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## Exploring the Efficacy of Science and Technology for Sociopolitical Change in Nigeria: Coming to Terms with Reality, Hopes and Actions

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### **Abstract**

*It is no gainsaying that little or no distinction exists between science, technology, societal change, and political development in nations of the world. This is so in light of how much science and technology have permeated every aspect of human life without sparing governance or public policy. Despite how digital the world has become and how much reliance nations of the world place on science and technology to reap dividends of democracy, foster social and economic development, improve national security, impact public administration, increase public engagement and increase social entrepreneurship, it is pitiable that the boundary between science and technology and sociopolitical development in Nigeria is bleak, giving the low-level of priority given to science and technology by the Nigerian government and the rather vague gains recorded thereupon. Thus, this paper explores the effectiveness of science and technology in engendering a positive sociopolitical change in Nigeria, whilst assessing where we are (reality), where we aspire to be (hopes) and how we intend to get there (action). Wherefore, the paper concluded that the growth of science and technology for sociopolitical change can only be made possible through improved funding for research by polytechnics and Universities of Science and Technology to a definite benchmark*

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**Keyword:** Science, Technology, Socio-political, Governance, and Politics.

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### **Introduction**

The advancements and achievements of the world today are products of science and technology which makes one believe and generalize that science and technology (ST) have the solutions to the world and human difficulties. This is because man has, through science and technology, been able to explore, exploit and expand his immediate environment for his benefits. Hence, for a nation to be considered as developed, the level of science and technology must be very high and of course, sophisticated. This view is held by Imiere (2004) that the quest for national development, growth, and self-reliance should be matched with corresponding progress in science and technology. This is a submission further buttressed by Edobor and Maliki (2006) who asserts that no nation can rise above the level of its scientific and technology attainment.

It is thus no surprise that more developed nations of the world are paying dire attention to the development of science and technology as is evident in the increase in publications in top

journals and patent awards in China and South Korea. For instance, many Asian countries, especially China and Korea, have pursued aggressive initiatives with major investments in research and development, infrastructure, and educational capacity.

In the past five years, Asia's share of global research and development investment has increased from 33% to almost 40%. China has gone up from 10% to 18%, making it the second-largest spender after the US. Increased investment in research and development in China contributed 60% to economic growth and reduced reliance on foreign technologies to less than 30%. China produced 1.5 million new science and engineering graduates in 2011 compared to 857 000 in the European Union. A similar objective was pursued by South Korea in the 1980s making it a global leader in science and technology (Adenle, 2015). This shows the importance of investing in science and technology.

Nigeria's desire to level with economic giants of the world, be a cynosure in the comity of nations as well as have a system that is at par with developed nations of the world may not be realizable without de-linking her undue dependence on natural resources and embracing reliance on science and technology. As Iyoboyi (2016) puts it, this is because science and technology are fast replacing natural endowment as means of wealth creation as demonstrated by countries like Japan, South Korea, Taiwan, etc. These countries have become economic giants of the world today through the industrial technology they embraced. This further buttresses the vital and non-negligible role of science and technology in the global stratosphere.

Science and technology are unarguably focal to the development of energy, increase in agricultural output, as well as, improvement of environmental and health conditions. This made Ravetz (2004) refer to science as the powerhouse of civilization. According to Colucci-Gray, Camino, Barbiero, and Gray (2006), to salvage itself from the vague shackles of underdevelopment, a country blessed with natural resources has to develop the required technology to drive both the depth and variety of its revenue, promote job creation and ultimately improve the living standards of its citizens. Meeting the goals of development, within short, medium, and long terms would require sentient efforts by policymakers to deal frontally with the way to incorporate science and technology within the framework of national development. Otherwise, efforts geared towards improving productivity in all strata of the economy as a method of providing an enabler for economic stability would be self-defeatist.

Within the conventional schema, economists emphasized the amassing of labour and capital to serve as the principal forces of growth. However, recent events have prompted a rethink, with more attention increasingly being paid to non-traditional sources, like technological change and institutions. In the 21st century, which might be appropriately described as the century of information explosion, the road to Nigeria's economic emancipation does not belong in reinventing the wheel but adopting and adapting the technologies that are advanced within and outside; on the resources with which nature has generously endowed the country. Thus, the scientific assignment of discovering the laws of motion, gravitation, gasses, and optics, among other intellectual accomplishments is undertaken by a number of the brightest minds in history (Iyoboyi, 2016).

