

Repositioning Higher Education towards effective patronage of Science and Technology for Sustainable Development

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*" Education is the most powerful weapon which you can use to change the world"
- Nelson Mandela 1918-2013*

Protocols

1.0. Opening Speech

It's with great pleasure and deep sense of responsibility that I stand to give this Convocation lecture, the 1st to be delivered in the history of this great institution. The title of today's lecture: 'Repositioning Higher Education towards effective patronage of Science and Technology for Sustainable Development', is apt for a nation on transit like ours seeking to maintain equilibrium amidst contemporary global challenges and a couple of internal imbrolios.

I remain grateful to the Rector and the entire management of Edo state Polytechnic Usen, for giving me this unique platform and lifetime opportunity to be the guest lecturer of today. I stand here to felicitate the entire management and the many generations of graduands represented here today.

I take the liberty of this moment to make my modest submission towards the sustainable development of our nation. I do hope that this piece will meet your expectation and arouse a sense of commitment that can actually strengthen our nation on her path to sustainable development.

2.0. Introduction: Definition of Basic Concepts

In today's context, higher education which is synonymous with tertiary education, refers to post-secondary educational systems. This include training at Colleges of Education/Technology, Polytechnics and University systems.

Science and Technology 'S & T' are highly related. The term 'science' has been defined as 'the intellectual and practical activity encompassing the systematic study of the structure and behaviour of the physical and natural world through observation and experiment'. While, 'technology' is referred to as 'the use of science in industry, engineering, etc., to invent useful things or to solve problems', (Merriam Webster's Learner's Dictionary, 2017). Technology is an application of scientific research. Science, which includes the natural and social sciences comprises of a multi-

disciplinary body of knowledge about nature and society gained through observation and experimentation. While its primary functions are descriptive and explanatory, science also affords guidance on normative goals such as improvements in the human condition, promotion of civil rights, and wiser ways of living. Engineering involves the practical applications of this knowledge and of empirical experiences to create structures, facilities, processes, and products. Those processes and products that have become established by acceptance of society and its marketplace are commonly classified as Technology (Rabiu, 2006a). In reality, technology takes advantage of scientific knowledge to set up machines/tools in order to deploy deliverables for benefit of man and the town as a whole. Suffice it to say that technology cannot exist without scientific research. This implies that any system that does not seek to improve its scientific research cannot develop its own technology. Indeed, science is the bedrock of engineering/technology.

3.0. Sustainable development: The Nigerian experience

Rabiu (2018a, 2018b, 2018c) recently discussed the potency of science and technology in sustainable national development. This section and section 4.0 are culled from the texts of these references.

3.1. Sustainable development

'Sustainable development' has many definitions, but the most often used one is that credited to Brundtland report in 'Our common future' given as the "Development that meets the needs of the present without compromising the ability of future generations to meet their own needs", (United Nations General Assembly, 1987; Dernbach, 1998, 2003; Cerin, 2006). Sustainable development includes all forms of developments such as economic development characterized by low growth rate, absence of pollution, and greatly diminished environment impact (Business dictionary, 2017); human development void of environmental damages and social developments that give room for future development. Sustainable development has at least three dimensions: the economic, social and environmental.

Rabiu (2006a) emphasized that human development is culminated in the ability to transform in-built human capacity to agent of transformation of his immediate and remote environment to object of his own pleasure and instrument of peace. UNDP (2004) explained that human development is about creating an environment in which people can develop their full potential and lead productive, creative lives in accord with their needs and interests. The report further emphasized that people are the real wealth of nations. Development is thus about expanding the choices people have to lead lives that they value.

The United Nations General Assembly gave a new contemporary face to the term 'sustainable development' when on 25 September 2015, the 194 countries of the UN General Assembly UNGA adopted the 2030 Development Agenda titled Transforming our world: the 2030 Agenda for Sustainable Development. As a way of building on the successful Millennium Development Goals MDG (United Nations, 2015), the UNGA announced the 17 Sustainable Development Goals and 169 targets (United Nations General Assembly, 2015). They are integrated and indivisible and balance the three dimensions of sustainable development: the economic, social and environmental. The 17 Sustainable Development Goals SDG adopted by the UNGA are thus shown in Table 1.

Table 1: The 17 SDGs (Source: United Nations General Assembly, 2015).

- Goal 1: No Poverty: End poverty in all its forms everywhere
- Goal 2: Zero Hunger: End hunger, achieve food security and improved nutrition and promote sustainable agriculture
- Goal 3: Good Health and Well-being: Ensure healthy lives and promote well-being for all at all ages
- Goal 4: Quality Education: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all
- Goal 5: Gender Equality: Achieve gender equality and empower all women and girls
- Goal 6: Clean Water and Sanitation: Ensure availability and sustainable management of water and sanitation for all
- Goal 7: Affordable and Clean Energy: Ensure access to affordable, reliable, sustainable and modern energy for all
- Goal 8: Decent Work and Economic Growth: Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all
- Goal 9: Industry, Innovation and Infrastructure: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation
- Goal 10: Reduced Inequalities: Reduce inequality within and among countries
- Goal 11: Sustainable Cities and Communities: Make cities and human settlements inclusive, safe, resilient and sustainable
- Goal 12: Responsible Consumption and Production: Ensure sustainable consumption and production patterns
- Goal 13: Climate Action: Take urgent action to combat climate change and its impacts
- Goal 14: Life Below Water: Conserve and sustainably use the oceans, seas and marine resources for sustainable development
- Goal 15: Life on Land: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss
- Goal 16: Peace, Justice and Strong Institutions: Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels
- Goal 17: Partnerships for the Goals: Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development



