**CHAPTER 1**

**INTRODUCTION**

Africa has been closely watched as the [next big growth market](https://store.hbr.org/product/africa-s-business-revolution-how-to-succeed-in-the-world-s-next-big-growth-market/10191?sku=10191E-KND-ENG&referral=02560) – a description that [has](https://www.mckinsey.com/featured-insights/middle-east-and-africa/africas-overlooked-business-revolution) remained for a [sometime.](https://hbr.org/2011/05/the-globe-cracking-the-next-growth-market-africa) There are many reasons for optimism: the continent is home to some of the [youngest populations](https://www.worldometers.info/world-population/africa-population/) in the world, it promises to be a major [consumption market](https://www.brookings.edu/research/africas-consumer-market-potential/) over the next three decades, and it is increasingly [mobile phone-enabled](https://www.pewresearch.org/global/2018/10/09/majorities-in-sub-saharan-africa-own-mobile-phones-but-smartphone-adoption-is-modest/). An emerging digital ecosystem is particularly crucial as multiplier of that growth, because access to smart phones and other devices enhances consumer information, networking, job-creating resources, and even financial inclusion.

Nigeria as a country in this continent has a powerful entrepreneurial climate, with innovative ventures such as Jumia, Interswitch, Kobo360, and Andela as the outcomes. These ventures cut across the education, fintech, agriculture, healthcare, logistics, and travel. Nigeria was Africa’s [leading startup investment destination](https://www.appsafrica.com/nigeria-is-top-funding-hub-for-tech-startups-334-5m-invested-across-africa-in-2018/) in 2018, recording nearly $95 million in deals. Lagos’ Yaba neighborhood has even earned the nickname [“Yabacon Valley.”](https://www.ft.com/content/3382e58e-c32d-11e8-84cd-9e601db069b8) The relative [affordability](https://techpoint.africa/2018/03/19/nigeria-affordable-internet-africa/) of Nigeria’s internet is key: The Economist ranks it first in affordability in the region. The government’s [National Identity Management Commission](https://www.nimc.gov.ng/) is set for a massive registration for the country’s mandatory National Identity Number (NIN). A unique identity system is essential in developing countries, where the vast majority have few other ways to prove who they are and thereby get access to public services or the financial system, usually through a mobile phone.

* 1. **THE NIGERIA ECONOMY**

The economy of [Nigeria](https://en.wikipedia.org/wiki/Nigeria) is a middle-income, [mixed economy](https://en.wikipedia.org/wiki/Mixed_economy) and [emerging market](https://en.wikipedia.org/wiki/Emerging_market), with expanding manufacturing, financial, service, communications, technology and entertainment sectors. It is ranked as the [26th-largest economy in the world in terms of nominal GDP](https://en.wikipedia.org/wiki/List_of_countries_by_GDP_(nominal)), and the [24th-largest in terms of purchasing power parity](https://en.wikipedia.org/wiki/List_of_countries_by_GDP_(PPP)). [Nigeria](https://en.wikipedia.org/wiki/Nigeria) has the largest economy in Africa; its re-emergent manufacturing sector became the largest on the continent in 2013, and it produces a large proportion of goods and services for the [West African](https://en.wikipedia.org/wiki/West_Africa) subcontinent. In addition, the [debt-to-GDP ratio](https://en.wikipedia.org/wiki/Debt-to-GDP_ratio) is 16.075 percent as of 2019.

There has been a drastic change in the Nigerian Economy overtime, and this economic change can be broadly categorized into two segments namely;

* The Colonial ( Pre-independence Era)
* The Post-Independence Era

**1.1.1 The Colonial (Pre – Independence Era)**

Nigeria Pre – Independence economy era was the exact replica of the British economy due to the fact that Nigeria as a country was colonized by Britain. The country’s output as at then was predominately agricultural products like groundnut, palm oil, rubber, cotton to mention quit a few. The economy of Nigeria was quit better off than some African countries because a large portion of the agricultural product were exported to Britain while the country also provide a virile market for Britain goods imported into Nigeria.

However, the first ten years development plan between (1945 – 1955) and the second years development plan between (1945 – 1960), no conscious attempt was deliberately made to accelerate economic growth but rather more priority was given to the welfare of citizens and social services plan. The economy witnessed some level of growth during the plan period but little is known about sectorial performance especially on an account that most sectors were at their emerging stage except for the agricultural sector which the country was known for. The performance of the Nation’s economy during the pre-independence era is summarized in the table below

Table 1.0: Nigeria Pre-Independent Economic Performance Indices

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Expenditure Category | 1950 | 1955 | 1960 | Increase  Amount | 1950-1960  % Increase | %  Per Annum |
| Gross  Domestic Product (GDP) | 699.3 | 891.9 | 1023.9 | 329.7 | 42.1 | 4.1 |
| Govt. exp. on Goods and services (GE) | 24.4 | 45.5 | 77.0 | 53.0 | 220.8 | 22.1 |
| Gross Fixed Invest. (GFI) | 48.4 | 102.6 | 158.0 | 109.6 | 226.4 | 22.6 |
| Consumption Expenditure (CE) | 609.4 | 805.5 | 870.0 | 260.6 | 42.76 | 4.28 |
| G.E as % of GDP | 3.4 | 4.9 | 7.7 | 4.3 | 126.5 | 12.7 |
| GFI as % of GDP | 6.9 | 11.1 | 15.4 | 8.5 | 123.2 | 12.3 |
| C.E as % of GDP | 87.1 | 87.4 | 85.0 | -2.1 | -2.4 | -0.2 |

The table below clearly shows that the country’s Gross Domestic Product (GDP) increased by 42.1 percent between (1950 and 1960) while the percentage increase per annum was 4.1 percent. Government Expenditure and Gross Fixed Investment increased tremendously by 220.8 percent and 226.1 percent respectively within the same period, more so consumption expenditure equally grew by 42.76 percent between 1950 and 1960. The annual increment for Government Expenditure, Gross Fixed investment and consumption expenditure were 22.1, 22.6, and 4.28 percent. However, Consumption Expenditure in relation to Gross Domestic Product declined by 2.4 percent as against Consumption Expenditure (as a percentage of Gross Domestic Product) and Gross Fixed Investment as a percentage of Gross Domestic Product) which respectively increased by 126.5 and 123.2 percent.

**1.1.2 The Post- Independent Economy**

Nigeria economy was still under the influence of Britain in the early Post-independent era, as import and export of the nation was skewed to their advantage. The first and second national development plans culminated into substantial overall economic growth as indicated in the rise in Gross domestic product. In the era of 1970 a structural change was experience in the economy due to the discovery of crude oil as a major contributor to Gross National Product (GNP), ) and the growing dominance of building and construction as an item of capital formation. Manufacturing fell below expectation due to infrastructural constraints and scarcity of willing and competent partners. The agricultural sector witnessed a negative total average growth of -0.4% and become stagnated during the third development plan. About 23 institutions were established during this period to provide economic drive for the country e.g. the Central Planning Office, Agricultural Development Bank, Nigeria National Oil Corporation etc. The economic growth were hindered by oil glut of the 1980’s, high level of corruption , high level of inflation, lack of good data base and non-evolution of coherent policies to give a direction to the economy.

From decades after independence, in terms of national income, the agricultural sector dominated the economy in the first decades with no significant contribution from the oil sector. The second decade witnessed agriculture maintaining the lead in the contribution to GDP in the first half while this lead was taken over by the mining and quarrying sector in the second half due to increase in oil prices and rise in nation’s oil reserve. Others sectors had insignificant contribution to the GDP.

