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LEVERAGING ON INDIGENOUS TECHNOLOGY TO DIVERSIFY THE NIGERIAN ECONOMY

Abu Aminu[1]
Braimah Abdul Ganiyu[2]
Sherifat Usman[1]
[1]School Of General Studies,
Auchi Polytechnic, Edo State Nigeria
[2]Department of Accountancy,
Auchi Polytechnic, Edo State Nigeria

Corresponding author: abuaminuo@gmail.com

Abstract

Economic diversification of Nigeria has longed been overdue. At independence the Nigerian economy was far ahead of that of Malaysia, Indonesia, Singapore and South Korea. The Nigerian economy has continued to rely on primary products for survival since independence; firstly, on agriculture up to 1970, and secondly, on crude oil from 1970 till date. The unstable nature of crude oil prices has severally and severely exposed the economy to external shocks over the years. However, despite efforts made to restrategise the economy towards diversification through the introduction of the Structural Adjustment Programme (SAP) in 1986 and the establishment of various industrial and export processing zones across the country, the economy continues to be heavily dependent on crude oil for external income and government revenue. It has therefore become imperative that deliberate efforts must have to be made to steer the economy away from oil dependence. This study examines the employment of indigenous technologies to diversify the economy away from oil. Emphasizing on the indigenous technologies would require that special attention be paid to wherever they are abound in Nigeria with regard to documentation, re-modeling, modernization, financing and adoption. This development, no doubt would usher in a revolution in all the sectors of the economy that would ultimately create a stream of multiple income sources for the economy, boosts government revenue, promotes sustainable growth in the economy, improves human capital development and reduces the level of poverty in the country

***Keywords*:** *Indigenous Technology, Economic Diversification, Nigeria*

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Introduction

Nigeria as a country is highly blessed with material and human resources. However, Nigeria today faces economic challenges which have for decades been deeply rooted in the country. If these challenges, such as high level of unemployment and poverty, falling economic output, shortage of foreign exchange, over dependence on imports, among others must be tackled head on the government must have to embark on a well-planned and map out diversification strategy from a primary resource based economy to other sources (Aminu, 2017).

Diversification in the present Nigerian economic context simply means creating new avenues for economic growth. It involves using the right strategy to boost output and revenue generated from selected or other sectors of the economy apart from the oil and gas sector. This implies facilitating the growth of other sectors of the economy with a view to mitigating recurring economic crisis and returning the economy to a growth path.

It must be emphasized that diversifying the Nigerian economy will not necessitate a neglect of the oil and gas sector but accommodate maximizing revenue derivable from the sector through effective deployment of such to other sectors of the economy (Obinna, 2016).

The nation's economy therefore has to be rescued from the "Locked in Syndrome" if Nigeria must improve the lives of its citizens and appropriately occupies its place in the comity of nations. In other words, there is a need to urgently consider the promotion and massive deployment of indigenous technologies to promote the growth and stability of the various sectors of the economy as possible ways of diversifying the economy away from oil and gas.

The use of indigenous technology to transform some key sectors for wealth creation while developing competent, resourceful and skillful manpower through entrepreneurship cannot be overemphasized. And, one of the major challenges

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bedeviling Nigeria and other third worlds today is inefficient use of human resources due to low human capacity building. According to Adefemi, Ilesanmi, Charles and Samuel (2015), the existence of African indigenous technologies provide an opportunity to close this identified development gap and steer economies away from relying on primary resources. To achieve this would require checkmating the problem of low skill acquisition among Nigerians and Africans. Indigenous technologies should therefore be leveraged on to diversify the Nigerian economy with the encouragement of entrepreneurship skills and training among the people. Marrying indigenous technology, if properly exploited would enhance skill acquisition and maximize value addition in critical sectors, thereby inhibiting economic diversification challenges relating to policy making, sustainable development and method of development while considering the potentials, limits and needs of the people (Adewole, Olaopa & Siyanbola 2012). This paper therefore examines how indigenous technologies can be leveraged on to diversify the Nigerian economy, given special attention to where ever they are abound with specific emphasis on documentation, modernization, financing and adoption.

