SCIENCE, TECHNOLOGY AND GOVERNANCE: THE SOCIO-POLITICAL IMPERATIVES

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Introduction

There is a broad consensus of opinion that Science and Technology (S and T) lies at the heart and soul of the development of any country. Its importance derives from many considerations. Manufacturing and industrial activities, which development economists use as an indicator of a county's level of development, depend on S and T. In this regard, economies in which domestic output is dominated the by industrial and manufacturing sector output are considered more developed as compared to those in which primary production activities are dominant. Indeed, this has been the usual criterion for distinguishing between developed and underdeveloped countries.

S and T is critical to an understanding of the basic principles and laws underlying the workings of nature. An understanding of these principles and laws makes inventions possible. Thus, under the laws and principles of nature, it is possible, for example, to imagine the invention of a device (car) that can be self-driven. Such a device, expectedly, would not need to be driven by its owner. Perhaps all that the owner would need to do is to enter the device and with some appropriate manipulations, it would take him to his desired destination. Inventions (such as the process of originating the device in the first instance) and innovations (such as improving on the device once having been invented/originated) are critically dependent on S and T. Thus, with knowledge of S and T, it becomes possible to originate, from the abstract, devices that are critical to a comfortable dwelling on the earth plane. It is not hard to appreciate, therefore, the fact that knowledge of S and T constitutes an indispensable asset at both the individual and at the national levels. Indeed, S and T constitute the fundamental basis upon which industrialization and development originate. This explains why all countries try to develop and improve their base and potentials in S and T.

Ideas and know-how, it has been argued, create wealth. These ideas and know-how derive from an understanding of the laws of nature. It is these laws of nature which scientists exploit in inventing things that are hitherto unknown or imagined. Thus, for example, the invention of the aircraft is a fall-out of the scientific and technological knowledge about the workings of nature as learnt from the flight of birds. It is the same natural principles underlying the suspension of birds during flights that the scientists who invented the airplane understood and tapped into in its invention. In our everyday life, we encounter and enjoy some of the fruitful fallouts of science and technology. The simple calculator, the radio, telecommunication devices, electricity, etc. are all inventions that are fallout of scientific and technological know-how.

Scientific and technological know-how are invisible and abstract, yet indispensable assets to the individual and society. Equipped with such know-how, inventions and innovations become possible. It is against this background that Lord Sausbury of Turville, the Minister of Science of the United Kingdom averred that *science is a key driver for wealth creation, employment and improving the quality of life,* adding that *we believe that the excellence of our science base is a great national asset.* And in what clearly underscores the critical importance of scientific and technological know-how to the development and advancement of the British economy, Blair (2002) noted that *the science base is the absolute bedrock of our economic performance.*

The picture that emerges from the foregoing, therefore, is that scientific and technological know-how are fundamental to the well-off-ness of an economy and the society generally. Thus, as Isenhuwa (2004) has observed,

> "All countries try to develop and improve their science and engineering technology (SET) base and potential because they form the basis of industrialization and development."

He observes further that:

> "Africa's hope of breaking the (vicious) cycle of poverty, disease, ignorance and excruciating and strangulating debt burden lies with the exploitation of the full benefits of S and T."

Olayiwola (2003) observes in the same vein that:

> "Science, engineering and technology can help reduce poverty and enhance national and international competitiveness and build society's capacity."

In fact, it has been argued that science and technology is *vital to national security and survival* and as the South African Minister of Science and Technology has observed,

> "Technological and scientific inventions lie at the heart of our hopes because they can act as accelerators for South Africa's economic growth. The more we can innovate, and the faster we can do it, the richer our lives can be, and the sooner will the goals of the accelerated and shared growth initiative for South Africa be realized...over the millennia, and particularly in today's world, speed and the capacity to innovate have been and are what counts. Those who cannot develop the necessary acceleration, run the grave risk of being left permanently behind. And there are no prizes for those who choose not to compete . . . in economic terms, our intended speed for economic growth of at least 6% of GDP is to a great degree dependent on innovation, the introduction of new products and services and the mastery of key technologies by our society . . . the use and development of technology must address the needs and aspirations of our people. South Africa's immediate need is to attain technological self-reliance, tailored to bring about swift and tangible improvements in the living conditions of all our people. Our scientists and technologists must always be alert to even the smallest developments that can better and make affordable South Africa's material, services and work processes."