In the third decade, while the agricultural sectors attain its dominance of the national economy, Crude oil on the other hand was known to be the foreign exchange earner. Going to the fourth and fifth decades there was a noticeable decline in agricultural growth and over dependency on crude oil as the major income source became the other of the day in the Nigerian Economy.

**1.2 THE ROLE OF INNOVATION IN THE ECONOMIC DEVELOPMENT OF NIGERIA**

Innovation is very vital and critical for the economic growth and advancement of any nation, there are various sectors of the Nigeria economy that needs technological innovation to better enhance the overall effectiveness and performance of the country’s economy architecture. The defects in the legal framework for protection of innovators in Nigeria; examine certain factors challenging technological innovation in the country, based on the data that was collected from statues, case laws textbook and also the internet, it was discovered that the level of innovation and technology in Nigeria is low and the Nigerian patent law is week.

There are factors posing challenges to innovation in Nigeria some of which include;

1. Institutional Framework
2. Human Capital
3. Research/Innovation infrastructure
4. Sophisticated Business Community

The Government on their own part can change the narrative of the Nigerian economy by bringing and implementing policies that would effectively address the challenges in technological innovations. More so the Patent law needs quick amendment, and modern research facilities should be established with human capital development coming in to play a key role.

Africa has been classified as a third world or an underdeveloped continent, despite its rich, human and material resources states the fact that there is a fundamental problem with maximizing and utilization of the human and material resources in the continent.

The Global Innovation Index (GII) 2014 surveyed 143 economies around the world, using 81 indicators to gauge both their innovation capabilities and measurable results. Mauritius, which tops the African countries in the ranking, came at the 40th position, followed by South Africa at 53rd and Tunisia at the 78th position. Nigeria was placed at the 110th position. The foregoing GII ranking has shown that in a global and dynamic world, the economies that can remain flexible, adaptive, and innovative will reap the benefits of world trade. This is because the global competitiveness of any economy depends on its science, technology and innovation (STI) capabilities. In all ramifications of economic development, technology-dependent economies surpass economies dependent on their natural resources.

However, there remain certain challenges to the mitigation of technology in Nigeria, First; the law does not encourage technological innovation and its capability to protect prospective innovators remains in doubt. Furthermore, Nigeria lacks human capital to man effectively its sectors. Moreover, research facilities in the country are either inadequate or outdated. There are no effective policies to serve as incentives to arouse local innovators and to attract foreign investors. Nigerian technological environment is discouraging. Modern infrastructures are also required to encourage foreign direct investment (FDI)

There is virtually no sector of the Nigeria economy that does not need innovation, with time as we continue to enhance our innovative capabilities, a larger percentage of the sectors will become strong pillars of economic development in Nigeria.

Some of the key sectors that need innovation in the Nigeria economy to improve sustainability include;

* The Agricultural Sector
* The Pharmaceutical Sector
* Power/Energy Sector
* Biotechnology
* Mines and Steel Industry
* Trade and Manufacturing Industry
  1. **TECHNOLOGY IN NIGERIA**

One of the indices by which a nation’s growth and advancement can be measured is by her technological endowment and not by the level of her endowment in natural and 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.

Going by the Etymology of the word “Technology”, which has its root origin from the Greek language, the word Technology is made up of two words which are “techne” and “logos”. Techne means art, skill, craft, or the way, manner, or means by which a thing is gained, it means activities by which man seeks to adapt to his environment. Logos means word, the utterance by which inward thoughts are expressed, like a saying, or an expression. Going by this etymological translation of these two words “techne” and “logos” literally, technology can be easily concluded to mean words or discourse about the way, art, skills and craft are gained.

It is said that technology development pertains to development witnessed through industrial activities. Technology embraces the means by which a man controls or modifies his natural environment. It is also seen as a special kind of knowledge which is directed towards practical applications in the physical and social world. It is also defined as the application of practical, mechanical and scientific knowledge to industry and commerce. More so, technology is understood as the body of organized knowledge, tools and machines used by man to manipulate his environment to satisfy his basic needs. Further definition of technology puts it as a systematic application of manufacturing methods and industrial arts to enhance efficiency in human activities. Simply put, technology is defined as the result of man’s efforts to do things more efficiently and effectively. Technology is also defined as way or means of accomplishing a task. Summarily, technology can be deduced as the harmonious application of organized scientific, socio-cultural know-how to manipulate the environment with the intention of solving problems and satisfying human need.

In a recent time, the word technology has come to host a lot more than what was portrayed by its etymological translation and this is due to the ever changing world which is function of time.

In the 17th century, the word technology was used to mean a discussion of applied arts only. Gradually, these “arts” themselves came to be the object of the [designation](https://www.merriam-webster.com/dictionary/designation). Also in the 20th century, the term has been used to embrace a growing range of means, processes, and ideas in addition to [tools](https://www.britannica.com/technology/tool) and [machines](https://www.britannica.com/technology/machine). By mid of the 20th century, [technology](https://www.britannica.com/technology/technology) was defined by such phrases as the means or activity by which humans seeks to change or manipulate their environment.

In the 21st century, technology is best described as the set of knowledge, skills, experience and techniques through which humans change, transform and use their environments in order to create tools, machines, products and services that meet their needs and desires. It is the sum of [techniques](https://en.wikipedia.org/wiki/Art_techniques_and_materials), [skills](https://en.wikipedia.org/wiki/Skill), [methods](https://en.wikipedia.org/wiki/Scientific_method), and [processes](https://en.wikipedia.org/wiki/Business_process) used in the production of [goods](https://en.wikipedia.org/wiki/Good_(economics)) and [services](https://en.wikipedia.org/wiki/Service_(economics)) and in the accomplishment of objectives.

**1.3.1. Advancement of Technology**

Technology advancements in many areas make it possible to build devices that were not possible 20, 10, or even 5 years ago. Even though Moore’s law is not a law of physics, it gives an indication of the rapid technology evolution for integrated circuits. This evolution enables faster processing/computing and more memory in smaller devices at lower cost. Similarly, the rapid development of color touch-screens, small digital cameras, etc. makes it possible to envisage services to a device that were seen as utopian 10 years ago.

The size and weight of user equipment (UE) have reduced dramatically during the past 20 years. The standby and talk times have also been extended significantly and the end users do not need to re-charge their devices every day. Simple black-and-white (or brown-and-gray) numerical screens have evolved into color screens capable of showing digital photos at good quality and further into the touch-screens common on today’s smartphones and tablets. Mega-pixel-capable digital cameras have been added, making the device more attractive to use. Thus, the mobile device has become a multi-purpose device, not only a mobile phone for voice communications.

On the network side, a number of technologies have emerged that have altered the ways in which networks can be built. [Base station](https://www.sciencedirect.com/topics/engineering/basestation) [miniaturization](https://www.sciencedirect.com/topics/engineering/miniaturization) enables low cost, small cell deployments, while faster and more cost-effective backhaul mechanisms enable more varied deployments. In larger sites, advanced designs that integrate transceiver electronics and [antenna systems](https://www.sciencedirect.com/topics/engineering/antenna-system) reduce [losses, energy](https://www.sciencedirect.com/topics/engineering/energy-dissipation) costs, form factors, and site costs. In the longer term, network coordination and relocation of network functionality have the potential to change the topology of networks.