The Concept of Technology and Indigenous Technology

Different meanings at different times have been ascribed to the world technology right from when the word was first, coined by the Greeks in 1615. Technology was said to have played significant roles in the industrial revolution and renaissance in Europe from the 10th to the 18th century (Bijker, Huges and Pinch, 1987). They argued that it is pointless wasting valuable time trying to reach a consensus definition as the term does not carry a single meaning. However, Foucault (1988) sees technology in four perspectives. These four types of technologies are technology of production, technology of sign systems, technology of power and technology of the self. According to him, the technology of production allows us to produce, transform or manipulate things; technology of sign systems allows us to

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use symbols, signs or meaning while technology of power determines individuals behavior. Meanwhile, the technology of the self is an approach to study the ethics of the individuals. However, the technology of production which is the focus of this paper is referred to as a collection of techniques skills, methods and processes used in the production of goods and services or in the accomplishment of objectives such as scientific investigation (Manabete and Bobboi, 2014).

At the beginning of the 20th century, the public meaning of technology was associated with achievement, progress and purpose (Adams, 1991). The International Technology Education Association (2002) defined technology as the way people modify the natural world to suit their own purposes. It made reference to the diverse collection of processes and knowledge that people use to extend human abilities to satisfy human needs and wants. From the renaissance period into the present era, technology has been seen as a body of knowledge about the useful arts and its contemporary understanding associated with modernity. Menabete and Bobboi (2014) further emphasized on technology as the application of knowledge towards the design and fabrication of devices, tools and appliances to better the condition of living of a people. It refers to art of using knowledge appropriately to create something that alters the condition of living of man. It involves the application of knowledge, skills and resources to meet people's needs and wants. Technology can therefore be accepted as the tool that keeps the socio-economic life of a people going.

Indigenous technology on the other hand is synonymous with indigenous knowledge and technology itself. Indigenous technology is part and parcel of technology being it foreign or local as some foreign technologies are indigenous to their country or state of origin. Indigenous technology is peculiar to a particular people according to Essien (2011). It emanates from the knowledge of the people and concerns the essential things embodied in the knowledge system of the people.

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Adewale et al (2012) identified the following as the characteristics of indigenous technology.

1. It is centered on local or indigenous peoples and their beliefs and practices.
2. It is generally bound by geography and most often, does not transcend the locality it originates from.
3. The form of acquiring indigenous technology is normally through oral tradition from generation to generation.
4. It is not dated in the sense that the knowledge or practices do not necessarily have to be primordial.
5. It emerges from the implicit order to reflect the art of skillful living.
6. It attracts the learning spirit; it provides a learning ecology that supports the revitalization and transformation of awareness and knowledge.
7. Through meaningful interactions, indigenous technology seeks to engage and evoke significant knowledge and experiences reflective of the indigenous world.
8. Indigenous technology has the obligation to come into existence to be used and to transform within an ethical space that is responsible to life in all its forms.
9. The ability or capacity to make something does not constitute a valid reason for its existence i.e it is coherent with the rural order.

The Concept of Economic Diversification

A diversified economy is an economy that has a number of different revenue streams and provides nations with the ability for sustainable growth because there is not a reliance on one particular type of revenue. This diversification provides nations with the security and reliability that they need so that if one economic

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revenue stream should fail, the nation knows that they have several other options for revenue (Nwamaka, 2017).

Zagros (2016), is of the view that economic diversification can mean different things depending on the context. The predominant way of thinking about it is what is known as economic complexity, which is the idea that countries should not be dependent upon a small number of products for their economic livelihoods. For example, a country that has an economy based predominantly on oil production is neither particularly complex nor economically diverse (Igbokwe and Omeire, 2020). On the other hand, a country that has a strong manufacturing base, a vibrant services sector, a burgeoning natural resource sector, and a booming agricultural sector is quite complex and diverse. The more economically complex a country is, the more likely that it will have a low level of volatility in its GDP. This is not unlike the idea of financial diversification in an investment portfolio. In an investment portfolio, the idea is to reduce the unsystematic risk in your portfolio by having asset classes that tend to move in opposite directions to one another. This will end up reducing overall volatility.