While science and technology are thus indisputably beneficial to society, it is proper to stress that society can only enjoy *the full benefits of science and technology under good governance* (Isehunwa, 2004). Governance refers to the manner in which power or political authority is exercised in the management of a country's economic and social resources for development. (World Bank, 1992; Obadan, 1998; Boerninger, 1991; ADB, 1994, etc.) The role of governance in tapping the benefits of scientific and technological know-how derives from the fact that it plays the critical role of mobilizing the citizens of a country in the desirable direction of tapping and utilizing the creativity, ingenuity and the spirit of enquiry that they are variously endowed with to develop the country's scientific and technological base and potentials. This paper seeks to address the socio-political imperatives of governance in the development of science and technology in Nigeria. In doing this, Section 2 examines briefly the various strategies that can be used to develop science and technology while Section 3 discusses the role of the state in the acquisition and development of technology. Section 4 focuses on governance, science and technology acquisition and development and, specifically, on the efforts that have been made by successive governments in Nigeria to develop science and technology. In section 5, we discuss the socio-political imperatives underlying the development of science and technology in Nigeria. Section 6 examines the constraints to the development of science and technology in Nigeria. The final aection contains a summary of the paper and the conclusion.

Strategies for the development of science and technology

As Ebuh (1998) has observed, technology can be acquired in any or all of three major ways- (1) through self-development efforts (2) by copying or stealing (3) through transfers. The development of S and T in the pre-colonial times in the country was based on the first. In this regard, evidence abounds to show that systematic efforts to adapt materials and forces of nature to meet pressing challenges were already being made prior to the advent of colonial administration. The variety of ancient technologies ranging from the blacksmithing of Awka, the Igbo-Ukwu metal works to the blast finance of Saki, the dye pits of Kano, the famous Benin bronze works, the iron smelting of Ajilete as well as the war canoes of the Ijaws in the delta region of the country, etc. all serve to underscore this point.

Besides, such simple farm implements as hoes and cutlasses were manufactured using the know-how embedded in such indigenous technological know-how. Also, using locally available raw materials and indigenous technological know-how, bridges were constructed across rivers while canoes, boats and ferries were constructed for marine transport. Similarly, houses were constructed from locally available materials using the prevailing technological knowledge. In addition, herbal medicines were formulated also using available raw

materials. This era in the development of science and technology in the country was, however, disrupted with the onset of colonial administration.

The onset of colonialism brought in its wake a shift in focus and emphasis from indigenous and homegrown effort in the direction of technological development to a foreign one. Local technological know-how was disparaged and dismissed as lacking theoretical foundations. It must be stressed, however, that prior to the colonial times, the state and indeed the government played little or no conscious or visible role in the development of indigenous science and technology. Indeed, the state played minimal role in the development of Igbo-Ukwu Metal Works, the Benin Bronze Works, the architecture and construction of the Zaria Friday Mosque, etc. It is persuasive to argue, therefore, that the role of the state and the government came to the fore with the onset and end of colonialism.

The involvement of the state in acquisition and development of scientific and technological know-how, which came with the end of colonialism saw a shift away from self development, which largely entails tapping of inborn talents and potentials, based on an innate spirit of enquiry and creativity to the other two strategies of acquisition of and development of technology, viz. copying/stealing and transfer of same.

In seeking to acquire technology through stealing/copying, the approach is to dismantle technological devices that have been made elsewhere, study and understand its design and function and then replicate the manufacture of that device doggedly. Devices manufactured in this way would, expectedly, exhibit imperfections initially but overtime, improvements are made on them. Acquiring technology in this way is advantageous, reason for which it has been referred to as the *fast track approach* of acquiring technology, since it simply entails exploiting the knowledge of what has already been invented. It is, however, criticized on the grounds that it is not only an unethical but also an unhealthy professional practice. Nations that are desirous of rapid scientific and technological development downplay these criticisms and proceed to tap the aforementioned advantage, amongst others, inherent in copying/stealing technology. Indeed, many of the very technologically advanced countries today have at one stage or the other been accused of copying/stealing the technology of other countries.