The advancement of technology with its origin dated back to about 2 million years ago will be examined according to the ages of the evolution and revolution of man which are listed below:

1. Pre-historic age
2. Ancient age
3. Medieval age
4. 1st Industrial age (1760-1830)
5. 2nd industrial age (1860-1914)
6. 3rd Industrial age (1950-2000)
7. 4th Industrial age (2001 – present)

**Pre-Historic Age**

The pre-historic age which is also the stone age was about 1.8 million years ago where virtually every tool needed by man was made and shaped from stones. Tools for hunting, weapons and for making fire were crafted out of stones and these were the technological development of this time as all these were not achieved before the pre-historic age.

**Ancient Age**

This ancient age was characterized with the discovery of copper ores and bronze on smelting metallic ores. The concentration of these elements increase with depth in copper ore deposits and smelting of these ores yields  [bronze](https://en.wikipedia.org/wiki/Arsenical_bronze), which can be hardened to be suitable for making tools. [Bronze](https://en.wikipedia.org/wiki/Bronze) is an alloy of copper with tin and being found in relatively few deposits globally caused a long time to elapse before true tin bronze became widespread. [Bronze](https://en.wikipedia.org/wiki/Bronze) was a major advance over stone as a material for making tools basically because of its mechanical properties like strength and ductility and because it could also be cast into molds to make intricately shaped objects.

### Medieval Age

One of the most significant development of the medieval age was the development of economies where water and wind power were more significant than animal and human muscle power. Most water and wind power was used for milling grain. Water power was also used for blowing air in [blast furnace](https://en.wikipedia.org/wiki/Blast_furnace), pulping rags for paper making and for felting wool.

**1st Industrial Age (1760-1830)**

The 1st industrial age was driven by cheap energy in the form of [coal](https://en.wikipedia.org/wiki/Coal) which was produced in ever-increasing amounts from the abundant resources of [Britain](https://en.wikipedia.org/wiki/Great_Britain). This age was characterized by developments in the areas of textile machinery, [mining](https://en.wikipedia.org/wiki/Mining), [metallurgy](https://en.wikipedia.org/wiki/Metallurgy) and [transport](https://en.wikipedia.org/wiki/Transport) through the [steam engine](https://en.wikipedia.org/wiki/Steam_engine) and the invention of [machine tools](https://en.wikipedia.org/wiki/Machine_tool).

**2nd industrial age (1860-1914)**

The 2nd industrial age saw astonishing developments in transportation, construction, manufacturing and communication technologies originating in Europe. The [Second Industrial Revolution](https://en.wikipedia.org/wiki/Second_Industrial_Revolution) was a period of rapid innovation and industrialization that began in the 1860s or around 1870 and lasted until [World War I](https://en.wikipedia.org/wiki/World_War_I). It included rapid development of chemical, electrical, petroleum, and steel technologies connected with highly structured technology research.

**3rd industrial Age (1950-2000)**

This age was identified with the [Mass production](https://en.wikipedia.org/wiki/Mass_production) of [automobiles](https://en.wikipedia.org/wiki/Automobile) and other high-tech goods to masses of consumers. [Military research](https://en.wikipedia.org/wiki/Military_research) and development advances which included electronic [computing](https://en.wikipedia.org/wiki/Computing) and [jet engines](https://en.wikipedia.org/wiki/Jet_engine), energy and engine technology improvements which included [nuclear power](https://en.wikipedia.org/wiki/Nuclear_power). [Rocket](https://en.wikipedia.org/wiki/Rocket) development which led to long range missiles and the first [space age](https://en.wikipedia.org/wiki/Space_age) that lasted from the 1950s with the launch of Sputnik to the mid-1980s.

[Electrification](https://en.wikipedia.org/wiki/Electrification) also was characterized with this age which spread rapidly. At the beginning of the century electric power was available for the most part but only to wealthy people.

[Birth control](https://en.wikipedia.org/wiki/Birth_control) also became widespread during this. [Electron microscopes](https://en.wikipedia.org/wiki/Electron_microscopes) were very powerful by the late 1970s and genetic theory and knowledge were expanding, leading to developments in [genetic engineering](https://en.wikipedia.org/wiki/Genetic_engineering).

**4th Industrial Age (2001-present)**

In the early part of the 4th industrial age, research went ongoing into [quantum computers](https://en.wikipedia.org/wiki/Quantum_computers), [nanotechnology](https://en.wikipedia.org/wiki/Nanotechnology), [bioengineering](https://en.wikipedia.org/wiki/Bioengineering)/[biotechnology](https://en.wikipedia.org/wiki/Biotechnology), [nuclear technology](https://en.wikipedia.org/wiki/Nuclear_technology), [advanced materials](https://en.wikipedia.org/wiki/Materials_science) (e.g., grapheme), the [scramjet](https://en.wikipedia.org/wiki/Scramjet) and [drones](https://en.wikipedia.org/wiki/Unmanned_combat_air_vehicle) (along with [railguns](https://en.wikipedia.org/wiki/Railgun" \o "Railgun) and high-energy laser beams for military uses), [superconductivity](https://en.wikipedia.org/wiki/Superconductivity), and green technologies such as [alternative fuels](https://en.wikipedia.org/wiki/Alternative_fuel) (e.g., [fuel cells](https://en.wikipedia.org/wiki/Fuel_cells), self-driving electric and plug-in hybrid cars), [augmented reality](https://en.wikipedia.org/wiki/Augmented_reality) devices and [wearable electronics](https://en.wikipedia.org/wiki/Wearable_electronics), [artificial intelligence](https://en.wikipedia.org/wiki/Artificial_intelligence), and more efficient and powerful [LEDs](https://en.wikipedia.org/wiki/LEDs), [solar cells](https://en.wikipedia.org/wiki/Solar_cells), [integrated circuits](https://en.wikipedia.org/wiki/Integrated_circuits), [wireless power](https://en.wikipedia.org/wiki/Wireless_power) devices, engines, and [batteries](https://en.wikipedia.org/wiki/Battery_(electricity)).

Genetic engineering technology continues to improve, and the importance of [epigenetics](https://en.wikipedia.org/wiki/Epigenetics) on development and inheritance has also become increasingly recognized.

New [spaceflight](https://en.wikipedia.org/wiki/Spaceflight) technology and [spacecraft](https://en.wikipedia.org/wiki/Spacecraft) are also being developed. New more capable [space telescopes](https://en.wikipedia.org/wiki/Space_observatory), such as the [James Webb Telescope](https://en.wikipedia.org/wiki/James_Webb_Space_Telescope), to be launched to orbit in late 2021, and the [Colossus Telescope](https://en.wikipedia.org/wiki/Extremely_large_telescope#Colossus_Telescope) are being designed. The [International Space Station](https://en.wikipedia.org/wiki/International_Space_Station) was completed in the 2000s, and [NASA](https://en.wikipedia.org/wiki/NASA) and [ESA](https://en.wikipedia.org/wiki/ESA) plan a [human mission to Mars](https://en.wikipedia.org/wiki/Human_mission_to_Mars) in the 2030s. The [Variable Specific Impulse Magnetoplasma Rocket](https://en.wikipedia.org/wiki/Variable_Specific_Impulse_Magnetoplasma_Rocket) (VASIMR) is an electro-magnetic thruster for spacecraft propulsion and is expected to be tested in 2015.