Fig 1. Global Sustainable Development Goals (Global Goals). (Source: <http://www.un.org/sustainabledevelopment/news/communications-material/>, Accessed 14th June 2017)

3.2. Nigerian Current Status of Development

The poor level of development in Nigeria is underlined by the ongoing economic turbulence and the present state of affairs in the country. According to the Center for Global Development (2012), Nigeria, though the giant of Africa, ranked 93rd in the world MDG progress ranking tying with Congo republic and behind African countries such as Malawi, Ghana, Gambia, Burkina Faso, Egypt etc. With the current population of about 198 million, the human development index (HDI) as at 2016 is a weak 0.47 and the nation ranked 151 at global level, unbecoming figure for a nation endowed with tremendous mineral resources (UNDP, 2016). HDI actually measures the average achievements in a country in three basic dimensions of human development: a long and healthy life, knowledge and a decent standard of living. The World Economic Forum's Global Human Capital Index 2017 ranked Nigeria in the 114th position out of 130 countries, with a score of 55.06, behind Rwanda (71), Ghana (72), Cameroon (73) and Mauritius (74) and South Africa (87), (World Economic Forum, 2017). According to the Heritage Foundation (2017); Nigeria scored 57.1% ranked 115 in the world and 16 in Africa on the Index of Economic Freedom. This ranking put countries such as Cote d'Ivoire (63), Namibia (62.5), South Africa (62.3), Seychelles (61.8), Swaziland (61.1) and Uganda (60.9) ahead of us.

In contemporary time, Nigeria first attained the status of the largest economy in Africa in April 2014. As at then, things appeared rosy with growth rate of real GDP of 6.54% in Q2 2014 (4.18% quarter-on-quarter), higher than 5.40% recorded in the corresponding quarter of 2013, and also higher than the 6.21% recorded in the First Quarter of 2014 (NBS, 2014). Even as at then, the economic buoyancy was not translated to prosperity in the land.

Rabiu (2016) observed that the presumed economic abundance did not yield expected economic growth as over 62% of Nigeria's over 180 million people live in extreme poverty. Figure 2 displays the summary of the Nigerian economy outlook from 2011 to 2017. The GDP economic growth started declining from 6.2% in 2014 to 2.7% in 2015. In recent years, the first time the nation actually went into recession was in Q4 of 2014, the same year we attained the status of largest economy in Africa. The nation again hit economic recession at the end of 1st quarter of 2016 with a GDP of -0.4% while the woeful trend reached the record low of -2.24% in Q3 of 2016. The GDP in Nigeria shrank 1.3% year-on-year in the fourth quarter of 2016, following a 2.24% decline in the previous period. It was the fourth consecutive quarter of contraction. The economy contracted 1.5% in 2016 following a 2.8% growth in 2015, the first annual contraction in 25 years.

The Federal Government on Tuesday, March 7th, 2017, released its Economic Recovery and Growth Plan 2017-2020 (ERGP), and initiated series of measures to improve the economic outlook. According to this ERGP, the real GDP of the country is projected to grow by 4.62 % over the planned period from 2017 – 2020. It is expected to grow by 2.19 % in 2017 and eventually achieve a growth rate of 7 percent by 2020. Q2 of 2017 recorded growth of 0.55 %, and the Federal Government announced by September 2017 that the country is out of recession after five consecutive quarters of contraction since Q1 2016. The economy of Nigeria expanded 1.9 percent year-on-year in the first quarter of 2018, easing from an upwardly revised 2.1 percent growth in the previous period. It is the fourth consecutive quarter of expansion, as the oil sector continued to rise while the non-oil output growth slowed [Trading economics, 2018]. Today our exchange rate

is about 362 Naira to 1 USD. The International Monetary Fund, IMF, had earlier affirmed Nigeria's recovery from economic recession in 2017 and projected a growth of 2.3 % in 2018 (Komolafe, 2017).