The third way by which technology can be acquired is through transfer. This is based on instruction by those who already have the know-how to the knowledge seeker. It is also supposed to be a rapid way of acquiring and developing S and T, since once having been taught the know-how, the recipient of the knowledge can utilize it straightaway for the purpose for which he acquired it. The industrialization strategy of Build Operate and Transfer (BOT) is supposed to facilitate technology acquisition through transfer. One disadvantage associated with this method, however, as has been noted is that:

> "the cost of instruction could be marked up significantly to absorb the implied loss of patronage, only old technology is thrown open in the market and the instructor or technology source may not give up every detail to make room for further consultations. The contemporary and advanced technologies are showcased but not sold (Isehunwa, 2004)."

Not unexpectedly, these ways of acquiring technological know-how tend to lay less emphasis on the needs of the local environment and the resource availability therein. Moreover, the advantages of relative cheapness and ready adaptability inherent in self-development are lost. Worse still, the desirable qualities of creative abilities and ingenuity, which constitute an integral part of self development of technological know-how are also lost when resort is made to copying/stealing of technology or seeking to acquire same through transfer.

Irrespective of the approach, however, the reality of the low level of technological acquisition and development in an underdeveloped country like Nigeria implies that the state should play a critical role in the process of acquisition of scientific and technological know-how for national development.

The role of the state in the acquisition and development of science and technology

The state is expected to play a pivotal role in the development of science and technology. In this regard, it is expected to play the facilitatory role of mobilizing the citizenry towards a unified direction of harnessing and giving meaning to the creative talents and skills of its citizens.

The National Economic Empowerment and Development Strategy (NEEDS) document explicitly recognizes the imperative of developing science and engineering infrastructure. In this direction, it lays emphasis on the need to give vent to the creative energies of the citizenry for the creation of wealth, eradication of poverty, economic emancipation and empowerment and a productive and fruitful life. Accordingly, it emphasizes the imperative for the development and deployment of indigenous science and technology as a way of freeing the creative potentials of the citizenry and allowing such potentials to blossom. The state has a pivotal role in the tapping and development of the scientific and technological know-how with which its citizens are endowed. In this direction,

it is the duty of the state to build the capacity of the citizens that is vital to scientific and technological development and to create the enabling environment for those with such capacities to tap them to the fullest.

The role that the Indian government has played in the scientific and technological development of that country illustrates the active role the state can play in a country's quest for scientific and technological development. In this regard, Oladapo (1983) points out as follows:

> "the development of engineering in India may be relevant to the needs of Nigeria. India has evolved what appears to be a well-conceived technology policy. This policy envisages three stages of implementation, namely: (a) the care and maintenance stage (b) the design and construction stage (c) the research and development stage. The Indians recognized that a developing country will have to import some amount of modern technology and they therefore embarked on a massive programme of training intermediate and middle level manpower to care for, maintain and operate the imported technologies. After acquiring a broad technological base, the government, embarked on the next stage, which is design and construction."

What becomes clear from the foregoing is that the Indian government was actually involved at various stages in India's effort at the acquisition of scientific and technological skills through policy, capacity building, resources, etc. The result of the conscious and deliberate involvement by the government is that:

> "India is now poised in the final stages of research and development, which involve the organization of basic research by universities and research institutions, for solving problems of direct relevance to the needs of the country. To achieve this policy of self-enhance, a number of government measures were instituted. For instance, there is a severe limitation on imported manufactured goods but there is heavy investment in engineering education at the designated centers of excellence."

