



## DISCUSSION ON THE NEXUS BETWEEN TECHNOLOGY AND NIGERIA'S ECONOMIC GROWTH

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### ABSTRACT

**Purpose:** The purpose of this discussion is to identify the nexus between technology and economic growth, with the Nigerian economy as a focal point. Technology is often considered as a driving force behind the growth and advancement of many countries of the world, particularly their economies. Based on contemporary happenings and trends, it became imperative that we try identifying the inextricable nexus between technology and Nigeria's economic growth, with much emphasis on how it had impacted or would impact on the Nigerian economy using certain economic parameters.

**Design/Methods/Approach:** This paper adopted a qualitative research design, in which data collection involved the collection of archival data and of which interpretation was based on the researchers' perspectives, evaluations and inferences.

**Findings:** The paper came to a conclusion that technology is the key driver and engine room behind the advancement of various economies of the world; as such, Nigeria and her economy would immensely benefit from technology and what it has to offer.

**Practicality:** The paper concluded by giving five (5) key policy recommendations that would help accelerate the growth of the Nigerian economy, via leveraging on technology.

**Originality/Value:** This paper reflects pure and thorough individual research and profound interpretations, given by the researchers; thus, producing new knowledge.

**Keywords:** Technology, Economic Growth, Nigeria, ICT, Development

**Paper Type:** Research/Discussion paper

### 1.0 INTRODUCTION

Technology, especially in the contemporary world of today, is seen as an engine room or driving force behind the growth, development and advancement of various countries of the world; and Nigeria would definitely not be an exception. Truth be told, technology, especially in the 21<sup>st</sup> century has changed the way and manner a lot of things in the modern world are being executed.

Technology has overtime, proven to be an inextricable nexus between a country and her quest for attaining growth and all-round development; and which for the purpose of this discussion, the growth in question is narrowed down, using “**economic**” parameters and yardsticks, in order to allow for a proper justification and elaboration on the subject matter given above. We have seen advanced and developed countries such as the United States, United Kingdom, France, and even China, so to say, employ the use of technology, and not just technology, sophisticated technologies to advance the prospect of their economies and improve the standard of living, observed by the citizenry. Isioto Nte Nathaniel, Philip-kpae Friday O. & Dickson Rachael (2017), posited strongly in their research that one of the indices through which a nation’s growth and advancement can be measured is by the level of her technological endowment and not solely by the level of her endowment in natural and human resources. This statement, only but buttresses just how pivotal; technology can be in achieving economic growth for any country.

Technology is derived from the root word “techne” which means activities by which man seeks to adapt to his environment. Britannica defined technology as “the application of scientific knowledge to the practical aims of human life or, it is sometimes phrased, to be the change and manipulation of the human environment.” By scientific knowledge, we are referring to a concept that allows for the development of new technology, solve practical problems and make informed decisions. Interestingly, “practical aims”, as contained in the above definition, could be inferred to be the phenomenon of using science to carryout plethora of activities, executing task and every other thing that could practically be relieved off the shoulders of humans. By “change and manipulation”, it is no news that technology has changed the way and manner through which a lot of things are being carried out or executed, and this has to a large extent, impacted on the human environment. Flowing from the above, an improved definition of technology could be given as anything, mostly artificial; developed or conceived to provide a more nuanced and crafty way of doing thing or executing tasks through its application and use. There is virtually no sector in an economy that is yet to embrace or has not felt the touch of technology, although; whether positive or negative is a question to be considered some other day.

Economic growth and output, according to a release in July 2015, by the *Council of Economic Advisers Issue Brief*, USA, can be evaluated using two yardsticks, which are the Gross Domestic Product, (consumption, investment, government expenditure and net exports) and the Gross Domestic Income (GDI), (labor compensation, business profits and other sources of income). However, being an expansive discussion, other parameters or indicators can be used to measure economic growth, and they shall be explored in the course of this discussion. This discussion aims at identifying the nexus between technology and economic growth, as highlighted in the context above, and more specifically, the contribution of technology to the growth of the Nigerian economy.

## 1.1 CONCEPTUAL CLARIFICATIONS

Technologies of the Fourth Industrial Revolution are blurring the lines between the physical, digital and biological spheres of global production systems. The current pace of technological development is exerting profound changes on the way people live and work. It is impacting all

disciplines, economies and industries, perhaps none more so than production, including how, what, why and where individuals produce and deliver products and services (World Economic Forum, 2017).