What then is instrumental to Nigeria's economic transformation is how to adopt and adapt science and technology to assuage prevailing human problems. Nigeria is rich in human and natural resources. However, being rich in natural resources is not enough to be a wealthy

country. The resource-curse paradox deals sufficiently with this phenomenon. The economic history of mankind is illustrative of the very fact that resource abundance is just an additional factor in development. It should be a basic but not a satisfactory condition for development. The success stories of Japan and Singapore speak expressively of the necessities of other scopes of non-natural resources in the development trajectory. A technology-rich society will, in the end, be richer than a natural resource-rich country. However, a country rich in both natural resources and technology can attain the desired altitude of development.

### Concepts

The intricate connection between science and technology has a protracted history. With strict reference to development, science and technology have impacted economic areas such as poverty reduction, leading to healthier and more productive lives, rapid improvement in agriculture, and economic development.

**Science** - Science, derived from the Latin word “*scientia*” meaning what to know, what is a fact, truth, or certain, is a body of knowledge and process studied for the possibilities it offers for the development and advancement of technology. It is a way of explaining certain events, occurrences, and phenomena in nature using acceptable laws, principles, and practices (Besmark-Digbori, 2008). Science is the branch of knowledge that is empirically acquired through observation, experiments or tests, and logical analysis.

**Technology** - Technology, derived from the Greek word “*techne*” and the Latin word “*technicus*”, meaning “art” or “craft”. The Greek word “*techne*” was generally used to designate “a bag of tools” and was later responsible for the general definition by many people that technology is the study or mastery of the use of tools in the manufacturing and industrial sectors (Grace, 2010). Technology can be described as a systematic and scientific application of practical skills and theoretical knowledge to solve problems, particularly those problems that can hinder scientific development.

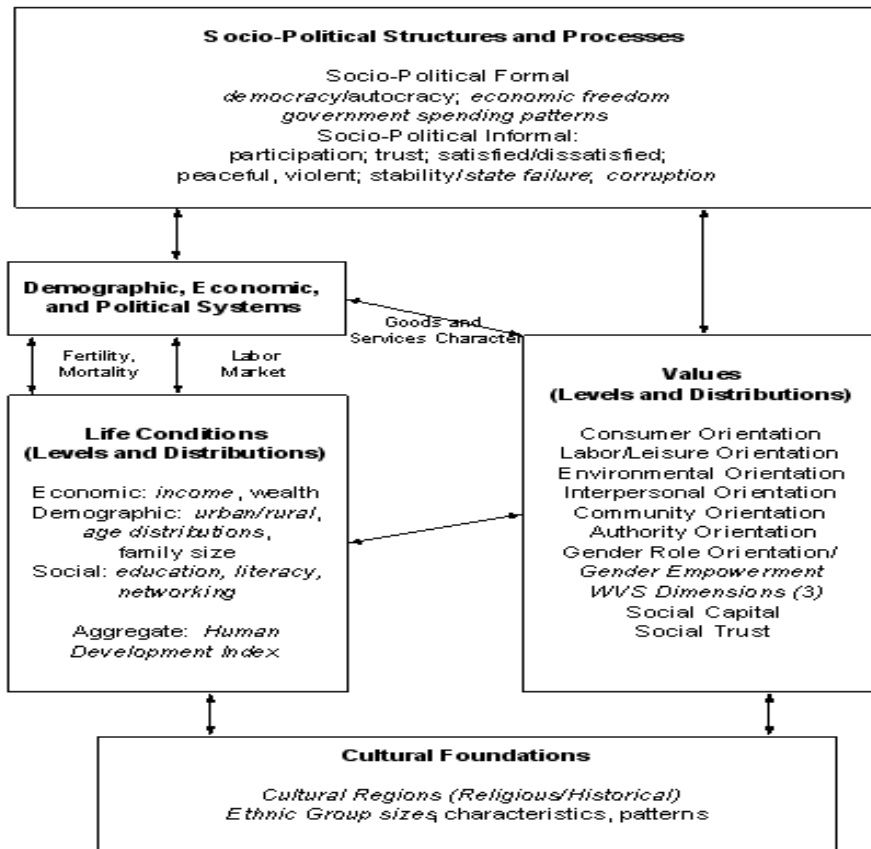
According to Oluka (2013), technology is understood as the body of organized knowledge, tools, and machines used by man to manipulate his environment to satisfy his basic needs. Further definition of technology puts it as a systematic application of manufacturing methods and industrial arts to enhance efficiency in human activities. Technology is also defined as the result of man’s efforts to do things more efficiently and effectively. Technology is a way or means of accomplishing a task (Dekoya, 2012). Technology can be deduced as the harmonious application of organized scientific, socio-cultural know-how to manipulate the environment to solve problems and satisfy human need (Isioto, Philip-kpae and Dickson, 2017).