In 2012, fossil fuel dependent countries including Bahrain, Qatar, Saudi Arabia and the United Arab Emirates indicated their readiness to put forward their actions and plans in pursuit of economic diversification that have multiple benefits in the form of mitigation and adaptation to the impacts of climate change and response measures.

The UN (2016) indicated that the global economy was stagnating, and uncertainty about its future was rising. These trends weighed heavily on countries that depend on the production and export of a small range of products, or that sell products in only a few overseas markets. Hence, the need for diversification strategies that can deliver sustained job intensive and inclusive growth.

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The World Bank (2017) is of the view that Chile is an example of a diversified economy, exporting more than 2,800 distinct products to more than 120 different countries. Zambia, a country similarly endowed with copper resources, exports just over 700 products — one-fourth of Chile's export basket — and these go to just 80 countries. Other low-income countries have similarly limited diversified economies. The Lao People's Democratic Republic and Malawi, for example, export around 550 and 310 products, respectively. Larger countries that export oil, such as Nigeria (780 products) and Kazakhstan (540 products), have failed to substantially expand the range of products and exports due their inability to fully diversified their economies

Overview of Development in Nigeria

Nigeria's overall economic performance has been largely unimpressive since independence in 1960 according to the world bank (2017). Though, the economy experienced impressive growth in the mid 2000s but the growth did not last enough to upstage the low growth experienced over the past decades hence, the world Bank (2012) put the average annual economic growth rate of Nigeria from 1960-2010 at less than 4 percent.

The first 30 of the first post-independence years in Nigeria were spent under the heavy-handed rule of military dictators and despots. Much of the failure of policies and the lack of development have been attributed to abnormal situation where the country was denied democracy, the rule law and accountability. There was therefore much hopes and expectations when democracy was restored in 1999, however such expectations and hopes were dashed after the successive civilian governments since 1999 towed the line of previous dictatorial regimes in terms of policy formulation and implementation (Okeke, 2015).

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Nigeria has since early 1970s depended on the sale of crude oil as its main revenue source. This according to experts has exposed the economy to international market shocks considering the volatile nature of the crude oil market (Obinna, 2016, Ayodele and Sabastine 2013, Eluogu 2016, Okeke 2016).

A recent study by the International Monetary Fund (IMF) (2015) showed that the significant and prolonged drop in oil prices since mid 2014 has changed the fortunes of Nigeria and many other energy exporting nations around the world. The study further indicated that budgets in oil exporting nations have generally turned from surpluses to large deficits, indicating that growth has slowed and financial stability risks has risen.

The Nigerian economy was hard hit considering its complete reliance on oil export and total dependence on imports. For example, the international oil market experienced shock which saw declining oil prices from 1979 to 1986. Prices remained volatile for the later part of the 1980sto the 1990sand recently in 2015 and 2016 when crude oil prices were at low ebb averaging 49.5 and 40.6 United States Dollars per barrel respectively (OPEC Annual Statistical Bulletin, 2017)

Going by the statistics of OPEC (2017) and Okeke (2015), the prices of crude oil per barrel made steady gains from an average of $28.1 in 2003 and peaked at an average of $109.5 in 2012 before steadily declining to $105.9, $96.3,$49.5, $40.6 and S54.4 in 2013, 2014, 2015, 2016 and 2017 respectively.

This implies that not too long ago the nation reaped tremendous gains from the sale of crude oil from early 2000s to 2014. However the impact of this gain was not visible in the economy as the economy had slipped into a deep recession by June 2016 (National Bureau of Statistic, 2016). From 2015, it was obvious that the economy was heading to the doldrums as revenue from oil decreased tremendously leading to foreign exchange shortages and fall in national output in addition to rising inflation and falling naira value (Aminu, 2017). This development further degenerated the poverty and unemployment problems in the country. According to

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the National Bureau of Statistics (2016), unemployment in the third quarter of 2016 rose to 13.9% compare to 13.3% in the previous period. This is said to be the highest increment since 2009 when unemployment increased from 5.2% in 2008 to 11.2% in 2009.On a similar note, The United Nations Development Programme (2016), and Fitch (2016) indicated that Nigerians living below the poverty line rose from 46% in 2014 to 60% in 2015 and further increased to 72% by the third quarter of 2016.