A nation's economic efficiency is determined, measured, compared, classified and ranked by its technological advancement. Various authorities have differently defined the term technology. Technology is derived from the root word "*techne*" which means activities by which man seeks to adapt to his environment. It is said that technology development pertains to development witnessed through industrial activities. Further definition of technology puts it as a systematic application of manufacturing methods and industrial arts to enhance efficiency in human activities. Professor Freeman J. Dyson, of the Institute of Advanced Studies, Princeton, in his book "*Infinite in all Directions*," had this to say about Technology:

*"Technology is a gift of God. After the gift of Life, it is perhaps the greatest of God's gifts. It is the mother of civilization, of Arts and of Sciences. Technology continues to grow to liberate mankind from the constraints of the past. The most revolutionary aspect of technology is its mobility. Anybody can learn it. It jumps easily over barriers of race and language. And its mobility is still increasing."*

As introduced in the text by [Volti \(2009\)](#), the word "Techne" is widely accepted to mean "skill" and "art." The reconciliation of both interpretations of the Greek word are facilitated by an appeal to the logical connection that exists between them: to create anything requires skill and art. Both skill and art may be considered as metonyms for creation. Nonetheless, as metonyms, they should not be misconstrued. Skill and art both refer to, and describe, the same core concept under different circumstances, as though an artist were to approach the object of his or her work from dual perspectives to properly render a masterpiece. From one perspective, "skilled" may be understood to be a structured approach (to creation) whereby one executes something to completion, according to a prearranged plan, without encountering obstacles. Conversely, the artistic perspective as an approach, is one in which the ability to create in a pre-planned structured fashion is hampered by challenges or obstacles encountered, but one possesses the expertise to be guided by spontaneity, and unpredictably compensates to see the process to fruition. Perhaps the difference is more readily understood from the perspective of control. Skillfulness may be interpreted as involving both having and exerting control throughout the entire process, to complete the creative undertaking, whereas artistry could be viewed as lacking control yet dominating the situation to complete the creative process. In essence, skill and art may be likened to two otherwise identical chiral molecules that are non-super imposable mirror images of one another. Similar to preparation and spontaneity, action and reaction, or offense and defense, both aspects of skill and art are necessary to capture the essence of "create" in "techne" completely.

Economic growth is first of all, a process of transformation, not of convergence to a steady-state growth path. The transformation of capitalism involves interaction of the economic sphere with other domains, such as science and technology, and institutions. This has three major implications. First, those differences in economic growth (both over time and between countries) are hard to predict, but often have clear underlying explanatory factors. Second, that in the long run, economic growth is not a process of general convergence. One might indeed observe

historical periods of convergence during times when institutions and technological developments allow this, but periods of divergence of economic growth must also be expected. Third, any distinction between trend growth and cyclical variations around the trend is problematic. Technology is a key factor shaping economic growth and the changes in growth rates. Obviously, this in itself is something that evolutionary economics has in common with new growth theory.

## 1.2 NEXUS BETWEEN ECONOMIC GROWTH AND TECHNOLOGY

Colin Clark and Jean Fourastié are regarded as the first economic thinkers who emphasized the role of technological progress and how it could impact on economic progress or development (Krume Nikoloski, 2016). As earlier reiterated, there is an inextricable nexus between the level of technology and the observable economic growth in any country of the world. Innovation and Information Communication Technology (ICT) are two indispensable components that are said to have played various fundamental roles in the lives of businesses, households and the entire economy at large (Akinwale, Ogundari, Olaopa and Siyanbola, 2012). It is on record that developed and emerging nations such as the United Kingdom, the United States, Singapore and South Korea, among others, note worthily used ICT to drive and propel their economic growth. This is not surprising as technology has always proven to be the engine room behind a nation's advancement and growth in juxtaposition with what is obtainable in other countries of the world.

To start with, a study by Cardona, Kretschmer and Strobel (2013), revealed that ICT serve as GPT (General Purpose Technology), which is an enabling technology for further innovations that affect economic growth and productivity, beyond the effect of regular capital goods. By tagging ICT as an **enabling technology**, they gave pointers to the fact that ICT might be the bedrock or foundation for any improved technology that might stimulate economic growth. The result of their study further revealed that this phenomenon is more evident in the United States than in European countries. A fairly more insightful study by Gruber and Koutroumpis (2010) discovered a significant positive impact of mobile telecommunications diffusion or better still; spread, on Gross Domestic Product (GDP) and productivity growth using data from 192 countries for the 1990 to 2007 period. This research by Gruber & Koutroumpis (2010) was quite elaborate and far reaching, especially with the sample coverage, thus, their result was dependable and one could infer a direct positive correlation between ICT diffusion and an increase in GDP.