[Breakthrough Initiatives](https://en.wikipedia.org/wiki/Breakthrough_Initiatives), together with famed physicist [Stephen Hawking](https://en.wikipedia.org/wiki/Stephen_Hawking), plan to send [the first ever spacecraft to visit another star](https://en.wikipedia.org/wiki/Breakthrough_Starshot), which will consist of numerous super-light chips driven by [Electric propulsion](https://en.wikipedia.org/wiki/Electric_propulsion) in the 2030s, and receive images of the [Proxima Centauri](https://en.wikipedia.org/wiki/Proxima_Centauri" \o "Proxima Centauri) system, along with, possibly, the [potentially habitable planet](https://en.wikipedia.org/wiki/List_of_potentially_habitable_exoplanets) [Proxima Centauri b](https://en.wikipedia.org/wiki/Proxima_Centauri_b" \o "Proxima Centauri b), by midcentury.

**1.3.2 Advancement of Technology in Nigeria**

The present day technology all around the world is far away beyond the scope of what anyone could have imagined in the past. It has transformed human lives from their crude selves to people capable of creating robots to perform nearly all human functions. Even though technology in Nigeria in the past is nothing to write about, it can be said that now, technology is beginning to permeates nearly every part of the urban society of the country and slowly but surely, technology is creeping into Nigeria's unwieldy economy.

Nigeria being the economic giant of Africa, is a country with human and material resources to shame others but has been lagging behind in technology advancement. The manufacturing sectors with industries like [textiles](https://www.stearsng.com/opinion/shock-value/the-textile-revival-buharis-turn-in-the-ring) thrived in the 70s and 80s, but their inability to advance technologically to meet up with the current societal demands of their consumers undermined their ability to relevant. A lot other of these companies couldn’t compete with their counterparts in the western world today because of some unfavorable Government policies which do not allow technology advancement to thrive. Today, Nigeria's manufacturing sector relies on importation of raw materials as we seem to be skipping the crucial industrialization stage of economic development.

There are a number of basic reasons for why Nigeria remains relatively unaccommodating to technological advancement. One is an evident lack of focus and coordination. Few years ago, Nigeria's Minister for Science and Technology proudly proclaimed that the country would soon no longer import pencils. Around the same time, America was pushing the boundaries in luxurious space tourism and Japan was unveiling its breakthroughs in Robotics. Obviously, both countries are centuries ahead on the development curve, but Nigeria has shown a worrying lack of aspiration in this area.

The lingering perception of technology in the public sector is out of step with the times. As such, attempts to leverage on technology e.g. by automating the 2015 election process through the use of card readers was accompanied by foreseeable hitches.

It can be said that the government has not shown enough interest in pursuing domestic technological progress. Budgetary allocations to science & technology have been small under every administration, and funding for research institutions generally goes unaccounted for. Despite the country's large number of niche research institutions, their economic impact has been seriously limited. According to NEPAD (2010), South Africa produced over 86,000 scientific papers between 1990 and 2009, compared to under 28,000 in Nigeria (the second lowest in 19 surveyed countries).

Many nations have overcome deficits of this kind by adopting [industrial strategies](https://www.economist.com/news/britain/21702531-new-prime-minister-signals-more-hands-approach-business-change-gear) for those areas. This requires a concerted public-private effort to unlock the economic and social potential of technology on both a micro and macro scale. Supporting infrastructures such as power and stable institutions (and the enforcement of the rule of law) would supplement this approach.

For Nigeria to experience a drastic positive change, the Government's priority sectors should offer fertile ground for scaling up technological use. Agriculture is one field that would benefit tremendously if done. [Productivity](https://www.stearsng.com/article/unlocking-nigerias-agriculture-potential) in this sector is hampered by poor access to inputs, credit, and markets. With most farms of the [smallholder variety](https://www.stearsng.com/article/rescuing-the-poor), mechanization is a crucial step in improving efficiency. The creative industry – another priority area for the government – has boomed in the past few decades despite inadequate intellectual property enforcement and until recently, a shortage of funds. As more money has flowed into Nigerian music, movies, and art, market participants will be eager to scale up in terms of technical and technological expertise.

The trend over the last decades tells us that economies are neither static nor isolated. Technology will become a bigger part of Nigeria's economy in the nearest future, even without government policies. [FinTech platforms](https://www.stearsng.com/article/should-banks-be-scared-of-fintech" \t "_blank) will continue to disrupt the financial services industry, the labor market will place a larger premium on [digital skills](https://www.stearsng.com/article/the-future-of-jobs-nigerians-need-not-apply), and even the [informal sector](https://www.economist.com/news/international/21708675-new-technology-may-persuade-informal-businesses-and-workers-become-formal-bringing-light?fsrc=scn/tw/te/pe/ed/bringinglighttothegreyeconomy) will not be excluded from this growth.

Nigeria shouldn’t hope to compete in tomorrow's global economy if it does not evolve at an even faster pace. Today, the government raises concerns over the fact that Nigeria imports petroleum products but equal weight should be given to the absence of the technological capacity needed to produce high-value goods and services in the future. As much as the advocated change cannot happen in a day, there must be visible signs to suggest seriousness on the part of Government, which can foster the necessary domestic and foreign investment.

* 1. **COMPARING TECHNOLOGY ADVANCEMENT IN NIGERIA TO OTHER AFRICAN COUNTRIES**

A study of six key countries which include Egypt, Ethiopia, Kenya, Rwanda, Nigeria and South Africa illustrates how digital technology would help one jump ahead in its economic development. These six African countries can be organized into four segments:

1. Paving the way: Kenya and South Africa
2. Punching above its weight: Rwanda
3. Untapped opportunities for growth: Egypt and Nigeria
4. Potential for greatest digital gains: Ethiopia

**1.4.1 South Africa**

The **economy of South Africa** is the second largest in [Africa](https://en.wikipedia.org/wiki/Africa). As a manufacturing hub, it is the most industrialized, technologically advanced, and diversified economy on the African continent. [South Africa](https://en.wikipedia.org/wiki/South_Africa) is an upper-middle-income economy, one of only eight such countries in Africa. Since 1996, at the end of over twelve years of international sanctions, South Africa's [Gross Domestic Product](https://en.wikipedia.org/wiki/Gross_Domestic_Product) almost tripled to peak at $400 billion in 2011, but has since declined to roughly $283 billion in 2020. In the same period, foreign exchange reserves increased from $3 billion to nearly $50 billion, creating a diversified economy with a growing and sizable middle class, within two decades of ending [apartheid](https://en.wikipedia.org/wiki/Apartheid).

[South African state owned enterprises](https://en.wikipedia.org/wiki/State-owned_enterprises_of_South_Africa) play a significant role in the country's economy, with the government owning a share in around 700 SOEs involved in a wide array of important industries. In 2016 the top five challenges to doing business in the country were inefficient government bureaucracy, restrictive labor regulations, a shortage of skilled workers for some high tech industries, political instability, and corruption, whilst the country's strong banking sector was rated as a strongly positive feature of the economy. The nation is among the [G20](https://en.wikipedia.org/wiki/G20), and is the only African member of the group. (*Wikipedia*).