This development was blamed on the sharp fall in the price of oil in the international market, leading to a recession that nosedived the nation's economy, thereby worsening the existing precarious situation of the average Nigerian who currently lives on $0.5 per day from $1.1 in the past three to four years. (Fitch, 2016)

The diversification of the economy away from oil has been identified as the way out of the current economy logjam in the country. Okonjo-Iweala (2016), Obinna (2016), Fitch (2016) urged for the diversification of the economy to encourage domestic production of the nation's imports and promotion of manufactured exports. This would require the creation of an enabling environment to encourage manufacturers to operate. It has therefore become imperative that for this to be realizable, more involvement of the private sector in key public assets ownership and management would have to be encouraged.

Methodology

The methodology adopted by this research is the Narrative Textual Case Study (NTCS). This is due to the absence of sequential data related to indigenous technologies and economic diversification in Nigeria. The NTCS is a social science research method that employs intensively the information data intensively. The information, data and academic materials made available are easily accessible through secondary information and information and communication technology.

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This paper is therefore basically not empirical, but rather descriptive since information is collected without changing the environment

Indigenous Technologies and Economic Diversification in Nigeria.

Indigenous technologies abound in Nigeria include, pot making, aluminum casting, bronze casting, leather tanning, blacksmithing, goldsmithing, animal husbandry, farming, trado-medicine practices, fabrication of local tools and equipment, among others. Leveraging in these technologies to promote economic diversification in Nigeria would also enhance their modernization. Folayan (1988), is of the view that every culture has her own technology for achieving desired goals. However, knowledge of other existing technologies and the desire for improvement for global acceptance and competiveness often lead to better choices and therefore better results. Over the years, Nigeria has impacted local skills and made giant strides in the design, fabrication, refining and development of indigenous technologies according to Siyanbola et al (2012). Equipment like cassava harvester, cassava planter, cassava peeler, maize Sheller and among others have been fabricated using indigenous techniques with the active collaboration of the Entrepreneurship Development Centre (EDC).

The diversification efforts would cut across different spectrums of the economy such as manufacturing, agriculture and agro processing, solid mineral extraction and processing, information and communication technology, among others, which would require personnel with high level and diverse skills to promote and sustain. In view of the above, the entrepreneurship development centers of the various higher institutions of learning should leverage on the opportunity provided by Tetfund to promote Research and Development (R & D) focusing on available

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indigenous technologies and possible ways of modernizing them. Such technologies should not just be taught on theoretical basis but should also be accompanied by practical training. This would ensure that skills are not only equitably transferred, but also ensured that they are improved on to sustain and promote the diversification efforts of the government. This would go a long way to encourage indigenous entrepreneurship to fast track economic growth and development of the nation (Adefenye, 2011).

Some Practical Steps Taken So Far

The National Office for Technology Acquisition and Promotion (NOTAP) has been involved in indigenous technology development initiatives to promote entrepreneurship in Nigeria. NOTAP has made concerted efforts in the following ways to promote indigenous technology and entrepreneurship in the country.

1. The promotion of the development of locally motivated technologies through the linkage of industry with National innovation system (NIS) in the areas of scientific Research and Development (R & D) and the promotion of international property rights and commercialization of R & D results.
2. The introduction of the Technology Storyboard Initiative (STI) aimed at sensitizing primary and secondary schools pupils on STI through a step-by-step pictorial representation of the production process of a given product form the raw material stage to the final product.
3. In collaboration with the federal and state government owned agencies, NOTAP has institutionalized the intellectual property capacity building programme in secondary schools aimed at developing the innovative skills and intellectual capacity of the youths.

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4. Plans are already on the way to establish the largest science and technology park in Africa in Abuja to be known as Africa's Premier Innovation Corridor (APIC). It is expected that APIC when established will among others provide a synergy between young entrepreneurs and other relevant science and technology stake holders including indigenous technology as well as promote the use of R & D for the economic development of Nigeria (NOTAP, 2011).