In a more profound study, carried out by Vu (2013); where he made use of econometrics, attached with growth accounting, and the result of which revealed that the intensity or level of ICT use in Singapore has a direct positive correlation with value-added and economic growth, especially in the manufacturing sector. This no doubt, lays further credence to how pivotal, technology and ICT could be, towards advancing a nation's economic growth. Krume Nikoloski (2016) explained four (4) stages of technological revolution and how it impacted on various economies of the world. He elaborated on them in a sequential manner as follows:

- ✓ **The First Industrial Revolution:** This was caused by the working of the steam engines or the repair or interchanging of a manufacturing system with an industrial system design (industrial age). When it began at the end of the 18th century, this resulted in a couple of changes in the economic way of people and as a resultant effect, led to the replacement of

some human functions with machines. Thus, we can infer that unemployment, imbalances, amongst other effects must have been witnessed.

- ✓ Second Industrial or Electromechanical Revolution: This can be explained simply as automation. By automation, we are referring to the strengthening of national economies via the advanced use of technology. Automation influences man and human development, not only in the execution of physical operations, but more profoundly, in the execution of certain mental operations. At the heart of the changes that came with this revolution is electricity and its application in the areas of electric motors, telephone, telegraph, automobile, aircraft, amongst others. All these had an impact on economic development.
- ✓ The Third Industrial or Technological Revolution: This form of revolution was reported to have begun before World War II and it's called electronic revolution. At the heart of the changes is a transistor whose application enables the development of computers or computers and microprocessors. To a large extent, this particular revolution had a great influence on national economies, as well as the growth witnessed by these economies.
- ✓ Lastly, we have the fourth technological revolution that began late last century and which is also called an information revolution. The key for this revolution is said to be the chip. A chip is directly associated with high technology, i.e. information technology, non-informational robots and other applications i.e. machines and tools with numerical control. Technological revolution in particular was said to have resulted in major changes, witnessed especially in the area of biotechnology, energy resources and raw materials. This lead to economies metamorphosing from a national economy into a global economy.

Krume Nikoloski (2016) concluded by positing that technological development and advancement allow for an increase in productivity. This advancement can be in the following categories; which are: energy, transportation & industrial machinery, communication and logistics. We can then conclude that - technology, as well as its advancement contributes largely to the growth of any economy.

## **2.0 OUTLOOK OF THE NIGERIAN ECONOMY**

Nigerian economy poses several challenges to scholars, because of its peculiar structure, characteristics and outcomes and the contradictions inherent therein. After witnessing a shift from agriculture to crude oil and gas, as the central driver of growth by the late 1960s, all efforts to diversify the economy and provide a better basis for broad, stable and productive growth have met with very limited success. Huge oil revenues since the late 1960s, have not translated into prosperity and development, and the country still ranks among the poorest in the world in terms of major indicators of development. In spite of the numerous plans, policy frameworks and reforms, economic growth remains epileptic, lacking sustained or consistent growth and subjected to the vagaries of crude oil and gas prices. Each plan, programme, vision and reforms generates much hopes but actually produces little impact while mismanagement, corruption and poor performance continue to underline economic management. While the majority of Nigerians reel under the yokes of poverty, disease and misery, the ruling elite has not demonstrated serious commitment, discipline and sacrifice in driving growth and progress. Economic inequality

remains deep as 10 percent of the poorest in Nigeria have only 1.9 percent of national income while the richest 10 percent have 33 percent (The Guardian, 2010).

A key regional player in West Africa; Nigeria, accounts for about half of West Africa's population with approximately 202 million people and one of the largest populations of youth in the world. Nigeria is a multi-ethnic and culturally diverse federation which consists of 36 autonomous states and the Federal Capital Territory. With an abundance of natural resources, it is Africa's biggest oil exporter, and has the largest natural gas reserves on the continent.

Oil price volatility continues to influence Nigeria's growth performance. Between 2000 and 2014, Nigeria's gross domestic product (GDP) grew at an average rate of 7% per year. Following the oil price collapse in 2014-2016, combined with negative production shocks, the gross domestic product (GDP) growth rate dropped to 2.7% in 2015. In 2016 during its first recession in 25 years, the economy contracted by 1.6%. Since 2015, economic growth remains muted. Growth averaged 1.9% in 2018 and remained stable at 2% in the first half of 2019. Domestic demand remains constrained by stagnating private consumption in the context of high inflation (11% in the first half of 2019).