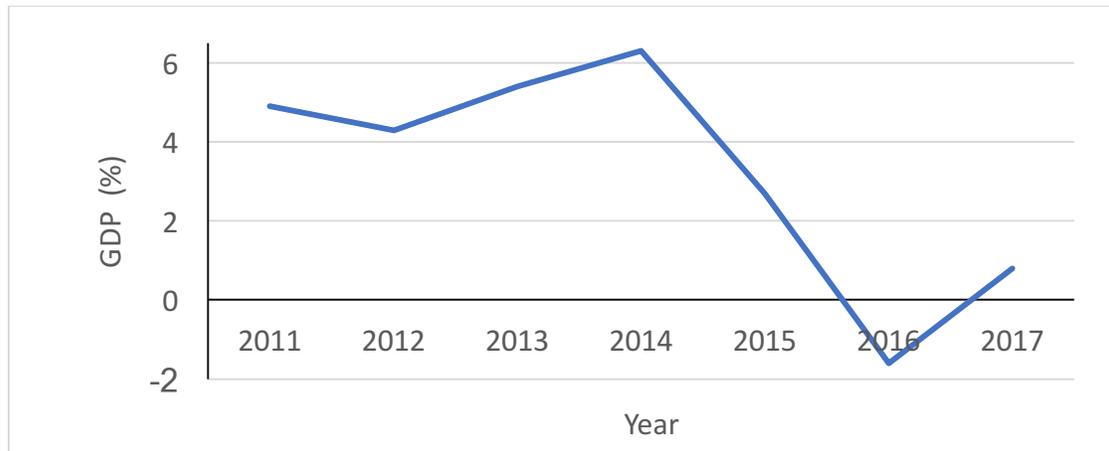


Figure 2. Nigeria GDP growth rate 2011 - 2017

Rabiu (2016) stated that our oil-rich nation has been bedeviled by epileptic power supply, lack of infrastructure, unfriendly business environment, high unemployment index, restrictive trade policies, persistent policy uncertainty, low crude prices, an inconsistent regulatory environment, real and disguised terrorism, slow and inconsistent judicial system, unreliable dispute resolution mechanisms, insecurity, disruptions in oil exports, infrastructural vandalism, economic leakages, restiveness, economic sabotage and 'chronic/fantastic corruption'.

Emphatically, Nigeria, a nation blessed with tremendous natural and human resources is in a sorry state of under-development. This paper highlights how the duality of science and technology have been engaged in some other nations of the world to create sustainable development and also how Nigeria can actually be healed of her underdevelopment using the instrumentality of science and technology which is achievable through higher education. Higher educational system when well repositioned is capable of providing the needed impetus to engage S & T towards our sustainable national development.

4.0. Science and Technology: Critical Inputs to Sustainable development

Rabiu, (2006a) argued that sustainable development must be based on scientific and technological knowledge. Creating this knowledge, however, is costly, and that is why much of it originates in industrial countries. The Organization for Economic Cooperation and Development (OECD) countries spend more on research and development (R&D) than the economic output of the world's 61 poorest nations taken together. According to the International Council for Science, the transition towards sustainable development is inconceivable without science (ICSU, 2002).

Bezanson (2002) observed that the pace and impact of scientific advances and technological innovations are unprecedented, with the result that those with the capacity to absorb, use, and adapt the advances in science and technology will be better placed not only to enrich themselves but also

to influence the conduct and evolution of human affairs. Those unable to harness these advances will almost certainly be increasingly marginalized and remain under-developed.

Research is the motor through which knowledge continuously expands, and technology can provide the impetus to supply products that provide a basis for sustainable development and a better livelihood for the poor and needy. Rabi (2006a) described S & T as the vital membrane that links man to sustainable development as illustrated in Fig. 3. It was clearly shown by Rabi (2015a) that human ability to harness the products of scientific research has made the present day man more comfortable than any of his ancestors.

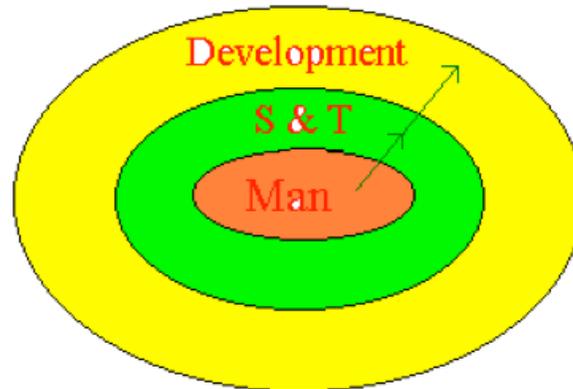


Figure 3. S & T as vital membrane linking man to sustainable development (from Rabi, 2006a)

Rabi (2016) emphasized that science and technology (S & T) are critical inputs for any economic development. S & T were engines of past economic discoveries. ICT and Space technology are the drivers of today's global economy including e-commerce. Space technology is rooted in basic sciences which include physics, chemistry, and mathematics. Doing financial transaction has never been a fun! The financial transparencies we see on electronic transaction platforms today are products of S & T. This makes misappropriation of funds difficult and easy to detect at the press of a button.

The economic boom and consequent prosperity that were recorded after the 2nd world war by Japan and other developed nations was attributed largely to development in Science and Technology (Morris-Suzuki, 1994). The acquisition, effective adaptation, and improvement of technologies from abroad by Japanese industry served as the basis for Japan's rapid economic growth and international competitiveness in a wide variety of manufacturing industries (National Academy of Sciences, 1997). Xie et al., (2014) submitted that scientific advances contributed 51.7% to China's economic growth in 2011.

Increase in applications of scientific and technical knowledge has been recognised by UN Task force on Millennium Development Goals MDG, reported by Juma and Yee-Cheong (2005), as sine qua non to tackling challenges in sectors of crucial significance to sustainable development. These include economic productivity, agriculture, education, gender inequality, health, water, sanitation, and environment. The UN Task Force asserted that 'technology innovation and the associated institutional adjustments underpin long-term growth and must be at the centre of any strategy to strengthen the private sector.

Smith (1994) observed that invention, growth in capital per worker, and advances in industrial organization were all linked. Rabiou (2006b) opined that today's world is not driven by wealth of nations in terms of natural resources, but by technological advancement. Through the ages, today's developed nations have used S & T to achieve their development goals. Science and technology have long been regarded as important determinants of economic growth. Unlike capital and labour, S & T do not suffer from diminishing returns rather they appreciate and thus are more powerful drivers of any development (Bordoff et al., 2006).