South Africa is a regional leader in the Ease of Creating Digital Jobs, buoyed by strong consumer demand for digital businesses and an institutional environment that offers supportive regulations, comparing favorably against key emerging market nations in Latin American and Asian/Southeast Asian regions. South Africa is also a regional leader in the deployment of several emerging technologies, such as biometric data and payment cards to deliver social security, drones in mining, which helps keep it at the innovative edge. South Africa also has several facilitating factors that reinforce its strengths: on a continent that struggles with power outages, it has the [lowest frequency](https://data.worldbank.org/indicator/IC.ELC.OUTG) of monthly outages among the countries studied; it has high digital transparency measures, including a relatively strong [Freedom on the Net](https://freedomhouse.org/report-types/freedom-net) score; and it was ranked [19th](https://www.iol.co.za/news/politics/sa-climbs-on-wef-global-competitiveness-index-34533898) globally as a financial hub by the World Economic Forum, which also scored the country highly for having one of the most advanced transport infrastructures in the region.

**1.4.2 Kenya**

The economy of Kenya is a [market-based](https://en.wikipedia.org/wiki/Market-based) economy with a liberalized external trade system and a few state enterprises. Major industries include agriculture, forestry, fishing, mining, manufacturing, energy, tourism and financial services. As of 2020, Kenya had the third largest economy in Sub-Saharan Africa, coming behind Nigeria and South Africa.

The government of Kenya is generally investment-friendly and has enacted several regulatory reforms to simplify both foreign and local investment, including the creation of an [export processing zone](https://en.wikipedia.org/wiki/Export_processing_zone). An increasingly significant portion of Kenya's foreign financial inflows are remittances by non-resident Kenyans who work in the US, Middle East, Europe and Asia.

As of September 2018, economic prospects were positive with above 6% GDP growth expected, largely because of expansions in the telecommunications, transport and construction sectors, and a recovery in agriculture. These improvements are supported by a large pool of highly educated professional workers. There is a high level of IT literacy and innovation, especially among young Kenyans.

In 2020, Kenya ranked 56th in the World Bank [ease of doing business](https://en.wikipedia.org/wiki/Ease_of_doing_business_index) rating, up from 61st in 2019 (of 190 countries). Compared to its neighbors, Kenya has a well-developed social and physical infrastructure. (*Wikipedia*)

Home to what’s known as a “[Silicon Savanah](https://www.wired.com/story/kenya-silicon-savannah-photo-gallery/)” in Nairobi, Kenya has a growing, tech-savvy ecosystem. Thanks to the popularity of M-Pesa, the mobile payments capability offered by Safaricom, over 70% of Kenyans have a mobile money account, and over [75%](https://globalfindex.worldbank.org/) of Kenyans aged 15 or older made a mobile payment in the last year. During the past decade, Kenya has advanced quickly as a hotspot for some of the continent’s most innovative digital enterprises, such as Ushahidi, M-KOPA, M-TIBA, etc. There are 200 digitized services offered through [Huduma E-Centers](https://www.bbc.com/news/world-africa-24855993) countrywide and a comprehensive online government-to-citizen services platform, [eCitizen.](https://www.ecitizen.go.ke/) Kenya’s policymakers have enabled a favorable regulatory environment, and have promoted a high use of digital payments.

**1.4.3 Rwanda**

The economy of Rwanda has undergone rapid industrialization due to a successful governmental policy. Since the early-2000s, [Rwanda](https://en.wikipedia.org/wiki/Rwanda) has witnessed an economic boom improving the living standards of many Rwandans. The Government's progressive visions have been the catalyst for the fast transforming economy. The President of Rwanda, [Paul Kagame](https://en.wikipedia.org/wiki/Paul_Kagame), has noted his ambition to make Rwanda the "[Singapore](https://en.wikipedia.org/wiki/Singapore) of Africa", by basing its economy on the [Singapore model](https://en.wikipedia.org/wiki/Singapore_model). (*Wikipedia*).

Rwanda has been moving to transform itself into a digital hub, with several notable initiatives, including[Irembo](https://irembo.gov.rw/rolportal/en/home), a government-to-citizen services e-portal, high mobile account usage, expanded 4G coverage across the country, and improved digital skills. Rwanda’s Mara Group also became the first manufacturers of a [smartphone made entirely in Africa](https://www.fastcompany.com/90414915/rwandas-mara-x-z-are-1st-smartphones-made-fully-in-africa). For example, 90% of Rwandans are within 5 km of a financial access point, due to the [Umurenge SACCOs](http://www.rca.gov.rw/about-sacco/umurenge-sacco/" \l ".XZ-zhedKigQ) (USACCOs), established in 2008 to boost rural savings and to provide livelihood-enhancing loans to Rwandans.  Also, Rwanda is has played a pioneering role in the region in exploring several key emerging technologies, such as [drones](https://www.bbc.com/news/av/business-47631709/using-drones-to-deliver-blood-in-rwanda) used to deliver critical supplies to inaccessible areas or considering a [central bank issued digital currency.](https://www.bloomberg.com/news/articles/2019-08-22/rwandan-central-bank-studying-ways-of-issuing-digital-currency)

**1.4.4 Egypt**

The economy of Egypt was a highly [centralized economy](https://en.wikipedia.org/wiki/Centralized_planning) focused on [import substitution](https://en.wikipedia.org/wiki/Import_substitution_industrialization) under president [Gamal Abdel Nasser](https://en.wikipedia.org/wiki/Gamal_Abdel_Nasser" \o "Gamal Abdel Nasser) (1954-1970). Since the 1990s, a series of [International Monetary Fund](https://en.wikipedia.org/wiki/International_Monetary_Fund) arrangements, coupled with massive external debt relief and U.S. aid, helped Egypt improve its macroeconomic performance.

Since 2000, the pace of structural reforms, including fiscal, monetary policies, taxation, privatization and new business legislations, helped Egypt move towards a more [market-oriented economy](https://en.wikipedia.org/wiki/Market_economy) and prompted increased foreign investment. The reforms and policies have strengthened macroeconomic annual growth results which averaged 8% annually between 2004 and 2009 but the government largely failed to equitably share the wealth and the benefits of growth have failed to trickle down to improve economic conditions for the broader population, especially with the growing problem of unemployment and underemployment. (*Wikipedia*).

The digital technology sector is Egypt’s second-fastest growing sector. The country is also producing a large number of skilled graduates; it has the [highest number of tertiary graduates](https://brusselsresearchgroup.org/index.php/2019/02/03/egypts-education-system-is-by-far-the-largest-in-the-region/) of the countries we studied. Egypt is a regional leader in skilled digital jobs creation with online freelancer pools in creative and multimedia, software development and technology, and in writing and translation. With 50% of its population below the age of 30 and a massive e-commerce market, Egypt is also developing one of the region’s [fastest growing entrepreneurial hubs](https://www.egypttoday.com/Article/15/71782/Changing-the-Startup-Scene-with-Technology).

**1.4.5 Nigeria**

Nigeria is a large, densely populated West African country on the Gulf of Guinea. Its neighbors are Benin, Niger, Chad and Cameroon. Nigeria’s coast is low-lying with lagoons and sandy beaches. There is a high plateau of extinct volcanoes in the center of the country and a mountainous area along its border with Cameroon.

Nigeria’s ICT (information and communication technologies) sector has grown from less than 1 percent of GDP in 2001 to almost 10 percent of GDP today (OC&C Consulting, 2018). Nigeria has also surpassed South Africa to emerge as a premier investment destination with 55 active tech hubs raising a total of US$ 94.9 million, while South Africa raised US$60.0 million with 59 active start-ups (Usman, Choi, & Dutz, 2019). The country is also Africa’s biggest technology market and accounts for 23 percent of internet users in Africa with 122 million people online in December 2018 (Internet World Stats, 2019). It also has the largest number of telecommunications subscribers, with a tele-density figure of almost 90 percent (Nigerian Communications Commission, 2019). The growth of the tech sector offers new possibilities for Nigeria’s growing labor force, in terms of employment and entrepreneurship.