Real GDP growth was estimated at 2.3% in 2019, marginally higher than 1.9% in 2018. Growth was mainly in transport, an improved oil sector, and information and communications technology. Agriculture was hurt by sporadic flooding and by conflicts between herdsmen and local farmers. Manufacturing continues to suffer from a lack of financing. Final household consumption was the key driver of growth in 2019, reinforcing its 1.1% contribution to real GDP growth in 2018. The effort to lower inflation to the 6%–9% range faced structural and macroeconomic constraints, including rising food prices and arrears payments, resulting in a rate estimated at 11.3% for 2019. With fiscal revenues below 7% of GDP, increased public spending widened the deficit, financed mainly by borrowing. At the end of June 2019, total public debt was \$83.9 billion—14.6% higher than the year before. That debt represented 20.1% of GDP, up from 17.5% in 2018. Domestic public debt amounted to \$56.7 billion and external public debt \$27.2 billion. The share of bilateral debt in total debt was estimated at 12.1%, and that of eurobonds at 40.8%. High debt service payments, estimated at more than half of federally collected revenues, created fiscal risks. The current account surplus sharply declined due to increased imports, lower oil revenues, and a smaller than expected improvement in capital flows. Poverty remains widespread. The poverty rate in over half Nigeria's 36 states is above the national average of 69%. High poverty reflects rising unemployment, estimated at 23.1% in 2018, up from 14.2% in 2016. Low skills limit opportunities for employment in the formal economy. Government social programs—N-Power and other youth empowerment schemes—are meant to address unemployment.

On the production side, growth in 2019 was primarily driven by services, particularly telecoms. Agricultural growth remains below potential due to continued insurgency in the Northeast and ongoing farmer-herdsmen conflicts. Industrial performance is mixed. Oil GDP growth is stable, while manufacturing production is expected to slow down in 2019 due to a weaker power sector performance. Food and drink output are expected to increase, likely in response to import restrictions. Construction continues to perform positively, supported by ongoing megaprojects, higher public investment in the first half of the year, and import restrictions. Growth is too low to lift the bottom half of the population out of poverty. The weakness of the agriculture sector

weakens prospects for the rural poor, while high food inflation adversely impacts the livelihoods of the urban poor. Despite expansion in some sectors, employment creation remains weak and insufficient to absorb the fast-growing labor force, resulting in high rate of unemployment (23% in 2018), with another 20% of the labor force underemployed. Furthermore, the instability in the North and the resulting displacement of people contribute to the high incidence of poverty in the North East.

Without significant structural policy reforms, Nigeria's medium-term growth is projected to remain stable around 2%. Given that the economy is expected to grow more slowly than the population, living standards are expected to worsen. Growth is constrained by a weak macroeconomic framework with high persistent inflation, multiple exchange rate windows and forex restrictions, distortionary activities by the central bank, and a lack of revenue-driven fiscal consolidation results. Rising public debt, and increasingly complex policy interventions by the central bank constrain private sector credit growth. External balances are fragile to hot money movements, and fiscal buffers are exhausted, making Nigeria's economy vulnerable to external risks.

### **3.0 TECHNOLOGY AND THE DEVELOPED ECONOMIES**

Very few literatures have examined the nexus between technology and the developed economies. A large chunk of literatures concentrated efforts on technology, with specific reference to third world countries, under developed or developing economies. As such, little empirical findings could be made with regards to torch lighting how technology has impacted on the developed economies. Although, technology usage, adoption and application are evidently very high in the developed economies, as a substantial number of them; if not all, have their economies driven by artificial intelligence and technology. It would be safe to conclude that technology is the engine room behind the continuous advancement and growth of developed world economies, with specific mentions of which are: United Kingdom, United States, Japan, France, Germany, to mention but a few.

A study by a visiting professor from the University of Michigan, Dr. F.K.A. Allotey, who doubles as the Chairman, Council for Scientific and Industrial Research, Ghana; gave some insights as to the usefulness of technology and how it impacted on the industrialized countries. He created juxtaposition between the newly industrialized Nations (Hong Kong, South Korea, Taiwan & Singapore) and African countries. He posited that these newly industrialized Nations have the same economic condition as some African countries in time past. However, he attributed the widening gap and advancement in the economies of these countries, when compared to that of African countries to the absence of Science and Technology; amongst other factors, in what he termed "manifestation of science and technology gap". He made specific reference to Ghana, by stating that South Korea is now ten times more prosperous than Ghana, especially as both countries, dating back to the 1960s, had the same per capita GNP of \$230. In all, this discussion will not focus much on developed economies; rather, much emphasis would be placed on developing economies, with the Nigerian economy as a focal point and centre piece of discussion.