US national Academies (2005) observed that '*since the industrial revolution, the growth of economies throughout the world has been driven largely by the pursuit of scientific understanding, the application of engineering solutions, and continual technological innovation*'. Bordoff et al (2006) confirmed that numerous academic studies confirm that technological progress has accounted for a significant share of US economic growth. In the words of Cohen (2009), 'economic growth in the 21st century shares at least one characteristic with growth in the 20th century: It is based on technological innovation'. In summary, Bordoff et al., (2006) asserted that for the United States to remain at the technological frontier, the United States must make more workers literate in science and engineering; embrace a redesigned system of national investments in—along with a stronger commitment to— scientific research; and adopt more effective incentives for private sector firms to undertake R&D.

Sachs (2012) having served as Special Advisor on the MDGs to two UN Secretaries-General Kofi Annan and Ban Ki-Moon, asserted that expanding the reach of crucial technologies (including medicines, diagnostics, electrification, high-yield seeds, and internet) from high-income and middle-income economies to low-income economies is the main strategy to elimination of extreme poverty and achieving any sustainable goal. He opined that the world will need new technologies and new ways to organise human activity to combine improving living standards and ecological imperatives. Technological and social change will be paramount, in both rich and poor countries alike.

Advances in S & T are as a matter of fact altering the way people live, connect, communicate and transact, with profound effects on economic development. Technological and scientific revolutions serve as the bedrock of economic advances, improvements in health systems, education and infrastructure.

Experience in the world today has shown that the emergence of new technologies in human history and the resulting innovations have not only resulted in technological change, but have also caused great and *positive* changes in the industrial and economic structure of the world and the social environment of mankind (World Technopolis Association, 2018, *italics mine*).

The technological revolutions of the 21st century are emerging from entirely new sectors, based on *micro-processors, telecommunications, space technology, biotechnology and nano-technology*. Technological products are transforming business practices across the economy, as well as the lives of all who have access to their effects. The extent to which developing economies emerge as economic powerhouses depends on their ability to grasp and apply insights from science and technology and use them creatively (Chetty 2012).

At this point, I commend the Edo State Government for its scientific approach to governance which is manifested in the administration's adoption of ICT-based reform initiatives in the state's civil service, revenue collection and data-driven governance (Vanguard, 2017). Of note is the establishment of the Edo State Geographic Information Service (EDOGIS) on the 1st of August,

2017 by Governor Godwin Obaseki for effective lands administration, management, registrations, geo-mapping and surveys, in Edo State (www.edogis.org). Also the Edo Innovation Hub which hosts the South-South Innovation Hub, was commissioned in June this year by this present administration and became the first state tech hub in the country. Already, the tech hub has completed the training of 724 entrepreneurs in less than three months of operation and has now drawn up a sustainability plan that will see the private sector drive activities at the cluster (Vanguard, 2018). These and other technology-based initiatives of the government surely positioned the state for economic explosion and sustainable development.

5.0. Selected Examples of Contributions of Scientific Research to SDGs

This section showcase the applicability of S & T to some selected SDG. Obviously our inability as a nation to adapt indigenous technology as support for our past economic gains have contributed to our present state of economic recession and overall under-development. We therefore consider applications of S & T in some of the key sectors that affect SDGs.

Goal 1: No Poverty: End poverty in all its forms everywhere

It is obvious that the poverty being witnessed in the land today is not as a result of lack of abundance, but due to triple afflictions of corruption, wastages and economic leakages among other factors. Knowledge is a vital key to overcome poverty of all kinds. S & T has advanced the propagation of knowledge more than ever.

S & T has proven to be effective in taming corruption and control of economic Leakages. Effective patronage of S & T is capable of overturning our looming economy. Effective application of ICT in banking sector actually led to the recent discovery of fraud in the appropriation of government fund in various X-gates around us. For example, through the effective application of biometric-based Bank Verification Number (BVN) scheme, a product of technology, to the Integrated Payroll and Personnel Information System (IPPIS) the Federal Government in February 2016 detected unbelievable size of 23,846 ghost workers and saved monthly recurrent losses to the tune of N2.293b! (Ogidan and Okwe, 2016). Some economically sensitive State Governments are now following this trend to control leakages.

Goal 2: Zero Hunger: End hunger, achieve food security and improved nutrition and promote sustainable agriculture

Scientific research has led to improved seedlings and plant varieties. Advanced nations of the world know the worth of food sufficiency. Scientific research is at the base of food sufficiency as it leads to quality and abundant farm yield.

Precision farming, a farming technique more advanced than mechanized farming, now embrace the use of autonomous vehicles, automated machines, real time network surveillance cameras and Global Navigational Satellite System based operations to handle farm operations. This S & T based applications has numerous advantages which include easy techniques, less tedious, improved yield, makes farming attractive, optimal use of resources – no wastages, machines can work day and night – extra time, effective farm surveillance, and long term cost effective. This ensures food security and sufficiency. Imagine the huge farm yield possible for us, if precision farming can be applied to large expanse of land across our nation lying fallow.

