Roadmap towards Nigeria's Technological and Industrial Independence

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ABSTRACT
The utmost concern of this paper- factor affecting technological growth in Nigeria and the way forward is to examine the challenges and the factors affecting technological growth in Nigeria, with the view of proffering solution or a structural base for technological development and industrialization framework for total national development. It is rather surprising that after over fifty years of independence, Nigeria still depends largely on foreign nations for her various technological and industrial needs. This research paper relied majorly on information sources, such as government documents, academic journals and articles, conference papers and personal observations and interactions with people carrying this same burden for Nigeria. From the study, colonialism truncated and hindered improvement in the indigenous skills and techniques of the pre-colonial economy. However, the development of indigenous skills and techniques of pre-colonial Nigeria is a pre-requisite to sound technological growth, rather than depending on foreign inputs, which must be properly monitored and developed to set the pace for Nigeria's industrialization.
Keywords: Technology, appropriate Technology, Growth, Industrialization, development, appropriate philosophy

INTRODUCTION
It has been established that one of the fattest ways a nation can attain growth and development is by technological innovation and development and not by the level of its endowed natural resources, nor that of its vast human resources. A nation's economic efficiency is determined, measured, compared, classified and ranked by its technological advancement. Various authorities have differently defined the term technology.

The Oxford Advanced Learner's Dictionary defines technology as the scientific study and use of mechanical arts and applied sciences, e.g. engineering, and its application of this to practical tasks in industry. Technology has its root traceable to the term *"techne"* which means activities by which man seeks to adapt to his environment (Kayode Joseph Onipede 2010). According to Hornby (2002), it is a scientific knowledge, used in practical ways, especially in the designing of new machines, machineries and equipment. (Uwaifo, 2009) sees it as a systematic application of manufacturing methods and industrial arts to enhance efficiency in human activities; He went further to say that technology can simply be put as the result of man's efforts to do things more efficiently and effectively. (Drucker, 2007) defines technology as way or means of accomplishing a task. Armed with the above definitions therefore, the traditional skills and techniques used in the production of arts and crafts, blacksmithing, and iron smelting, carding and weaving, brewery among others can be summed up as indigenous technology in Nigeria.

Technology development entails a process of mobilizing socio-cultural resources and the harmonious integration of modern and traditional technologies organized and fitted into feasible projects designed for specific purpose. Hence, the process of textile weaving, spinning and dyeing, ginning carding had been a well-established occupation in pre-colonial Nigeria (Onimode 1982). Several studies have been done on the traditional skills of the pre-colonial Nigerian, with evidence regarding the positive contribution of indigenous skills and techniques, particularly to the development and growth of various Nigerian communities before colonialism. For example, the Iron technology of the Nok culture around Jos, Bauchi, Daima, Kano and Zaria is dated to about 500 B.C (Olaoye 1992). Archeologists have excavated iron spears and axes at Nok, and iron smelting furnaces had been discovered in Taruga, and it is believed to have contributed to the development of agriculture in the region, while there had been ample evidence regarding the use of iron around the Kanji

Dam in the present Niger State of Nigeria, around 2nd century B.C. which had contributed to the building of canoe and other agricultural implements around that region (Obayemi 1980) among others.

Development, on the other hand, is the gradual growth of a skill to become more advanced or the process of producing a more advanced product (Hornby 2002). Consequently, technology development is the transformation of ideas to practical skills, which are concerned with the production and transformation of raw materials into finished goods. (Onipede, 2003) opined that technology development pertains to development witnessed through industrial activities.

INDICATORS OF LACK OF TECHNOLOGICAL GROWTH

The following factors are indicators showing a country that is affected by lack of technological growth. Any country can be seen as suffering from effect of lack of technological growth if:

(i) She unable to produce heavy duty equipment such as tractors, lathe machines, drilling machines, cars, trains, and other equipment for executing her capital projects.

(ii) She does not possess the technological withal to explore and exploit her natural environment but rather depend on foreign technology and expertise to undertake the exploitation of her natural environment.

(iii) She exports unfinished products to other countries abroad.

(iv) She is dependent on other countries for the supply of her spare parts for industrial machinery.

(v) Her agriculture is not mechanized i.e. crude implements are still used for agricultural activities by a large percentage of those who are involved in agricultural production.

(vi) She is unable to produce her own military hardware with which to defend herself if the need arises. A critical examination of Nigeria reveals that all the indicators itemized above are present in the country. Thus, Nigeria as a country has a problem of technological growth as visible from the factors above. The question now is 'what are the reasons responsible for this lack of technological growth in this country? From

the study, several factors have been observed as being responsible for the technological underdevelopment in Nigeria, thus affecting the technological growth of the country.

The first step in solving problem is to identify the problem. It is obvious from the above indicators that Nigeria has a problem of technological growth. The way forward for Nigeria to record remarkable technological growth, is for her to look into herself and believe in herself and her resources.

