPN)	-1.1246	-0.3879	-0.1897	1.1894
	(-3.9395)*	(-0.6441)""	(-0.5368)""	(2.3729)*
Ln(FDI)	0.0679	0.0532	0.0296	0.0089
	(1.6474)""	(1.2692)""	(1.0015)""	(0.3497)""
ict	———	0.8727	———	1.4993
		(1.3831)""		(3.4094)*
R^2	0.8428	0.8536	0.6554	0.7678
Adj. R^2	0.8195	0.8254	0.6002	0.7195
F-statistics	36.1821	30.3070	11.8859	15.8745
RSS	0.9192	0.8862	0.4602	0.3100
SER	0.1845	0.1815	0.1357	0.1137
D.W- statistics	0.7925	0.6774	1.6937	1.9567

Notes: – Figures in Parenthesis are t-statistics;
– Equations with + were transformed using Durbin two steps procedure;
– Superscripts (*) and ("") indicate statistical significance and insignificance at 5 per cent level, respectively;
– RSS and SER stand for Residual Sum of Squares and Standard Error of Regression, respectively.

5.2 Discussion

Of particular interest in this study are the domestic capabilities to sustain the desired economic growth as measured by capital, labour and technology. As shown earlier in our analysis, a percentage increase in ratio of capital stock to labour force in the production of aggregate output in Nigeria will bring about 0.309 per cent in output per capita.

The other variables in the extended model were designed to capture the effect of globalization on a small open economy like that of Nigeria. Thus, as given in equation 4, a percentage increase in the capital-labour ratio in the whole economy will bring about 0.54 per cent increase in manufactured output per capita. The implication of this is that the increased technological innovation brought about by globalization will have positive and significant impact on aggregate manufacturing output in Nigeria.

The volume of trade, which is simply the sum of export and import appears to be negatively correlated with the manufacturing output. Although it is not contrary to expectations, it may be due to the nature of the economy in which export of manufactures are relatively small in the total export while components of imports are disproportionately in favour of finished goods as against intermediate and capital goods. Expectedly, the latter could have contributed positively to improving production in the manufacturing sector.

The inclusion of the degree of openness variable, *opn*, is to measure the extent to which increased trade flow resulting from globalization could impact on the manufacturing sector in Nigeria. The coefficient being about 1.2 suggests that increased openness has a significant and a larger impact on the output of the manufacturing sector in Nigeria. Thus, a small variation in the factors influencing *opn* will provoke a large increase in the manufacturing sector.

Similarly, the coefficient of *fdi* is very low and not significant. This means that the inflow of foreign direct investment has not had

positive impact on the manufacturing sector. This result suggests and confirms the generally observed trend that a substantial proportion of the foreign direct investment inflows are not used for productive purposes. It suggests that major shares might have been put in trading ventures which have low value addition.

Finally, in our model, the influence of information, communication, and technology is captured by the variable, *ict*. Its coefficient is about 1.5 and significant even at 1 per cent level. This value is probably overestimated but it suggests that technological progress has a positive role on the growth of the manufacturing sector.

6. Policy Implication and Conclusion

This study has explored the link between globalization and industrialization by examining the impact of various indices of globalization such as degree of openness, volume of trade, inflow of foreign direct investment and increased technological innovations on aggregate manufacturing production in Nigeria. The findings of the study indicate that openness to trade, volume of trade, and increased ICT have significantly influenced the level of manufacturing output in Nigeria. In fact, technology and degree of openness were found to have positive impact on aggregate manufacturing output, while FDI, though positively related to the level of manufacturing production, was found to be insignificant. In the regression, it was estimated that a percentage increase in the ratio of capital stock to labour supply in the whole economy would bring about 0.54 per cent increase in manufactured output per capita, an indication that the adoption of capital-deepening technology will promote labour productivity and output in the manufacturing sector in Nigeria. The policy implication of this study is that openness and an embrace of globalization could stimulate manufacturing production in Nigeria. Moreover, foreign direct investment, although not significant at present, could stimulate manufacturing production if an enabling environment that gives room for greater inflow is created. The

situation in Nigeria is such that trade policies are so inconsistent while protection of foreign trade is still the order despite trade reforms. It, therefore, implies that to promote the growth of the manufacturing sector, there is need to promote duty-free input importation. This also connotes that there is need for sound policies that promote outward trade relations between countries. Moreover, policy that promotes technical capacities or specific knowledge needs to be enhanced. All these measures will ensure the competitiveness of manufactured exports in the world market.

To conclude this study, we maintain that globalization has the potential to promote manufacturing and industrialization in general. The main channels of causation as indicated in this study include degree of openness, technological innovation and increased capital stock. The study suggests that a determined shift towards the promotion of manufacturing and export of manufactured products will be a great stride in the achievement of rapid productivity growth in Nigeria, particularly by 2015.

Endnote

[1] See Bourouch, O.C. "Globalization and Economic Change in Algeria: From Industrialization to Deindustrialization, http.www.crvp.org/conf/stanbul/abstracts/omar.

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