#### **4.0 TECHNOLOGY AND THE DEVELOPING ECONOMIES**

The spread of technology is one of the central ideas underpinning growth theory in economics. Rich countries are positioned at the technology frontier, meaning that their economies make virtually full use of the best available devices, practices, ideas and know-how to generate their output. For these countries, marginal productivity gains depend on the discovery of new technologies that push the technology frontier further out. In contrast, poorer countries are positioned some distance back from this frontier. Poor countries' opportunity to make use of proven technologies without having to develop them from scratch is one factor that allows them to grow faster than rich countries under the right conditions, and thereby accelerate closer to the frontier. Globalization acts as a catalyst for this phenomenon.

During the last two decades, the boom in global trade driven by the containerization of traded goods and the elimination of tariffs and other barriers, cheaper communication made possible through information technology, and a dramatic expansion in foreign direct investment have all likely played a role in accelerating the diffusion of technology from rich to poor countries. The adoption of technology by developing countries has had profound effects on their economies, such as reducing the national costs of production, establishing standards for quality, and allowing individuals to communicate from a distance. Unfortunately, the current process remains one of adaptation, rather than innovation. In addition, the need for technologies appropriate to the capabilities of a developing country's poor has only recently been recognized. One major challenge to the diffusion of technology in low-income nations that persists is its uneven distribution and penetration within the country. The rapid spread of technology fueled by the Internet has led to positive cultural changes in developing countries. Easier, faster communication has contributed to the rise of democracy, as well as the alleviation of poverty. Globalization can also increase cultural awareness and promote diversity. However, the diffusion of technology must be carefully controlled to prevent negative cultural consequences. Developing countries risk losing their cultural identities and assimilating themselves into an increasingly westernized world.

In order to participate in a high-tech marketplace, developing nations require individuals with technical expertise. Problems arise when nations attempt to make overly rapid advances in education, producing graduates without a satisfactory infrastructure to support the education system. Namely, families must be able to afford to send their children to school, educational institutions need resources such as current textbooks and electricity, and educated individuals require incentives to remain in their home nations.

The Internet and other advances in communication technology have helped make the spreading of globalization even quicker. For developing countries, access to technology can have many benefits, one such improvement being the boost of a nation's economy. Other ways that technology is helping economies in developing countries include reducing the costs of production, encouraging the growth of new business and advancing communication.



## **5.0 PROS AND CONS OF TECHNOLOGICAL ADVANCEMENT AND ITS PROJECTED IMPACT ON NIGERIA'S ECONOMIC GROWTH**

Advancement in technology will no doubt, have both positive and negative impacts on Nigeria's economic growth, of which one will however outweigh the other. Having identified the nexus between technology and economic growth in the preceding headings, it became pertinent to examine to what extent, advancement in technology will impact on the Nigerian economy, especially in the context of growth. On one hand, the impact of these technologies might seem overwhelmingly positive, as various disruptions would be witnessed. Technological advancement, according to Eric R. Biel (1999) would provide countries with new access to information, opportunities to perform business globally and more importantly, the ability to communicate seamlessly with key players around the world. Access to information or data should always be emphasized, as data or information availability; incontrovertibly, helps government in making informed decisions. Availability of data is one advantage the developed economies have over the less developed ones, and this is something Nigeria could work towards achieving. Eric R. Biel (1999) further spoke about technological changes that would affect educational, medical, public safety and other critical services. Specific mention was made of Malaysia, where they had a technology that could, at that time, connect seven hospitals simultaneously, and which allows for joint consultation, diagnosis and treatment, and with technologies to assist with weather forecasting, crop yields, amongst others. With the recent drive to diversify into agriculture, Nigeria will no doubt, find these technologies, especially those ones that will serve agricultural purpose, very useful and this will indubitably, have a great positive impact on her economy.

Sridhar and Sridhar (2000) discovered a strong correlation, based on several regressions and instrumental variable methods, between investment and productivity growth in developing countries, which implies that developing economies have to import and install machinery and equipment, in order to grow. Nigeria, being a developing country, would have a lot to gain via the vast use of sophisticated technologies and machineries. No doubt, the country is not yet at a capacity to produce these technologies, but having to acquire and fully embrace them, be it by importing them, would have a profound impact on the country's (Nigeria) economic growth. By making use of the Peterson Index, Cronin, et al (2002), in their research, showed how basic telecommunication infrastructures can create a "digital divide" by making markets more efficient via information dissemination to isolated and information-deprived localities, which when correlated, is common in Nigeria, and will improve the standard of living; which in turn, would accelerate rapid economic growth. Technological advancement, no doubt, would have enormous positive impacts on the Nigerian economy, and all of these positives cannot be exhausted on this platform.