Also preservation and optimal processing of agricultural produce require S & T. These add values to raw materials from farms and enhance economic prosperity. In the domain of food security,

improved scientific knowledge of plant biology and breeding techniques had led to better seeds and cultivation practices that drastically increased yields.

Goal 3: Good Health and Well-being: Ensure healthy lives and promote well-being for all at all ages

Scientific research is at the root of every invention to cure of diseases and drug development. As at today, most expensive drugs are still been imported and more sadden is the fact that no vaccine is manufactured here in Nigeria. We have all it takes in terms of human resources and capabilities to get this done locally within our borders. With adequate manpower development in relevant basic sciences and appropriate infrastructural development we can get this resolved locally. Then imagine the huge capital flight we can save, the employment opportunities therein, and the impetus this can offer our economy. Pharmaceutical research should be seen to be above the level of lip service.

Telemedicine is a practice that utilize product of space technology and ICT in health care delivery. Telemedicine makes it possible to treat disease or injury by consultation with a specialist in a remote area by means of a computer or satellite link. Telemedicine makes health care readily available at all levels of demand irrespective of the remoteness of the location.

Goal 4: Quality Education: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all

E-learning, a scientific product, has transformed the way we learn and promote literacy more than ever. ICT, space technology and space dependent technologies have all combined to make the world a global village. More knowledge is being acquired outside the walls of classrooms and teaching/learning is getting better than ever with effective teaching/learning aids which had hitherto eluded the world. Advanced nations make these aids readily available to their citizenries. Underdeveloped nations need to adapt e-learning to improve quality of education being dispensed within their borders. Nations like India has embraced tele-education several years ago.

No doubt, the proliferation of modern social media and information technology have given the world an unprecedented opportunity for inclusive, global-scale problem solving around the main sustainable development challenges (Sachs, 2012).

Goal 7: Affordable and Clean Energy: Ensure access to affordable, reliable, sustainable and modern energy for all

This is only possible by scientific research that borders on generation of novel energy sources. For instance, our nation is naturally located in the tropics where we have abundant solar energy sufficient to drive our systems and needed electricity. Our inability to harness these readily available resources is a major factor responsible for our underdevelopment. Energy is a major concern in Physics and there have been great volume of research output even within our domain waiting for application. Sustainable development requires effective diversification of energy resources and application of environmentally friendly renewable energy sources. Solar, wind, geothermal and few natural energy sources are waiting for effective exploration. We shall forever remain in negative direction in terms of development until we switch our focus and think like advanced nations of the world – scientific research is the way out.

Utilization of new friendly energy sources requires intricate interplay of research and development, public investments in infrastructure (such as high-voltage direct current transmission grids for long-distance power transmission), private investments in renewable power generation, and new strategies for regulation and urban design (Sachs, 2012).

Goal 8: Decent Work and Economic Growth: Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all

I chose to highlight two points under this section: Diversification of Sources of national Income and optimal Exploitation of mineral resources. Diversification of sources of national income can only be attainable with correct application of S & T such as patronage of local engineering firm in development of appropriate designs and prototypes of infrastructures necessary for application in hitherto largely untapped industries.

Nigeria is endowed with enormous mineral resources such that every state is blessed with quite a number of mineral resources (Rabiu, 2014). These mineral resources when properly harnessed can lead to tremendous economic growth. Minerals are natural endowment capable of sustaining the energy and economy sectors of any nation. It should be made clear that the discovery of great reserves of mineral deposit alone does not on its own translate into economic development. Rather, the effective exploitation which is based on scientific and technological capabilities is the key to harness the optimal benefits of mineral resources (Okpanachi, 2004; Gotan, 2004; Gyang et al, 2010). Akthar (2001) rightly observed that proper exploitation and utilization of these resources is one of the key factors for the growth of the national economy. Gyang et al (2012) argued that universal best practices involve value addition to the quality of the raw minerals to attract buyers and increase utilization in the various industries. Value addition requires application of relevant science and technology in laboratory testing, further processing and beneficiation (Rabiu, 2014). It is sensual enough to know that finished processed products with appropriate add on done locally will have better market value than raw materials. S & T are the twin process that can upgrade our minerals locally through appropriate techniques, thus increase their market values and save capital flight. Apart from value addition to minerals, tourism, agriculture and entertainment sectors and other industries need appropriate technology to transform them to income earning sectors.

Diversification of national source of income would surely promote sustainable economic growth and create new employment opportunities. To drive home the need to begin to shift our national absolute reliance from crude oil export, some future-conscious nations had already set target to ban fossil fuel based cars with dates that are sacrosanct. The nations with set dates are Norway – 2025, Netherlands – 2025, Germany – 2030, India – 2030, France – 2040, and UK – 2040. China is working on the timetable to ban the production and sale of fossil fuel based cars (Roberts, 2017; Pitas, 2018). Phasing out of these fossil fuel based cars portray a great warning to our oil-dependent mono-economy. The year 2025 is just six years one month away from here! It is high time we learned from the story of Zimbabwe and the fall of copper export due to great fall in its demand at international market.