Science and technology have different functions, ways of viewing and knowing the planet, and therefore their relationship is usually tense and sophisticated. However, they serve to tell and extend one another in each preplanned and sudden ways knowledge base and methodologies themselves give a significant supply of input into the event of technological practices and outcomes. They’re additionally key tools within the establishment of explanations of why technological interventions were, or weren’t, successful. Technological practices, information, and outcomes will give mechanisms for science to realize a more robust read of its outlined world, and in truth will give serious challenges to the process of that world.

**Sociopolitical change** - The impact of social change on society cannot be fully evaluated until it is placed within the perspective of the interrelationships of political institutions. Herein, the total society is conceptualized as a social system in which the basic social institutions of the family, church, political and economic organizations are related and interrelated with each other to constitute a characteristic pattern. Thus, any change taking place in one or more of these social institutions will bring about a change in the pattern and,

consequently, in the totality of the social structure. This will, in turn, affect a change in power relationships and the overall relationship with persons, organizations, political, economic, and social institutions (Smith, 1968). It is thus the change involving both social and political factors. According to Rothman and Irfan (2013), Social and political change occurs on three dimensions; social characteristics or individual life conditions, values, socio-political institutions, and process (figure 1).

**Figure 1: Sociopolitical structure and process**



*Source:* Hughes and Jose (2014).

## REALITY

### Science, Technology and the Social Spectrum

Science and technology have a great impact on our existence. With technology, we read national daily using the web newspaper. Again, we connect families, relatives, or colleagues while abroad by using email correspondence, call conference, video conference, or messenger. Science and technology are the premises for human existence from the past and this has driven man to continuously seek ways to enhance the processing of data and communicating such information to one another on a real-time basis, regardless of distance (Ndukwe, 2002). Surviving the modern era depends on access to national and global information networks. Science and technology are the bedrock for the survival and development of any nation in a very rapidly changing global environment, and it challenges us to plan initiatives to handle a bunch of issues like reliable infrastructure, skilled human resources, transparent and accountable government, and other critical issues with capacity building.

According to Anyakoha (cited in Arugu and Chigozie, 2016), technology is the use of artificial tools for the gathering, generation, communication, recording, re-management, and

exploitation of data. It includes those applications and commodities, by which information is transferred, recorded, edited, stored, manipulated, or disseminated. UNDP (2001) asserts that whether or not a sustainable economic process facilitates the creation and diffusion of useful innovations, technology is not only the result of growth but will be used to induce growth and development. Science and technology are credited with the flexibility for transformation, and deep and substantial changes are expected from their widespread use in Africa. From this viewpoint, Africans can take maximum advantage of the new technologies whether or not major challenges remain. These challenges include adapting science and technology to local conditions and uses in developing countries and allowing each country to understand those innovations and adjust them to their own development needs.

It is now a fact as evidenced by developments from other countries that science and technology can contribute immensely to national development, especially by improving the national GDP of a nation in which science and technology, acting as an enabler, may end up in improved market competitiveness of a nation's products and services. Science and technology can impact positively governance and other sectors of the economy. More so, science and technology can effectively assist international economic integration, improve living standards, narrow the digital divide, and improve biodiversity utilization and management. The social advantage of science and technology is invaluable and cannot be easily enumerated. Nonetheless, a sizeable number of social benefits can still be appraised. And these benefits include social interactions. Keeping in touch with friends and relations remains one of the most important social benefits of science and technology. Science and technology have also condensed inequalities of opportunity between rural and urban areas with the introduction of internet services, which supplies educational programmes to remote locations (Arugu and Chigozie, 2016).