Acknowledging fully well that Information Communication Technology could have profound positive impacts on a society, another angle could be seen. Van Dijk (1999) positioned that the applications of ICTs and their transformative nature may have been largely exaggerated. ICTs may destroy more jobs than they create; the gap between the rich and the poor may also be widened. The cons of technological advancement could be very fatal, especially for a country like Nigeria, that is really yet to gain balance and have a strong foothold. To admit, technology will bring about loss of jobs, as machines and AI would be made to perform tasks that would

ordinarily have been performed by humans, thereby giving rise to some other multiplier effects. Considering that the Nigerian economy is largely labour driven, the aftermath effect of a technological revolution might be somewhat calamitous, with grave consequences.

Nigeria is a country, with a wide gap between the rich and the poor, and Biel (1999) expressed concerns that, while technology brings along with it, an array of opportunities, we shouldn't close our eyes to the fact that technology could facilitate widening the gap between the "haves" and the "have-nots" within a society. This statement remains valid till date, even after about two (2) decades. The logic is that the elites or ruling class may be well exposed or predisposed to enjoying the benefits of technology, of which they might use in promoting their class, at the expense of the disadvantaged ones. This discussion has therefore been able to establish that technological advancement comes with both pros and cons. However; Nigeria as a country should place its gaze on reaping the pros, and look for ways to circumvent the cons, all of which can be achieved by being more proactive and strategic. One thing is however incontrovertible; and it is that, technology is a critical component for growth in any economy, and Nigeria is definitely not an exception.

## **6.0 LIMITING FACTORS FOR TECHNOLOGICAL ADVANCEMENT IN NIGERIA**

There are serious inhibitions to technological advancement in Nigeria. The quality of institutions and governance remain poor. Poor governance is a major challenge in both the public and private sectors. Private sector poor governance has been reflected in failures observed in the banking and financial service sector. There are indications that good governance is a prerequisite for rapid economic growth and development, and that the quality of governance is tied to efficiency of investments, technical progress, efficient markets, economic outcomes and other conditions facilitating growth. Particularly, corruption and the lack of openness have been found to undermine efficient resource allocation. Given the pervasiveness of corruption and poor governance in the public and private sectors, the prospects of enduring and sustainable growth and development may be endangered. There are serious infrastructure deficits and social service delivery inadequacy and decay.

Recognizing issues that are responsible for the problem of technological growth is strategic to attainment of technological emancipation Nigeria deserves. Limiting factors for technological advancement in Nigeria can be emphasized as follows.

### ***Internal Factors – Taking an Inward Look***

It has been acknowledged that the attainment of technological growth will depend on the development of strategic industrial policy structure and infrastructural base for the implementation of such policy for global economic competitiveness. This will in turn require the development of efficient, accountable, transparent, and participatory governance, the creation of strong, efficient, and effective public service institutions to engender government effectiveness, the establishment of a competitive private sector-led business environment characterized by sustained microeconomic stability and the enhancement of national security and improvements in the administration of justice. The following are internal limiting factors of technological advancement in Nigeria. These are: inadequate infrastructural base, high level of corruption, internal security and lack of purposeful leadership.

### ***Inadequate Infrastructural Base***

The current infrastructure base in Nigeria is grossly inadequate in terms of capacity and quality and is not capable of catering for the anticipated industrial development. Despite government investments, Nigeria still has huge infrastructure deficits, particularly with regards to power generation. The current power generation capacity is less than 2000 Megawatt, which is about 20 per cent of the estimated national demand. A key challenge for government and the private sector is to build a modern, efficient, and effective infrastructure network within the next five to ten years.

### ***High level of Corruption***

Nigeria ranks highly in the Corruption Perception Index. This has implication for investment and the flow of foreign investment into the country. Previous anti-corruption policies implemented in Nigeria have been targeted at enforcement measures rather than addressing the root causes. The root causes of corruption in Nigeria have been identified to include nepotism, cronyism, social insecurity and over-centralization of resources at the centre. Even though there are suitable laws and viable institutions to fight corruption in Nigeria, the greatest challenge is in formulating a strategic plan of action to deal with the root causes.

### ***Internal Security***

The internal security of Nigeria has become a very big challenge in recent times. Internal conflicts, kidnappings, insurgency, including religious, ethnic and economic crisis, have had effects on the economy, most notably by scaring investors from certain parts of the country. Even though insecurity of lives and properties had become noticeable following the civil war and the subsequent military regimes which directly intensified urban violence, the recent upsurge of violence and insurgency in the country heightens the need to comprehensively address the persistent causes of social tension as a risk factor to Nigeria as an investment destination.