Goal 11: Sustainable Cities and Communities: Make cities and human settlements inclusive, safe, resilient and sustainable

Public safety is of great economic concern when it comes to investment in any nation. It is obvious that our public safety is at moment nothing to write home about, posing great risk to investment and economic development. Patronage of space research and technology hold the key to solving our present security crisis in Nigeria. Our government must be ready to enforce scientifically established security solutions to the present crisis in our country. Kidnappings, armed robbery, vandalisation of public infrastructure and terrorism are menaces that space technology has solutions to. For instance, an effective aerial surveillance which can be achieved with constellation of high resolution Earth Observation Satellites EO's in network with some Unmanned Aerial Vehicles UAV, distributed surface mounted cameras, some ground control rooms equipped with customised ICT and experts,

are all we need to effectively man our country land and borders. This kind of system would complement our security outfits and build confidence in any investor. Have you wondered how Brussels and United States detected terrorists behind the bombings of the Brussels airport of 22nd March 2016 and Boston marathon of April 15, 2013 respectively within few hours?

6.0. State of Higher Education systems in Nigeria

It has been demonstrated that science and technology are critical inputs to sustainable development. The tools of acquiring them is knowledge and knowledge is obtainable via education. Higher education is fundamental to development. From my travels round the globe, I found out that most nations of the world are reflections of their higher educational systems. Our tertiary institutions are supposed to provide developmental direction for the nation. No nation has risen above the standard of her educational system.

As at today, Nigeria has 165 universities (43 federal, 47 state and 75 private) (nuc.edu.ng); 122 Polytechnics (28 federal 43 state, 51 Private), 27 Specialised Institutions, 34 Colleges of Agriculture, 38 Colleges of Health Science and Technology, 82 Vocational Enterprise Institutions, 154 Innovation Enterprise Institutions, 117 Technical Colleges (net.nbte.gov.ng); and 89 colleges of education (www.nceonline.edu.ng). The higher education system in Nigeria is well coordinated under appropriate regulatory bodies established by the law of the Federal Government of Nigeria. The bodies are the National Commission for Colleges of Education NCCE (Established by the Act No. 3 of January 1989, amended decree No. 12 1993), National Board for Technical Education NBTE (Established by the Act No 9 of 1977 the National Board for Technical Education) and National Universities Commission NUC (Established by the National Universities Commission Act dated 15th January, 1974). The academic programmes in our tertiary institutions are well pre-conceived and outlined elegantly in our numerous brochures and booklets. These academic programmes are well coordinated by the responsible regulatory bodies.

In my discourse on the needed synergy between the 'town' and the 'gown' documented in Rabi (2018c), I mentioned that "the gown is supposed to provide solutions to the problems of the town. However, for the gown to do this, the gown has to be problem-free or at least quasi-free of problems. A system of gown that is engulfed in contemporary problems common to the town cannot effectively proffer solutions to the problems of the town. 'until one removes the log of wood in his own eyes, he may not be able to remove same from another person's eyes'. In the words of experienced Alice Gast, a former President of Imperial College London, 'I am disheartened by the current world climate, where I feel that some view higher education as part of the problem rather than part of the solution' Gast (2018). The gown has to put her house in order to be able to effect the kind of impetus necessary to unleash her contributions to technological advancement for the betterment of the town in a sustainable manner. A weak and corrupt gown cannot help the town to be better."

Rabi (2018c) observed that apart from this well-coordinated course outlines which are regularly regulated by the appropriate regulatory bodies, there are some key issues that have come to corrupt the delivery of the academic content over time. These issues need to be addressed in order to reposition the gown towards a better synergy with the town. These are not limited to:

- i. *Poor delivery of the academic lectures. Nowadays, there are actually absentee lecturers in a number of lecture halls in our public tertiary institutions.*

- ii. *Sexual assaults are now more prominent than ever, In recent time, we heard of the cases of OAU, then UNILAG, AAU etc.*
- iii. *Examination malpractice being aided by academics up to PhD level*
- iv. *Plagiarism of publications including theses; lack of respect for copyrights and intellectual property even by lecturers*
- v. *Inadequate reward system for core academic personnel as against favouritism of less-research oriented academia*
- vi. *Financial mismanagement*
- vii. *Incessant strike action by staff unions in our tertiary institutions.*
- viii. *Ethnicity: Few decades ago, ethnicity was never a problem in the Nigerian higher education system. Leadership was always on merit, it was neither based on ethnicity nor politics. Nowadays, we hear of host communities clamouring to provide leadership in the tertiary institutions within their domain. In those days, Professor Cyril Agodi Onwumehili, a south-easterner was a Vice Chancellor VC at now Obafemi Awolowo University in the south west, another person Prof J. O. C. Ezeillo was a VC at now Bayero University in the North.*
- ix. *The worst threat creeping into our domain is the idea of unholy criss-crossing from one field to another without in-depth knowledge of the field. For example, imagine a Space Physicist of my status claiming supervision of a PhD in condensed matter Physics, in the name of 'I want to learn'. This is liable to academic prostitution/immorality that the system will have to curb. This unholy menace gives birth to M.Sc and PhD that are half baked in the society and they in turn produce students in the field that are quarter-baked. Their quarter baked grand-children end up producing nonentity in the academic terrain (Rabiu, 2015b).*

These and other plagues actually combined to weaken the delivery of our tertiary institutions to the society. Rabiu (2018c) argued that 'the town has to develop zero tolerance to any act capable of tarnishing her image and thus reduce her potency in impacting, and stimulating the town towards patronage of S & T and their associated products'.