The economic advantage of telecommunications is immense, both as a growing industry in its claim and in terms of its influence on economic development. Telecommunications is making the planet a smaller place and creating a new information-free way of high-speed electronic data exchange. The economic implication of ICT are far-reaching; mobile telephones, television set and cash machines are just a few samples of the way science and technology are changing how people communicate, become informed, or do business.

### **Science, Technology and the Political Spectrum**

In Nigeria, the emergence of ICT has no doubt transformed the political stratosphere of the country. In realizing its decent advantages, former President, Olusegun Obasanjo mandated the Ministry of Science and Technology to develop appropriate programmes that would facilitate the buildup of a reliable and value-effective infrastructure which will encourage the efficient utilization of internet services in Nigeria through widespread information and communication technology devices to leverage science and technology to drive effective and efficient public service delivery to the citizens of Nigeria. Beyond this, science and technology have a positive impact on the electoral process, especially in making some decision making and communication of policies quicker and more efficient. Albeit, it is instrumental to note that strategic, operational and procurement planning is pivotal to the successful introduction and deployment of science and technology in elections.

As rightly observed by Tsagarousianou (cited in Arugu and Chigozie, 2016), science and technology can potentially contribute to the democratic process by supporting three different types of activities, namely:



- i. Obtaining information: technology could help provide information about government and also the democratic process through, for instance, websites developed by government institutions, political parties, campaigning groups, and online news services. The utilization of digital technology also supports 24-hour news-gathering and dissemination about current political events.
- ii. Engaging in deliberation: Asides from voter's turn out, attendance at public meetings, party membership, and participation in political fundraising activities also seem to be declining. However, using science and technology to reinforce the communication links between citizens and their representatives requires that government and representatives must show commitment to listening and learning and responding promptly, otherwise the perceived or real gap between the governed and also the government will only increase. This demands increased resources, skills, and facilities.
- iii. Participating in decision making: the foremost obvious way through which citizens participate in political decision-making is through voting for their government representative. Science and technology can of course make the voting process more convenient by enabling electronic voting, either from a voting station of the voter's choosing or over the web from anywhere. This could also speed up vote counting. However, there are significant concerns to pay attention to regarding the demand for e-voting, the secrecy of the voting act, security of the votes and counting systems, voter access to the technology, and voter ICT ability before e-voting may be implemented on a large scale (BBC 2003).

Citizen participation may be extended to decision-making via electronic referenda. Again, however, there are important issues concerning secrecy, security, and access. Science and technology, therefore, have the potential to reinforce or re-invigorate political participation and also the democratic process. Akpore (1999) stated that, only if technologies are legally supported, operationally appropriate, accurate, cost-effective, timely implemented, transparent and sustainable, they will build credibility by improving the speed and efficiency of the electoral process. Most issues regarding voter registration costs should do with the variant of the registration system, institutional responsibility for voter registration, and degree of resilience in cost assessment.

### **Challenges of Science and Technology for Sociopolitical Change in Nigeria**

Despite the numerous benefits of science and technology to social and political systems as discussed above, it is worthy to mention that engendering sociopolitical change using science and technology is replete with myriad challenges, which the succeeding paragraphs shall talk over. According to Muanya (2019), the Nigerian government's poor investment in science and technology, as well as research and development, is very pronounced. This is quite evident in the 2019 budget which reveals that a meagre 0.76% was allocated to the Federal Ministry of Science and Technology (FMST) i.e. N66, 823,303,434 from N8, 826,636, 578,915. A breakdown showed that the larger part of the money is for the payment of salaries and is not channelled towards research and development. According to the budget, 52% i.e. N35, 020,953,172 is proposed for recurrent expenditure and 48% i.e. N31, 802,350,262 for capital expenditure. Unfortunately, the budget for science and technology is the least in the 2019 budget. Even the office of the secretary to the government of the federation got more money than science and technology.

The situation as described above represents how pitifully funded science, technology, research, and development is in Nigeria. Isioye et al. (2017), submits that a good number of research institutions in Nigeria are not adequately funded. This implies a setback to the

efficacy of research work. China has been growing its research and development expenditure by 20 per cent annually, since 1999. China now accounts for 12 per cent of global R&D expenditure, spending nearly 5 per cent of its budget (or 1.76 per cent of GDP) in 2010 on the sector. When compared to Nigeria over the past decade, the government's science and technology expenditure has been less than 1 per cent of the yearly budget – a grossly inadequate figure. This is expectedly saddening for a sector intended to drive scientific and technological research and development for sociopolitical change in Nigeria.