Nigeria’s tech sector is an outgrowth of the Global Systems for Mobile Communications (GSM) System, which was introduced in Nigeria in August 2001, a few months after the creation of the National Information Technology Development Agency (NITDA). Almost 20 years later, over 100 million people have access to mobile telephones and internet use has risen to almost 50 percent (Internet World Stats, 2019). Mobile telephony and internet connectivity, combined with urbanization and population growth, have created an environment for technology products and services.

The Nigerian tech sector has benefitted from entrepreneurs moving to the country to set up companies (Bright, 2016). In 2012, two Harvard Business School graduates cofounded Jumia, a Nigerian e-commerce site and one of the first tech start-ups in the country. Since then tech firms have been established in the fields of energy, agriculture, banking, transportation, logistics, health, and finance. Several large tech companies have emerged over the past few years; these have attracted international attention and funding.

Nigeria’s tech sector has often found creative solutions to fill gaps left by the state. A weak public education system has provided room for education (“edutech”) start-ups that try to make learning more accessible and effective. Financial technology (fintech) start-ups are looking to engage segments of the population that cannot access traditional financial services.

**1.4.6 Ethiopia**

The economy of Ethiopia is a [mixed](https://en.wikipedia.org/wiki/Mixed_economy) and [transition economy](https://en.wikipedia.org/wiki/Transition_economy) with a large public sector. The [government of Ethiopia](https://en.wikipedia.org/wiki/Government_of_Ethiopia) is in the process of [privatizing](https://en.wikipedia.org/wiki/Privatization) many of the [state-owned](https://en.wikipedia.org/wiki/State_ownership) businesses and moving toward a [market economy](https://en.wikipedia.org/wiki/Market_economy). However, the banking, [telecommunication](https://en.wikipedia.org/wiki/Telecommunications_in_Ethiopia) and [transportation](https://en.wikipedia.org/wiki/Transport_in_Ethiopia) sectors of the economy are dominated by [government-owned](https://en.wikipedia.org/wiki/List_of_government-owned_companies_of_Ethiopia) companies.

[Ethiopia](https://en.wikipedia.org/wiki/Ethiopia) has one of the fastest-growing economies in the world and is Africa's second most populous country. Many properties owned by the government during the previous regime have now been privatized and are in the process of privatization. However, certain sectors such as [telecommunications](https://en.wikipedia.org/wiki/Communications_in_Ethiopia), financial and insurance services, air and land transportation services, and retail, are considered as strategic sectors and are expected to remain under state control for the foreseeable future. Almost 50% of Ethiopia's population is under the age of 18, and even though education enrollment at primary and tertiary level has increased significantly, job creation has not caught up with the increased output from educational institutes. The country must create hundreds of thousands of jobs every year just to keep up with population growth.

While it has the most ground to cover among the six countries studied, Ethiopia is experiencing positive developments in several areas that can facilitate digitally enabled growth. Prime Minister Abiy Ahmed, who won the [2019 Nobel Peace Prize](https://www.theguardian.com/world/2019/oct/11/abiy-ahmed-ethiopian-prime-minister-wins-2019-nobel-peace-prize), has a [background in and understanding](https://africanbusinessmagazine.com/company-profile/the-dawn-of-ethiopian-tech/) of the tech sector and has been implementing reform in a number of sectors, including [privatization](https://africanbusinessmagazine.com/opinion/ethiopia-rebirth-suddenly-everything-is-possible/) of several state-owned entities. Ethiopia has also been upgrading its infrastructure, with a [$20 billion](https://ethiopianembassy.be/2014/12/01/ethiopia-to-make-usd-20-billion-investment-for-power-development/) investment in the power sector. Overall enrollment in higher education facilities in the country have grown five-fold since 2005, and the government has a policy of training [70%](https://www.howwemadeitinafrica.com/ethiopia-is-africas-new-growth-engine-heres-why/63699/) of students in STEM; so the human capital base is strong. With a fast-emerging tech hub, also known as [‘Sheba Valley,’](https://www.itnewsafrica.com/2017/07/sheba-valley-ethiopias-silicon-valley/) the country has had several homegrown ride-hail ventures, Ride and ZayRide, startup marketplaces, Gebeya and BlueMoon, as well as an agtech incubator and seed fund. Ethiopia can leverage advances in adjacent areas: there is a [growing manufacturing industry](http://www.taipeitimes.com/News/editorials/archives/2019/10/11/2003723749) and use of advanced technologies, such as [blockchain use](https://www.coindesk.com/ethiopia-explores-blockchain-role-in-tracking-coffee-exports) in tracking the supply chain and enhancing trade in coffee beans.

**CHAPTER 2**

**NIGERIA TECHNOLOGY IN THE PAST**

Changes to technology over time has affected many aspects of life. The way we lived in the past is different to the way we live today and this is vastly due to the changes in technology. Technological changes affect the way we work, travel, communicate and play. Over the past 20 years, technology has developed in leaps and bounds, and we’ve seen changes occur that we couldn’t have even imagined back at the turn of the millennium. Below is the review of the most dramatic changes that technology has undergone in the past two decades.

**Mobile Phones**

Today, your mobile phone is likely never more than an arm’s reach away, but 20 years ago things were quite different. According to a study by The Office for National Statistics (UK), in 2000, only 47% of households in the UK had a mobile phone, and unlike the ones we own today, they were very limited on what they could do, mostly restricted to SMS texting and calling.

Nowadays, everyone has a mobile phone in their pocket, but it’s no longer just a mobile phone! Today, mobiles have internet access, high definition cameras, gaming capabilities, music storage and a whole host of apps, from ordering a taxi to finding a date in minutes. It's hard to imagine a world where our phones didn’t have cameras, but camera phones didn’t actually start appearing until the 2000s. It was Nokia and Motorola that dominated the market throughout the 90s and early 2000s. The models that were released between 1998 and 2000 brought about the first ever customizable ringtones, appearances and games, with the first ‘smartphones’ beginning to appear between 2004 and 2006 as they enabled GPS.

Flip phones were extremely popular throughout the 2000s, with Samsung being the most notable brand. The first iPhone was released in 2007, however, iPhones weren’t immediately popular like they are today. Instead, Blackberrys were popular due to their physical keyboard with singular letters, email function and instant messaging system ‘BBM’. Today, touch screens are the norm and physical keyboards are somewhat of a rarity! Compared to the 47% of households that had mobiles in 2000, in 2018 this figure had more than doubled to 95%.

**Television & Entertainment**

In the early 2000s, VHS tapes were ever popular as a way to watch films that you had bought, or to record programmes that you were going to miss, as there was no catch up function on televisions back then. Around 2002, VHS tapes decreased in popularity as people switched to DVD’s due to their higher quality, and by 2008, VHS tapes were practically obsolete. Today, streaming sites such as Netflix are the most popular way of watching films and TV shows, and it’s a rarity for people to purchase physical copies of films. Interestingly enough, Netflix initially started as a DVD rental service, and didn’t introduce streaming services until 2010!