All the aforementioned symptoms are sure enough to lead to the 'decline of trust' which 'has widespread negative effects across all aspects of society: political, economic and social' (Gast, 2018). Tertiary institutions surely have an important role to play in winning back the trust that has been lost [Gast, 2018; Rabiu, 2018c]

7.0. Repositioning Higher Education: The Challenges and Roles of Regulatory Bodies

It is evident that the contemporary challenges are different from the past challenges. Emergence of new technologies has ushered in new ways of learning and human lifestyle. Employment opportunities have come with new requirements. Global and national challenges are now closely interlinked. These and many others necessitate the need to reposition our higher education systems as a way of meeting the present day challenges and in particular towards sustainable development.

The regulatory bodies for higher institutions must work together to take the enlightenment campaign to the executive and legislative arms of government on the need to guide against proliferation of federal institutions in the name of politics.

Just yesterday 28th November 2018, the Nigerian Senate approved the establishment of 9 new higher institutions; four (4) of these are Federal Polytechnics, (Federal Polytechnic, Daura, Katsina State; Federal Polytechnic, Ikom, Cross Rivers State; Federal Polytechnic Langtang, Plateau State; Federal Polytechnic, Kabo, Kano State); two (2) Universities (Federal University of Education Aguleri, Anambra State, Federal University of Technology Manchok, Kaduna State); two (2) Colleges of Education (Federal College of Education (Technical) Arochukwu, Abia State and Federal College of Education Usugbenu- Irrua, Edo State) and one National Institute of Construction Technology and Management (Umoru, 2018)

The Acts of NUC, NBTE and NCCE empowered them to make recommendations for establishment of new institutions when necessary:

- a. *Subsection b(ii) of section 3 of the NBTE Act of 1977 mandated NBTE to make "recommendations for the establishment and location of new polytechnics and colleges of technology as and when considered necessary".*
- b. *subsection e(ii, iii) of section 5 of the NCCE Act mandated the commission to make '(ii) recommendation to the Minister for the establishment and location of new Colleges of Education, as and when considered necessary; and (iii) recommendation to the Minister for upgrading of any college of education to or the recognition of any college of education, as a degree awarding institution"*
- c. *subsection b(ii) of section 4 of the NUC Act mandated the commission to make "recommendations for the establishment and location of new universities as and when considered necessary, and in accordance with the Commission's approved guidelines"*

The current practice, where the legislative and executive recommend and approve establishment of higher institutions and then get the appropriate regulatory bodies to rubber stamp, should be discouraged. This present trend which is against the 'Acts' if allowed to continue will lead to chaos in due time and the ripple effect shall be unbearable. It will do a lot of harm to the future generation. In clear terms, this present trend is not sustainable.

The regulatory bodies are called upon to sanitize the higher education by getting rid of the symptoms listed in Section 6.0. For example the perennial industrial strike action by staff unions in our tertiary institutions have always been bordering on *salaries, wages and conditions of service*. This perennial industrial strike action has indeed done more damages to our educational system than good.

In Rabi (2018c), I explained clearly how NUC is responsible for the needed housekeeping in the Nigerian Universities. Today, I extend the same argument to NBTE and NCCE. I chose to address the '*apparent neglected*' functions of these educational regulatory bodies:

i. The functions of the Commission listed under section 4 of the NUC Act include the following:

- “(e) inquire into and advise the Federal Government on the financial needs, both recurrent and capital, of university education in Nigeria and, in particular, to investigate and study the financial needs of university research and ensure that adequate provision is made for this in the universities; and*
- (i) undertake periodic reviews of the terms and conditions of service of personnel engaged in the universities and to make recommendations thereon to the Federal Government, where appropriate"*

ii. The functions of the National Commission for Colleges of Education as stipulated in the enabling Decree (now Act) No. 3 of January 1989 (amended decree No. 12 1993) include the following:

*"(f) Inquire into and advise the Federal Government on the financial needs of the Colleges to enable them meet the objectives of producing the trained qualified teachers of the country; and
(l) undertake periodic review of the terms and conditions of service of personnel in colleges of education and make recommendations thereon, through the Minister, to the Federal Government"*

iii. The functions of the National Board for Technical Education in its Acts include the following:

*"(c) to inquire into and advise the Federal Government on the financial needs, both recurrent and capital, of polytechnics and colleges of technology and other technical institutions to enable them meet the objective of producing the trained manpower needs of the country; and
(i) to undertake periodic reviews of the terms and conditions of service of personnel in polytechnics and colleges of technology and to make recommendations thereon to the Federal Government"*

It is clear from the sub-sections of quoted above from various Acts of the regulatory bodies that they have the absolute mandate to 'advise the Federal Government on the financial needs, both **recurrent** and **capital**, of higher education in Nigeria'. Recurrent expenditure captures both overhead and personnel emolument, which has to do with salaries and wages of personnel. Furthermore, the sub-sections the various Acts, imply that they have the mandate to actually 'undertake the periodic reviews of the terms and conditions of service of personnel engaged in the higher institutions and to make recommendations thereon to the Federal Government, where appropriate'.