More so, the standard of education is falling and therefore the consequence is that the production of half-baked graduates and job seekers who incidentally move the streets. No wonder the atrocious rate of social vices (bank theft, kidnappings, arms struggle, cultism, ritual killings, drug merchandising, non-secular conflicts, etc.) within the country. Ibiyemi (2007) stressed that the Nigerian instructional system has to be restructured. The restructuring is to deal with the problems of falling commonplace, the asymmetry within the distribution of admission into our polytechnics/colleges of education on one hand and therefore the universities on the opposite hand; and non-functional and non-market driven programmes, among others in our universities and polytechnics. University education might not for everyone, although everyone ought to tend a chance to prove their ability.

Maduagwu (2000) says Nigeria is politically an unstable country besieged with a violent sort of ethnic nationalism, right down to the creeks of the Niger Delta where the youths are in a virtual state of rebellion. Hence, the inflow of foreign investments cannot present itself in an environment of political and economic instability. There is inadequate business infrastructure; inefficient administration, erratic power provision, poor and epileptic phone connectivity, absence of drinkable water, inadequate crime management, poor system, fuel inadequacy, inadequate primary health care, and lesser than the average educational system.

Policy continuity is additionally lacking in Nigeria. For Akuta (2009), once a different government takes overpower, they sometimes abandon previous governmental policies or programs. More often than not, only a few policies were maintained by successive administrations (both military and civilians). The National Youth Service Corps (NYSC) has lasted over thirty-five years. The federal character principle (enshrined in the 1979 constitution) has lasted thirty-one years. High-level official corruption, that although isn't legislated, has become a part of most governments for over forty-nine years of our existence as a nation.

There is little question that human capital is the most significant sort of wealth for a contemporary nation. As noted by Iredale, Fei, and Santi (2003), countries with the foremost intellectual resources attain the best rates of economic development and therefore the quickest development in science and technology. However, information produces quite more than economic riches; it's additionally an important ingredient for addressing several of the social and environmental issues of life nowadays. Within the drive for human capital, several industrialized countries (Canada, the UK, United States, Japan, Singapore, Hong Kong, Germany, and Australia), are giving priority to policies aimed toward attracting extremely consummate immigrants. These known weaknesses and constraints have inspired the Nigerian government through the Ministry of Science and Technology to develop an additional brief, strong and viable Science, Technology and Innovation (STI) policy that is predicted to retort to the dictates of globalization, dynamic business atmosphere, and new/emerging technologies and so give way for effective funding of R&D.

## **HOPES**

What is instrumental to Nigeria's economic transformation is how to adopt and adapt science and technology to assuage prevailing human problems. Nigeria is rich in human and natural resources. However, being rich in natural resources is not enough to be a wealthy country. The resource-curse paradox deals sufficiently with this phenomenon. The economic history of mankind is illustrative of the very fact that resource abundance is just an additional factor in development. It should be a basic but not a satisfactory condition for development. The success stories of Japan and Singapore speak expressively of the necessities of other scopes of non-natural resources in the development trajectory. A technology-rich society will, in the end, be richer than a natural resource-rich country. However, a country rich in both natural resources and technology can attain the desired altitude of development (Iyoboyi, 2016).

Innovation connected to new medical technologies has conjointly become a very important foundation of competitive advantage, particularly within the rising field of life sciences – a key driver of economic progress within the 21st century. According to Salomon (2010), once the export is focused on a few primary commodities, there will be serious economic and political risks. Export diversification aims at mitigating these economic and political risks. Economic risks to be alleviated include: within the short term, volatility and instability in exchange earning that have adverse economic effects (employment, investment coming up with, on growth import and export capability, inflation, capital flight, undersupply of investments by risk loath investors, debt repayment); and within the future, laic and unpredictable declining terms of trade trends that exacerbate short-run result. According to Odiá and Omofonmwan (2013), a review of Nigeria's economic development between 2000 thus far unconcealed that overall economic policies and development methods didn't give a facultative setting that would alter the structure of production and consumption activities to diversify the economic base. The country is continually a mono-cultural economy, reliant on oil, indicating that the export base is however to be diversified.