One of the ways through which indigenous technology can be leveraged to enhance entrepreneurship in Nigeria is the standardization and codification of IT along with the exploration of transfer of modern technology with a view to marrying such with the local indigenous technology (Vandeleur, 2010). This is in view of the fact that Nigeria and Africa indeed as a whole need to compete favourable with countries from across the globe. The collaboration of indigenous technology and modern technology to promote economic diversification in Nigeria will not only enhance skill acquisition in all the sectors of the economy but would as well facilitate the development of the Nigerian economy. According to Manabete & Bobboi (2014), areas to be covered include medical practices, collaborative R & D efforts, fabrication of tools and equipment, agricultural practices, scientific research efforts, among others to promote and further impact skills in the people who are regarded as the greatest needed to fastract the economic diversification process.

New Frontiers and Opportunities to Fast-Tracking Economic Diversification

There are reasonable arguments in favour of a position to upgrade and advance for new frontiers for indigenous technologies to promote production in the Nigerian economy. For instance, the world footwear and leather products sector can easily be fed from our own indigenous technology and thereby presents further opportunities for growth, import substitution and export promotion in the country. Although many developing countries, Nigeria inclusive, possess strong potentials

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with respect to raw materials and skills, they have mainly remained suppliers of raw and semi-finished products. This has been attributed to a limited number of African companies and local industries having developed the capacity to produce finished products. This implies that if efforts are geared at solving this problem, Nigeria will expand its scope of production and skill promotion courtesy of exportation of leather and other 1-Tech products. It was suggested that efforts towards achieving this feat will provide partly a solution to the call for the diversification of Nigeria's non-oil sector and consequently increase the country's revenue generating capacity there by reducing unemployment (Siyanbola et al, 2012). In order to fully realized the above, Siyanbola et al (2012) concluded that technology business incubators (TRIs) are important especially for business development. Research had shown that Technology Incubation works in achieving the goals of technology commercialization by facilitating the growth of technology-based production systems and SMEs thereby facilitating the creation of skilled labour force that can provide potential clients with employees who have the critical skills to fill the newly created technology-oriented jobs to produce made in Nigeria goods and services meant for the domestic and international markets to reduce the nation's continuous dependent on a primary resource.

Conclusion

The ability of nations to compete in the global world today depends not on their comparative advantages but rather on their competitive advantages and one of the ways through nations can compete in today's global world is the efficient exploitation of the marriage between indigenous technologies, modern technology and entrepreneurship to promote economic diversification and national development. This marriage could better be facilitated through deliberate effort to modernize IT through massive investment in R & D and the importation of modern

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technology for a holistic collaboration and skills building and transfer in Nigeria. This can further be facilitated through the following:

1) The role of government as the provider of the initial impetus in the deployment of 1K and l-Techs for national innovativeness and development cannot be substituted. It is important to note that government has to demonstrate sufficient commitment and will power for any meaningful achievement to occur by putting in place adequate mechanism it the form of policy and conducive environment to drive the development of these 1T and 1-Techs. In India, for instance, government created strong institutions to harness the power of 1T and 1-Techs while opening up new frontiers for their application.
2) I-Tech IT practitioners should be opened to knowledge, particularly as is available in knowledge centers. As was demonstrated in China, achieving a convergence between state-of-the-art in modern scientific and technology & knowledge and the traditional knowledge and practices will go a long way in enhancing the impact of 1T and I-Techs.
3) The role of policies and institutions is critical. The documentation, remodeling, modernization, financing and adoption of IT are of critical important if they should play their expected role in the economic diversification of the nation. Strong research, development and brokerage institutions are required to move the 1K and I-Tech sector forward on the learning curve, assist in the codification of knowledge and facilitate product development and standardization. For instance, the role played by the National Innovation Foundation in India is of note in this regard. This is basically because they support grassroots innovation and move them to the next level by scouting and documentation of the IKs and innovation
4) The government should as a matter of urgency upgrade the existing infrastructures in the country with a view to checkmating the problem of infrastructural deficit in the country. This would go a long way to fastrack

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production in the economy through efficient application of IT with a view to promoting and sustaining the diversification process.

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