FACTORS AFFECTING TECHNOLOGICAL GROWTH IN NIGERIA
Negative Influence posed by our Colonial Masters
The British came to Nigeria among other reason, for economic reason- as a ready market for their sprits, dane guns, mirrors and other goods. Before the advent of colonialism Nigerians were involved in many aspects of industrial and practical arts. They made their own hoes and other implements for farming, etc. According to (Akaninwor 2008), the colonialists discouraged further development of Nigerian technology as they reasoned it was a threat to the smooth marketing of goods imported from Europe. He went further to assert that "ogogoro" was termed illicit gin by the colonialists, and whoever was caught producing, marketing, or consuming it was frustrated.

Lack of Purposeful Leadership
Selfishness or selfish interest on the part of our leaders is a jinx that needs to be broken for Nigeria to record any meaningful technological growth. Yet Government attitude towards breaking the jinx of technological backwardness in Nigeria is laughable. Leaders are easily distracted (because of selfishness and greed) by their quest to amass wealth for themselves and their generation yet unborn. Nigeria is probably the only country in the world where you can find all brands of cars without any one having been designed and made by Nigerians. More so, technical decisions are taking without consulting Nigerian engineers and technologists. And where sometimes good policies are

taken, the follow up and implementation becomes an uphill problem as out implementation methodology in all facets of our Nation has never been adequately sustained.

Western Education

Western education is the main and proper channel for technological emancipation provided it is built on appropriate philosophy of education. The philosophy of Nigerian education during the colonial period was built on the wrong philosophy as can be confirmed by the statements of Lord Lugard and Rev. J.C. Taylor who said respectively: *"The chief function of government primary and secondary schools among primitive communities is to train the more promising boys from the village schools as teachers for those schools, as clerks for the local native courts, and as interpreters: (Lord Lugard 1921)".* "I looked upon them as the commencement of our missionary work. We lost no time and began to teach them the A.B.C." (Taylor 1857). It is therefore not surprising that apart from the Yaba Higher College that was established in 1947 to produce middle level technical manpower, the colonialist only established secondary schools that were meant to produce clerks, missionaries, and interpreters. The aspect of education which emphasizes skill and practical competence was however not an integral part of our western educational system brought to us as at that time.

Government Attitude towards Policy Implementation

The average Nigerian is known to be good in policy formulation. Generally, lack of adequate implementation on the part of our leadership has been the bane of Nigeria's technological growth. The Nigeria's Vision 2020 embodies Nigeria's blueprint for an industrial revolution, its aspiration to undergo catch-up. The Vision 2020 document predicts that by the year 2020 – some seven years from now – Africa's most populous nation and the world's 6th largest crude oil exporter will have undergone the type of catch-up industrialization that will catapult it into the ranks

of the 20 largest global economies. This is realizable if the document will be fully implemented.

In an address to the Nigerian Economic Summit Group [NESG] in October 2008 President Umaru Yar'Adua returned to the Vision 2020 theme, admitting, however, that its realization faces serious constraints posed by a lack of 'purposeful leadership', a definite roadmap and growth-inducing environment. This remark has already unfolded the problem of lack of implementation to the detriment of this laudable document and subsequently, the possibility of the vision 2020 being a mirage.

Industrial Policies after Independence

The Nigeria industrial policies after independence were not vision oriented. For instance, the major industrial policy that Nigeria embarked upon after independence was import substitution industrial policy. The major thrust of this policy was:

(i) Building of assembly plants in Nigeria.

(ii) Importation of completely knocked down(CKD) parts into Nigeria to be assembled in these plants.

(iii) The establishment of steel plants, like Delta Steel Plant and Ajaokuta Steel Plant, and associated foundries that were to produce automobile parts that would be assembled in already established assembly plants.

(iv) The establishment of machine tool companies (like Oshogbo Machine Tool Company) that were supposed to produce capital goods. The import substitution industrial strategy did not go beyond the stage of building the assembly plants, as the technical partners know that if Nigeria stops importing CKD parts, their companies in Europe would automatically stop production and eventually fold up. It meant that Nigeria would no longer be a market for European.

Inadequate Infrastructural Development in our Educational Institutions

As it is commonly said, 'garbage in is garbage out'. That is to say that our output depends on our input. Our universities, polytechnics and technical colleges that are supposed to train proficient engineers, technologists, and technicians are now filled with obsolete and in most cases nonfunctional equipment. This affects the quality of products from these technological institutions. It is however not a surprise to see engineering graduates in our Nigerian Universities who cannot tell between a bolt from a nut.

Non Involvement of Engineers in Technological Decision Making

In this country we have science and technology ministry coupled with other technological agencies, but science and technology researches are financial intensive venture and requires brains having not mainly theoretical, but also practical experiences. Government and decision makers take technological decisions without consulting Nigerian engineers and technologists (through the Nigerian Society of Engineers, NSE) who are the key players in the field of engineering and posses the experience and technical knowhow to contribute towards the effectiveness of any technological developmental decision.