### ***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 by their selfishness and 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.

### ***EXTERNAL FACTORS - Taking an outward look***

#### ***Conflicting Interest in Transfer of Technology***

While the receiver wants technology to bring independence, modernity, and prosperity, the donors do not want receivers to be lifted up but only want to create supplies of what they need and maintain markets for what they produce. For instance some countries did not want Nigeria to have steel mills so as to make Nigeria a dumping ground for steel products.

### ***Selfishness in Controlling Transfer of Technology***

Technology is usually kept as a preserved property of the donor and thus the exclusive control is vested in them. The donors determine how far and how much the receiver can use the technology by retaining production of spare parts and other components. The technology can only be viable as long as it serves the goal of the donors with little or no concern for the receiver.

### ***Transfer of the Appropriate Technology***

The technology that suits one environment may not suit the other. There can even be differences between environments within a country. It is therefore necessary to compare and identify the systems vis a vis the environment and make sure the technology is appropriate for the new environment.

Other limitations of technological advancement in Nigeria are:

- Importation and transfer of technology versus Local Technology
- Political Instability
- Sustainability issues
- Budgetary allocation for science and technology
- Bureaucratic Control



## **7.0 CONCLUSION**

It would of course, be safe to position that justice has been done in discussing or identifying the nexus between technology and Nigeria's economic growth. Technology adoption or diffusion; incontrovertibly, has its bad sides. However, the good sides of it seem very hard to overlook and evidently outweighs the negative impact it might have on the Nigerian economy. This discussion, sequentially and systematically took us through the journey of technology in itself; to an expository on how it would impact on the Nigerian economy, making use of appropriate sub-headings to identify areas of convergence and divergence, thereby giving us appreciable insights. This discussion concluded that technology has proven to be the engine room behind a nation's advancement and growth, in juxtaposition with what is obtainable in other countries of the world and as such, Nigeria would benefit greatly from technology.

The policy recommendations; contained in the tail end of this discussion, would prove to be very crucial for the trio of government, the private sector, and other stakeholders, as it encompasses actionable solutions that would help the Nigerian economy enjoy the positives that come with

technology. The recommendations; we are convinced, if holistically implemented, would unlock the potentials of the Nigerian economy, and will thus, guarantee unprecedented growth.

## 7.1 PROSPECTS OF TECHNOLOGY AND THE NIGERIAN ECONOMY

The increasing speed with which new technologies gravitate toward developing countries is a welcome phenomenon. But access to these technologies offers no guarantee that they will be broadly adopted and applied to their full range of possible uses. Indeed the evidence of technology adoption rates in poor countries is chastening. Once technologies establish a foothold in the markets of industrialized countries, it is virtually certain that they will spread widely within these countries. But in developing countries, technologies are very rarely adopted on a large enough scale to ensure genuine leapfrogging. On this measure, the difference between developing and developed economies appears to be widening. A priority for poor countries is to invest in the right kinds of knowledge so that imported technologies can be more effectively harnessed and adapted for productive use. But it is fiendishly hard to identify these kinds of knowledge.

***BELOW IS AN EXCERPT FROM AN INTERVIEW GRANTED BY HIS EXCELLENCY, PROF. YEMI OSINBAJO, SAN, GCON, VICE PRESIDENT, FEDERAL REPUBLIC OF NIGERIA, TO A GROUP OF JOURNALISTS AT CO-CREATION HUB, YABA, LAGOS, DURING HIS VISIT TO ICT/INNOVATION HUBS/COMPANIES IN LAGOS STATE, ON TUESDAY, APRIL 17, 2018. HE SAID,***

*“Technology is obviously the future; the future of our economy, the future of commerce and the future of industry. The government is also trying to see how it can collaborate, how it can partner with tech enterprises and, in some cases, with membership organizations they have in order to be able to create the kind of environment that makes it possible for technology to advance seamlessly and in a way that the Nigerian economy actually can have a multiplication or replication of all we are seeing today. So, the government is collaborating already with a number of hubs and also with some that we are starting. For example, the government is doing some work in partnership with Civic Hub in Abuja. The government is doing some with the Humanitarian Hub in the North East, focusing on the humanitarian challenges in the North East of Nigeria, and creating technology and innovation that could be helpful in solving some of their problems. The government has a Climate Change Hub in collaboration with the Lagos Business School. And, of course, intend to collaborate and partner with Co-Creation Hub and several other hubs. The point is that the government is anxious not to get in the way. Government can sometimes get in the way of enterprise. What we really need to do is to partner and to work hand in hand with them so that we help in whatever way, in whatever difficulty that they have. In some case, it might be credit; in some others, it may just be in creating and ensuring the right policy. So, one of the things that we are trying to do is to set up a council of sorts. Already, we have an industrial and competitiveness council. We want to look at doing one for technology and for innovation as well so that we bring in some of the key players and thinkers around technology working with government and government officials to develop policy and various ways we can help them to do what they are doing better.”*