In terms of television, back in 2000 it was rare to have more than the standard five channels, yet today satellite boxes can give you hundreds of channels to watch, perhaps even too many to choose from! There is also the option to catch up on the programmes that you’ve missed from the broadcaster’s on demand services – meaning you don’t have to program your VHS player to record your favourite programmes while you are out.

The introduction of streaming services such as Netflix, Now TV and YouTube also mean that fewer people are watching traditional TV. Instead, they are opting to stream programmes online where they can choose what they want to watch and when.

**Gaming**

Huge advancements have been made in the gaming industry since the millennium, aided by increasing internet speeds. It was the year 2000 that the PS2 was launched, which marked a turning point for gaming culture – it was the first console that looked ‘grown up’. Prior to then, gaming consoles were mostly aimed at children and teenagers, with popular games being classics like Super Mario and Sonic the Hedgehog, played on N64, Xbox, PS1 and Sega consoles.

Where portable gaming is concerned, the Nintendo GameBoy was popular in the early 2000s, with the Nintendo DS being released in 2004, introducing a touch screen into the portable gaming world. Gaming systems nowadays are more portable than ever, with consoles such as the Nintendo Switch and the introduction of Google Stadia – which allows you to stream games over wifi and play them on a desktop, smartphones and tablets.

Gaming graphic capabilities have also advanced hugely in the last 20 years, moving from colour blocks through pixelated images, arriving at the near lifelike quality of imagery we know today. As we head into 2020, a huge number of different gaming consoles are available, with features such as motion tracker technology and virtual reality headsets that make you feel like you are actually in the game rather than just playing it! This is aided by the advancement of realistic 3D graphics and game physics that occur just as they would in real life. Using this technology the Nintendo Wii provided a breakthrough in further expanding the appeal of gaming, reaching older ‘non-gamers’, as did mobile gaming. Finally, there is a much richer range of gaming content available today thanks to market places such as Steam and online app stores, which have given indie developers a real foothold into the industry.

**Music**

In the early 2000s, music was stored on cassette tapes and CDs, bought in store and listened to on devices such as stereo systems or portable Sony Walkmans. The first iPod was released in 2001, where you uploaded your CDs into iTunes and stored them all on a portable device that you could listen to anywhere.

The original iPod featured a 5GB hard drive capable of holding 1000 songs in 160-Kbps MP3 format. A 10GB option was available from March 2002, which doubled its capacity to around 2000 songs. Even the iPod and other MP3 players themselves have become almost obsolete in the last five years, as the memory capacity of mobile phones grew to be large enough to store your music collection on.

Nowadays, practically all music is downloaded or streamed to our phones and computers, dismissing the need for physical in store purchases. We can listen to our entire music collection anywhere, in great contrast to the year 2000 when you had to physically carry any tapes or CDs you wanted to listen to on the go.

**Computers**

According to a study published by The Office for National Statistics (UK), only 44% of households in the UK had a home computer in 2000. Twenty years ago, computers were heavy, bulky and took up a lot of space on a desk (monitors could be more than 30cm deep!) They could be slow and unreliable, with the graphics being a lot slower than what we are used to today. Memory in computers was also limited, so external hard drives were common.

Today, it’s hard to imagine a world without computers. By 2018, the figure of those who had home computers had doubled from 44% to 88%. They are smaller, faster and more convenient than ever, and subsequently are part of our daily life, as we use them at work, home and even on the move. Rather than taking up a whole desk, computers can fit into a handbag in the form of a tablet or notebook, to be taken anywhere you like. They also have more memory than they used to. Although laptops first came about in the 80s, it wasn’t until 2005 that they overtook desktops in terms of sales. Laptops have transformed the way we work, enabling hot desking and remote working. With technology advancing at the rate it has, a laptop today costs a fraction of what it would have in the early 2000s, yet the performance is infinitely better.

**Social Media & Messaging**

The first blogging sites became popular in the late 90s starting a social media sensation that continues on to this day. Early blogging sites included Blogger and LiveJournal. MySpace was launched in 2003 to become one of the first ever worldwide social media sites, and was popular among budding musicians as a place to upload and share their tracks. Facebook was launched in 2004, and by the end of the year, it had 1,000,000 monthly active users.

Today, we have multiple social media platforms that all fit different social networking niches, such as Instagram, Snapchat, TikTok, LinkedIn and many more. It’s rare to come across someone who isn’t on at least one social media channel, and as of the third quarter of 2019, Facebook had 2,499,000,000 monthly active users – making it the most used social networking platform worldwide.

The first widely used instant messaging platform was MSN Messenger, which was popular with teenagers as a way to connect with school friends after classes were over for the day. It started as a text messenger, but later added photo sharing, video calls and games. In 2009 it had as many as 330 million users but was closed down in 2014 when Microsoft replaced it with recently purchased Skype. Today’s popular messaging platform is WhatsApp, which in 2018 boasted 450 million daily users, with 1.5 billion people using the app.

**Internet Speed**

Twenty years ago, the internet connection used was known as ‘dial-up’, which used a telephone line to connect to the internet. This meant that you could only use either the phone line or the internet at one time, sharply increasing the number of arguments in households with teenagers! Dial-up would take up to a minute to connect and was characterised by a series of musical beeps, screeches and boings as the modem connected. Needless to say dial-up was notoriously slow – 56kbit/s, which contrasts with UK average speeds today of 22 Mbps. To put this into context – a 6MB image would take 15 minutes to download on dial-up, but only 2 seconds today. Today, we are able to access the internet completely wirelessly, from wherever we are. WiFi was introduced in the early 2000s, but demand for it exploded when WiFi enabled phones hit the market around 2007 and consumers wanted public WiFi points for when we’re out and about. On our mobile phone networks we also have internet access via 4G, and are slowly being introduced to 5G, which will only make our access to the internet even faster.

The number of people who have access to an internet connection has also hugely increased in 20 years. In 2000, only 25% of all households in the UK had broadband access, yet in 2018 over 95% did!

**Memory**

There is a stark contrast between the data storage of 20 years ago, the storage available now. Twenty years ago people were using floppy disks and Compact Disc Rewritables (CD-RW) to hold files such as documents and photos, and although they were large in physical size, they didn’t hold much data. At the beginning of the millennium, USBs had just been invented, which held around 8MB – enough for two ebooks or a 90 second low-resolution video. Nowadays, we have USB-C drives, that can carry significantly more information compared to USB drives and offer double the transfer speed, all whilst gradually getting smaller in size.

SD (Secure Digital) cards are also commonplace today, they come in a variety of different sizes to suit your different devices, from cards around the size of a stamp to ones the size of your fingernail! It’s also not unusual to see SD cards today that hold over 250GB – which is a huge advancement from the 32, 64 or 128 MB cards available 20 years ago! This is the equivalent of being able to hold just ten 12 megapixel photos on a 64MB card, whereas a 250GB card can hold around 30,000.

Over the last few years, we’ve gradually been moving away from storing information on physical devices as cloud storage has become very popular. Cloud storage allows us to access data from anywhere that has an internet connection, removing the need for us to carry around memory devices. Instead, our information is stored on huge servers around the world, providing almost limitless capacity. This does, however, leave your files at the mercy of other companies, so many people prefer to privately store them on memory devices.

It’s evident that huge advancements have been made in the past two decades across all areas of the technological world. It almost seems impossible to imagine what will happen in the next two!