Here lies the crux of the matter. The regulatory bodies hold the key to terminate the demon of incessant strike action due to disagreement on staff wages that has afflicted our universities system for years. 'Conditions of service' include salaries, wages, and staff welfare matters. These factors have been the major bone of contentions between the government and various staff unions in the Universities. Strike action has never done us any good, rather it has degraded our university system and made us a laughing stock at the global community. It has made our higher education unattractive to international communities. It is one of the root causes of low global rating. Gone are the days when people come from other African countries to school in Nigeria. It is now the other way round. People want stable academic calendar with quality education. The proposed scholarship meant to attract foreign students to Nigeria by JAMB is not the solution to this crisis (Ezeh, 2018; Jumbo-Asukwo, 2018). If JAMB have such fund, then it should be directed to meet the needs of the higher institutions in Nigeria in order to reposition them.

The ripple effect of incessant strike action by staff unions and other menaces listed in section 6.0 is the derogatory treatment to which some of our graduates are subjected to after spending extra years in the tertiary institutions. Some graduated as unemployable graduates; some have to be re-trained; etc. Certain persons are even canvassing for a special compulsory one-year training programme for all fresh graduates to make them employable after graduation from our tertiary institutions (Naike, 2018; Okeke, 2018). It is not the graduates that need re-schooling, rather it is

the NUC, NBTE, and NCCE that should unleash their inherent potentials to sanitize the system holistically. A seasoned entrepreneur will neither invest nor commit his/her research project to a system that suffers from terrible incessant strike action like ours. No wonder, unlike other parts of the world, only very few individuals and few companies have ever tried to endow professorial chairs, special lectures, or research grants in our tertiary institutions. It is high time NUC, NBTE and NCCE activated the relevant but neglected aspects of their mandates and save our higher education system from further international embarrassment and eventual collapse.

8.0. Recommendations

Science and Technology are critical inputs for sustainable development. Higher education, as the vehicle of knowledge for the delivery of scientific products and technological advancement, has to be repositioned for optimal benefits of the society and the nation as a whole. I hereby make the following recommendations:

- i. S & T related MDAs and tertiary institutions should begin to foster interactions with the town [society and industries] with the aims of identifying their needs and direct their agenda towards meeting those needs in sustainable manner.
- ii. The town (communities, governments at all levels, civil organizations etc) must place demand on the higher education systems.
- iii. NUC, NBTE and NCCE are called upon to restructure and enhance their administrative capabilities to activate their respective mandates to curtail incessant strike action by staff unions due to wages and working conditions.
- iv. Seeking effective partnership with R & D establishments in the MDA
- v. NUC, NBTE and NCCE should work together in harmony to advise the executive and the legislative arms of government to stop further establishment of public tertiary institutions. The meagre available resources and collective effort should be made to strengthen the existing institutions.
- vi. A responsible education curriculum changes pro-actively with the needs of the society (Rabiu, 2015a, 2016, 2018a,b). Reshaping tertiary institutions to effect economic recovery and sustainable development will require
 - a. adjustment in curricula,
 - b. changes in schemes of service,
 - c. modifications in pedagogy,
 - d. shifts in the location of institutions (*having outposts*), and
 - e. the creation of a wider institutional ecology that includes other parts of development process (Juma and Yee-Cheong, 2005).
- vii. For sustainable development, a tertiary institution must increasingly direct its curriculum and research agendas towards issues that address SDGs. Tertiary institutions, industries and government authorities must be effectively linked as is the case of India's CSIR.
- viii. Edo state polytechnic should be able to mount a HND-Bachelor conversion program of 18-month duration (4 semesters) in collaboration with UNIBEN or Ambrose Ali University. Such program will serve as remedial program and award B.Sc, B.A or B.Eng to qualified students in a bid to equip the beneficiaries for greater productivity.
- ix. Mounting new programmes to meet the urgent and contemporary needs of the society.

- x. Introducing entrepreneurship courses as compulsory component of every program run in our higher institutions at all levels.
- xi. Our higher institutions should be able to share human resources via virtual learning technology. For instance Edo State Polytechnic can share human resources with Ambrose Ali University and UNIBEN. This may however require establishment of memoranda of understanding with the appropriate parties.

9.0. Conclusions

A responsible education curriculum changes pro-actively with the needs of the society. Our tertiary institutions should direct their curriculum and research agendas towards issues that address Sustainable Development Goals SDGs.

NUC, NBTE and NCCE are called upon to restructure and enhance their administrative capabilities to activate their respective mandates to curtail incessant strike action by staff unions due to wages and working conditions.

NUC, NBTE and NCCE should work together in harmony to advise the executive and the legislative arms of government to stop further establishment of public tertiary institutions. The meagre available resources and collective effort should be made to strengthen the institutions.

Once again, I congratulate all the graduands of today irrespective of your years of graduation. I charge the older generation of graduands to keep advancing in life. I admonish the fresh graduands to march into the outside world with positive mentality. I charge you to go forth and show the stuff that you have been impacted with during your studies at this great institution. A knowledge that does not impact the society is a useless venture. Go and make room for yourself. Go and break barriers. Make way for yourself. Dream big and be focused. In all your ways, always remember that you are now ambassador of your alma mater.

I conclude with the words of the father of India nation:

“It is science and science alone that can solve the problems of hunger and poverty; of insanitation and running to waste of a rich country inhabited by starving people. Science is the spirit of the age and dominating force of the world; future belongs to science and to those who make friends with science and seek its help for advancement of humanity”
- Jawaharlal Nehru, the father of India nation 1889-1969- (Naduyama, 1999).

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