DISCUSSION AND RECOMMENDATION

So far, the challenges and factors militating against the technological growth have been uncovered .This is a necessary prerequisite to proffering solutions to the problem of technological growth and its attendant effects of underdevelopment, unemployment, poverty, youth unrest, dependence on industrialized foreign nations. The following recommendations provide the roadmap and the way forward for the technological growth of our nation Nigeria.

THE WAY FORWARD FOR TECHNOLOGICAL GROWTH
Copying Items in the Market

The idea is to buy and knock down products of interest in the workshops, study and analyze each component in the laboratories or workshops developed intentionally for component analysis and for building prototypes of items to be produced. The essence is to ascertain the chemical composition, physical properties and other production parameters of interest and replicate such items.

Selfless, Determined and Visionary Leadership

For Nigeria to be technologically developed there must be a leader who is sincere, vision oriented, focused and has Nigeria at heart and devoid of political 'sweet mouth' as common with our leaders but with passion for performance. Koontz et al. (2002) noted that "the importance of good leadership is nowhere better dramatized than in the case of many underdeveloped countries where provision of capital or technology does not ensure development. The limiting factor in almost every case has been the lack of quality and vigor on the part of managers." This statement is particularly timely for Nigerian leaders whose major aim is not only to amass wealth for themselves but also for their unborn generation.

Revamp the Steel Industry

For Nigeria to realize the goal of vision 2020 there is need to revamp steel industries and this will have a positive impact in its economy, thereby creating employment for her citizenry.

Infrastructural Facilities in our Schools

Societal values are designed to be passed to the next generation by the school system. Presently, the older universities in Nigeria have obsolete tools and the newer ones cannot afford to equip their laboratories and workshops Otubanso (2005) in "Education for Underdevelopment" quoted a chemistry professor as saying that "students no longer do practical but only the theory of practical." If our students cannot do

basic practical how can we aspire to a technological breakthrough? It is therefore imperative that for us to overcome the problem of technological backwardness, we (the public and private sectors) must invest monumental resources towards upgrading our educational infrastructures.

Technological Espionage

This has to do with the systematic use of spies to get military or political secrets. This is because such technical and military technology is closely guarded by their proprietors. The secrets can be obtained either by direct investments or through espionage, where spies are always engaged to retrieve vital information and company documents required for developing new technology or products, which they pass on to their sponsors for a fee.

Adequate Funding of our Research Institutes

Research is a capital intensive venture. To reverse the trend of technological backwardness, Nigeria has to learn from other countries who allocate high percentage of their GDP for research and development (R&D). A good number of research institutions in Nigeria are not adequately funded. This constitutes the major challenge to the effectiveness of research work. According to Ngozi Okonjo-(Iweala, 2012), China has been growing its R&D expenditure by 20 percent annually, since 1999. China now accounts for 12 percent of global R&D expenditure, spending nearly 5 percent of its budget (or 1.76 percent of GDP) in 2010 on the sector. Let's compare this to Nigeria. Over the past decade, government's S&T expenditure has been less than 2 percent of the yearly budget (less than 0.3 percent of GDP per year) – a grossly inadequate figure. Nigeria's highest allocation figure was 0.43% in 1983, which went down to 0.05% in 1992 and 0.23% in 2003 (*The Nigerian Engineer,* Vol. 35 No. 4 December 2003): This is very sad for a sector whose responsibility is to research into areas that will enhance development in the country.

Government Implementation Will-Power

Government should act and talk less. There are beautiful papers and policies of what to do in the direction of industrialization and technological growth. It is high time they are implemented.

GET IT RIGHT: THE RELEVANT TECHNOLOGY

The world has been classified technologically into developed technology, underdeveloped technology and developing technology. Following this classification, there is a technological gradient between developed technology and developing technology. It becomes natural for technology transfer. Therefore, we need to embark on the acquisition of the relevant technology that is appropriate and useful to us as a nation. Nigeria as a Nation needs to look inward into her environment to see what her problems are and then exploit the resources in her environment to solve her problems. That America has sent men to space does not mean that Nigeria must also send men to space. We need to look at our environment see what our local people do, and fabricate machines tools and equipment that will assist them to do these things more efficiently.

Technological Transfer

As already established, there exists a technological gradient between developed technology and developing technology such as Nigeria. So like current, technology will flow from higher potential (developed technology) to a low potential (developing technology). This technology transfer can be accomplished through the following channels which include: bilateral cooperation with international development agencies, Training and retraining of employed staff to acquire expert knowledge, industrial development where large scale industries can be built in the developing country the technical partner abroad and by organizing conferences/workshops.

CONCLUSION

This paper has identified various policy issues as well economic and industry factors as being impediments to the technological growth of Nigeria. In this paper, an attempt has not been made to empirically test the significance of these variables factors and the level of their impact on the technological growth of Nigeria. However, the above recommended roadmap if judiciously implemented will not only form a structural framework for technological development but also serve as a sustainable development blueprint for the nation.

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