This so speaks truly of the case of Nigeria since its mono-cultural economy has created a very little impact on its people, nevertheless its natural resources. Therefore, the necessity for increasing such merchandise, and seeking proper utilization wherever doable, are priorities for the Nigerian economic process and diversification. It has been noted that among the assorted factors that have the potential to drive economic diversification, a country's natural resources are crucially necessary. These resources will be exploited to extend the varying exports and products a country produces, particularly through innovation, whereby further worth will be created from the resources extracted. Therefore, Nigeria during this regard has enormous benefits within the diversification of its economy.

The private sector obviously will assume a significant role in job creation. This will go far to decrease the degree of neediness in Nigeria. All the more along these lines, Science and technology additionally assume a key job in improving personal satisfaction and life quality. For example, an investigation into medicinal services has proven effective in counteracting, analyzing, and treating different diseases. Innovation in science can bring huge improvement into health care services (Uguru, Hemen, & Atuba, 2016).

According to Ismail and Giulia (2014), recent proof has shown that a rise of ten mobile phones per hundred individuals will boost gross domestic product growth by 0.6 per cent and a 1% increase within the variety of web users will increase total exports by 4.3 per cent.

At the point when a decent number of power organizations crop up, constantly they will require manpower to work and keep up the organizations, which implies the formation of business opens doors for the tremendous greater part of Nigerians that are jobless. Many



engineering graduates wandering the roads looking for inaccessible employments will, at last, hurl a mutter of assuagement as the majority of them will be consumed by the rising autonomous power makers.

## **ACTIONS**

### **The way forward: Science and Technology for Sociopolitical Change in Nigeria**

Undoubtedly, science and technology can confer real opportunities to enhance social and political change in Nigeria. For one, the development of science and technology in Nigeria promises great value for the nation because it is the best, most realistic, and pivotal alternative to reliance on natural endowments. To be sure, if properly implemented, science and technology will accelerate the swift social, political, economic, and cultural expansion needed as a nation to be among the developed nations of the world. Fully embracing science and technology in Nigeria is tantamount to espousing transparency, which exposes corruption; a social malady that has eroded the psyche of Nigerians and has defeated their trust in the sociopolitical process. Thus, the growth of science and technology for sociopolitical change can only be made possible through improved funding to the Ministry of Science and Technology as well as funding for research by polytechnics and Universities of Science and Technology to a definite benchmark

It is pertinent, therefore, to deepen our level of reflection on social dynamic forces and on the constrictions encountered when introducing and using science and technology for sociopolitical change. A healthy information society is concerned with getting reliable and timely information to its members. Making people conscious of the advantages derivable from the utilization of science and technology will help to reshape society to a healthy one.

## **Recommendations**

It is as a result of assessing the reality and hopes, that this paper proposes the following actions:

- i.** Urgent attention should be paid to the funding of the Ministry of Science and Technology. The funding should be directly linked to the Federal Government's Consolidated Revenue Account.
- ii.** In addition to the above, a Single Contingency Account should be set aside to be proportionally funded by respective state governments for research and development.
- iii.** Government should improve funding of the polytechnics and Universities of Science and Technology to a definite benchmark and equally fund research in Science & Technology as well as award more grants.
- iv.** A feedback monitoring system should be put in place to monitor the funds allotted to research and development, grants as well as innovation.
- v.** Strong alliances with universities should also be fashioned to develop intensive new curricula in science and technology and to conduct joint analysis on new technologies.
- vi.** Government should ensure that a clear roadmap on policies is created and that such policy is institutionally driven rather than person-centred. The essence of this is to ensure continuity in policies regardless of the government in power.
- vii.** Manufacturing corporations should be inspired to dedicate a sizable share of their annual turnover to research and development establishments.
- viii.** The government ought to encourage research collaboration between higher institutions of learning, research institutions, and industries.
- ix.** Owing to Nigeria's plentiful endowment in renewable energy resources like electricity, solar, wind, tidal, and biomass, there is a requirement to harness these resources and chart an innovative energy future for Nigeria. Hence, the government should shoulder the responsibility to make renewable energy accessible and cheap to all, as well as

offering a constant, high-quality power supply to improve the Nigerian business atmosphere.

- x. The policy of the Ministry of Science and Technology should be targeted at enhancing content development in key areas of Information and Communication Technology. The implementation of this policy should be driven principally by the private sector, promoting entrepreneurship, innovation, and local capability development, while the government will be the supporter and catalyst for the projected growth.

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