The Chairman, Board of Commissioners, the Nigerian Communications Commission (NCC), Olabiyi Durojaiye, has expressed the determination to ensure increased contribution of the

telecommunications sector to the growth of the nation's economy come 2020. He noted that the sector has contributed over 10 percent to the nation's Gross Domestic Product (GDP) in 2019, adding that it played a critical role in the administration's economic recovery and growth plan, and is emerging as the key driver of the economy.

The Nigerian Economy should be focused towards the following prospects;

- Availability of technological development plans and schemes
- Visionary leadership
- Availability of research studies and institute
- Technological investment friendliness
- Development of startup tech companies

Nigeria has many opportunities to transform its economy, particularly in technological advancement. But insecurity could deter foreign investors, shrivel the domestic economy, and ultimately dampen prospects for economic growth. High unemployment could create social tensions. Rising public debt and associated funding costs could pose fiscal risks if proposed adjustments are not implemented. Nigeria's oil exports have been affected by developments in the Middle East and also, by other international factors. Trade tensions between the United States and China could weaken global growth and lower demand for Nigeria's products, including oil. Protracted delays in concluding the Brexit deal could accentuate investors' aversion to emerging markets, including Nigeria, reversing the current upward trend in foreign portfolio flows. Prolonged closure of borders by Nigeria to curb smuggling may affect trade with other countries in West Africa and raise the prices of imported products, especially rice.

These risks underscore the need to accelerate structural reforms to promote economic diversification and industrialization to minimize vulnerability to external shocks. The Covid'19 pandemic disease has rendered the economic forecast non-feasible and driving the Nigerian economy into recession. The current account was projected to remain in surplus in 2020, benefiting from improved oil revenues. This forecast is far from being achieved due to recent fall in price of oil. Hence, Technology would play a crucial role in diversifying the Nigerian Economy and entrenching economic growth.

## **7.2 POLICY RECOMMENDATIONS**

Flowing from the above, the following recommendations are strongly made:

1. In order to participate in a high-tech marketplace, developing nations like Nigeria, require individuals with technical expertise. Problems arise when nations attempt to make overly rapid advancement in education and producing graduates without a satisfactory infrastructure to support the educational system. Hence; Government must be able to provide not only a sound education but a form of education which is equipped with present generation high level learning schemes, of which would enhance the expertise needed for technological advancement. In addition, promising and technologically driven individuals are to be incentivized to enable them stay in the country, and by so doing, discouraging brain drain;
2. The Nigerian government should adopt a Technology Action Plan (TAP), which would be targeted at addressing the identified barriers to the development and transfer of well

prioritized technology. Similar plan was adopted by the government of Kenya, Bangladesh, Sri Lanka, Azerbaijan, e.t.c.

3. The Nigerian government has the opportunity to accelerate the pace of structural reforms to build an institutional and policy framework capable of managing the volatility of the oil sector, supporting the sustained growth of the non-oil economy and enhancing technological advancement. Bold reforms that could have a significant impact on the economy's trajectory are the removal of subsidies, reasonable budgetary allocation for technological advancement; elimination of forex and trade restrictions, greater transparency and predictability of monetary policy, increased domestic revenue mobilization and lastly, research and innovation schemes. Such reforms would help raise living standards of low-income groups, while increasing spending on much needed public services and contributing to the pace of a technologically driven economy;
4. Developing countries such as Nigeria, should pool technological resources together to address common economic challenges. The creation of an economic integration that can help to:
  - a. *Promote technological learning at the firm level;*
  - b. *Promote enterprise development and financing of innovation;*
  - c. *Entrench activities that are of particular importance to developing countries as a whole; and*
  - d. *Act as a platform for sharing innovation experiences and promoting policy learning.*
5. Government should help in facilitating loans for business, particularly SMEs, towards giving them the capacity to acquire equipments and machines that would advance their business. This would result in higher productivity, cheaper commodities; and in the long run, promote exportation – thus accelerating economic growth.

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