**CHAPTER 3**

**THE PRESENT EFFECT OF TECNOLOGY ADVANCEMENT IN THE NIGERIAN ECONOMY**

Recognizing the seemingly insatiable appetite of consumers for phone services, and the potentials of the Nigerian market, investors pumped in $2.110 billion into the sector by December 2002, $2.55 billion by June 2003, and over $4.0 billion by March 2004. The initial investment was just US$50 million as at the end of 1999. This represents a percentage increase of over 8,000. Investment in the telecommunication sector ranks second only to the oil industry. Of all the applications of ICTs, the use of mobile phones is on the increase in most developing countries while internet usage is considered to rank next to phone usage, especially in Nigeria. Specifically, ICT has successfully aided the following sectors of the Nigerian economy: the Industrial/Manufacturing, Education, Transportation, Tourism, Health, Banking, Commerce, Agriculture, Government Services, Defense, Sports, and Rural Development.

ICTs played vital roles in the enumeration of the 2006 population census in Nigeria, and the successful hosting of the 15th National Sports Festival, 2006. The Network Providers in Nigeria has been devoting huge sums of money to support sports. E-voting is in the pipeline, with strong support from major stake holders, against the on-coming national election in 2007. It is expected that the Network Providers will soon devote their assistance towards research in the higher institutions of learning in Nigeria. The impacts of ICTs have been noted to influence the environment, employment, poverty alleviation, attraction of foreign funds, and empowerment for the disabled. The fastest growing employer of labor in Nigeria today is the telecom industry -- specifically the wireless telephone sector that provides services to individual customers using the GSM. The “tele” density (fixed and mobile lines) in Nigeria has jumped from 1 line to 440 persons in 1985 Technology 332 to 1 line for every 263 persons in 1997 and 1 to 18 in 2004. As at March, 2004, the sector created about 5,000 new direct jobs and 400,000 indirect new jobs. These appear in the form of the various ICT engineers, scientists, technicians, software developers, accountants, managers and clerks employed by the network operators, and individual small scale related activities. Table 1 shows a picture of how the introduction of ICTs has been able to generate employment at the grass-root. The average monthly profit from Table 1 is commensurate in the process of alleviating poverty since the Nigerian per capita income is about $320 - implying below US$1.00 per day – and $1.00 exchanges for about N140.00

**3.1. Current Challenges of ICT in Nigeria**

ICT which is the economic driver for most developed economy has been identified as the key player in economic/sustainable growth. The following are the challenges of ICT in Nigeria.

* Inadequate ICT policy enforcing the use/adoption of ICT driven services- there are no adequate rules in place to ensure the safe use/adoption of ICT services in the Nigerian State, while sectors like the banking sector fully adopt ICT in the execution of its services, other sectors are yet to fully adopt the use of ICT services in its service e.g. education and tourism sectors.
* High Cost of ICTs Equipment in Nigeria- the exorbitant cost of ICT equipment in Nigeria is a major challenge of ICT growth in Nigeria. The Federal Government of Nigeria(FGN) should has not adequately protected the ICT sector through price control and the ensuring the standardization of important ICT goods/services.

**3.2. E-Health and M-Health (ICT Health)**

ICT in Healthcare is powerful in monitoring the outbreak and spread of disease, disseminating health information about health-promoting and disease-preventing, training and long distance support to health care practitioners. E-Health is defined as the use of ICT in provision of health care services. This means ICT can be used in various health care functions such as clinical, educational, research and administrative regardless of geographical settings. M-Health (Mobile Health) extends the efficiency and accuracy of the already available health systems through the use of electronic devices such as PDAs and mobile telephone networks to improve functions of the health systems.

**3.3. Electronic Governance**

The questions that usually come to mind are: what is the role of Information Communication Technology in governance? Is government doing enough to empower her people through ICT? In Nigeria, many government agencies are now using websites to provide information on the activities of government. Today people of Nigeria can go to the internet and get any information they want. Jobs, contracts, and government activities are posted to websites for public knowledge. This has greatly improved productivity, thereby making the economy of Nigeria high. Nigerians can now ask questions about public issues, and make their views known to government. Therefore E-Government must be customer driven and services oriented, meeting the needs of citizens and improving the quality of life while the government should understand ICT and their implication to government and society at large.

**3.4. Employment Opportunities**

The use of ICT to bring new employment for youths and migrant workers has also given opportunity to develop new ideas in the technology via the education system, training facilities and affordable access to computers. In this way, youths have an opportunity to be self-employed, and they are exposed to entrepreneurship through the use of information and communication technology. The demand of technology is seen to be a reality in creating employment opportunity for young people, where the youths will show their interest and creativity in software applications, bio-engineering, digital media, and mobile applications, which will attract young people’s creativity. Social interactions through the use of information and communication technology will help reliable and creative business ideas in the next one to three years, so that they can respond more effectively in all aspects of learning needed, and to document the best information and communication technology practices among the youths for future benefit.

**3.5. E-Business and Services in Nigeria**

Doing the business online has emerged as a practice in Nigeria. Though the industry is in nascent stage but has shown tremendous potential over last few years especially after competitive growth in banking sector. The growing young, educated, and technology friendly population has contributed largely in growing trends of e-business in the country. Popular E-Commerce models Business to Business (B2B), Business to Customer (B2C) and Customer to Customer (C2C) are adopted by many Small and Medium Enterprises (SMEs) as a growth strategy for their business. Similarly, public service innovations are also driven by Government to Government (G2G), Government to Citizen (G2C) and Government to Business (G2B) models.

**3.6. ICT in Education (E-Learning)**

ICTs are a potentially powerful tool for extending educational opportunities, both formal and non-formal, to previously underserved constituencies, scattered and rural populations, groups traditionally excluded from education due to cultural or social reasons such as ethnic minorities, girls and women, persons with disabilities, and the elderly, as well as all others who for reasons of cost or because of time constraints are unable to enroll on campus.

Some of the importance of E-learning to the country is:

1. Access to Remote Learning Resources
2. Evaluative Learning
3. Active Learning
4. Creative Learning
5. Collaborative Learning
6. Integrative Learning
7. Evaluative Learning

**3.7 ICT in Economic Development**

The economic growth of any nation is tied to its ability to expand productivity. ICTs have the capacity to increase productivity, that is, to create more cost-effective output with the same or less input. Wealth generation is increasingly closely tied to the capacity to add value using ICT products and services. The value of information and accumulated knowledge within developing countries is an important aspect of their future growth potential. Only a very few developing countries have succeeded in narrowing the development 'gap' by harnessing the production or use of ICTs to their development goals. These technologies do not offer a magic potion that can be expected to provide a cure for the sick, to prevent environmental degradation, or to create jobs. However, if these technologies can be combined with domestic and external human resources, they can be instrumental in achieving major changes in the organization of industrial activity and the conduct of everyday life.

REFRENCES

1. <https://www.cgdev.org/reader/new-economy-africa-opportunities-nigerias-emerging-technology-sector?page=0>
2. <https://en.wikipedia.org/wiki/Economy_of_Egypt>
3. <https://en.wikipedia.org/wiki/Economy_of_Rwanda>
4. <https://en.wikipedia.org/wiki/Economy_of_Nigeria>
5. <https://en.wikipedia.org/wiki/Economy_of_Kenya>
6. <https://en.wikipedia.org/wiki/Economy_of_Ethiopia>
7. https://en.wikipedia.org/wiki/Economy\_of\_South\_Africa
8. <https://hbr.org/2019/12/research-how-technology-could-promote-growth-in-6-african-countries>