The experience of Korea in the course of developing the country's scientific and technological base is also instructive to Nigeria. In Korea, the government played a leading role while the private sector played a very major and pronounced complementary role. Korea boasts of about 400 research and development outfits, most of them privately owned. This is a clear pointer to the fact that the private sector does have a critical role to play in the country's efforts at scientific and technological development. While the government invested heavily in education, the private sector complemented government's effort by assisting in the training of high calibre scientists, engineers, and technologists both within Korea and in the West (NISER, 2004).

The foregoing suggests strongly that the role of the government in the country's quest to develop its science and technology base is vital. This vital role not only presupposes, but is in fact predicated on, the existence of transparent governance, coupled with the existence of a requisite social, political and moral will to mobilize the citizenry in the direction of developing the country's science and technology base.

Governance, science and technology acquisition and development and government's efforts at the acquisition and development of science and technology in Nigeria

The role of the government in the development of the country's scientific and technological base logically calls for a responsive, serious-minded, focused and result-oriented government to jump start the process as the experiences of other countries have shown. This entails the existence of a high level of transparency in governance. And governance as was noted before entails the exercise of political power for the direction and management of a society.

Good governance, in the literature, reflects a number of fundamental elements: accountability based on the notion of popular sovereignty and public choice, a legal framework that guarantees the rule of law and due process, participation in decision-making process based on political and social pluralism and freedom of association and expression; transparency in government procedure, processes and decision-making; predictability in government behaviour; and openness in government transactions and a reliable flow of the information necessary for economic activity and development to take place. Thus, good governance implies efficient and effective public administration, good policies and sound management of national resources (Obadan, 1998).

A strong link exists between good governance, scientific and technological development as well as the overall economic development of a nation. A good government is a force around which citizens rally for the greater good of society. In recent times, the quality of governance has increasingly come to be considered a critical factor and in fact a *sine qua non* to overall societal development. Given the role of scientific and technological know- how in the overall well-being of a society, it is not hard to establish the existence of a strong causal link between the quality of governance and societal well being, via its impact on the development of the society's scientific and technological base and potentials.

In the light of the above, the Nigerian situation presents an interesting case study of the existence of a strong but vicious link between inept governance that is fundamentally lacking in such attributes as purposefulness, transparency, focus and a clear sense of direction and scientific and technological backwardness coupled with overall societal retrogression. In this direction, Kwanashie (2000) observes that:

> "even though Nigeria has, since the colonial period, witnessed the central role of the state in the development process, yet the Nigerian state remains a principal actor in the drama of decades of underdevelopment and in fact remains largely culpable for the underdeveloped nature of the country's scientific and technological base and the overall development of the economy."

That Nigeria exhibits the features of a failed state is not now a contentious issue. In fact, Karl Maier (2000) in his book titled *This House has Fallen* describes Nigeria as *the largest failed state in the third world.* That failed governance is the principal culprit that is responsible for the failure of the Nigerian state is also not now a contentious issue. Kwanashie (2000) argues that *the issues of governance and political instability are central to the analysis of the failed attempts at development in Nigeria.* He points out that:

> "the country has failed, especially when compared to some developing countries at similar stage of development in the 1960s, to build a sustainable economy that could address the basic needs of her population, because of the apparent inability of the nation's leaders to mobilize the population for creative employment that would facilitate the process of wealth creation . . . worse still is the fact that the ruling elite have deliberately impoverished the country by looting and plundering it."

According to him,

> "leadership has to be seen at various levels. The Nigerian case is that of leadership failure at virtually all levels . . . The Nigerian situation shows graphic collapse of governance. Nigeria with all its resources is still one of the poorest nations of the world so much so that the country is faced with a system collapse manifested by the frequent usurpation of political power by the military elite, institutionalization of corruption, lack of transparency and accountability in the conduct of public affairs, grossly declining productivity, on account of weak, squalid and rudimentary scientific and technological base, the totality of which has resulted in the economy remaining underdeveloped while the quality of life of the average citizen has worsened progressively."

In what seems to corroborate the foregoing arguments, Bello–Imam (1997) observes that:

> ". . . the dynamics of the country's political history has imposed on it a succession of leaders who rule in such a way that sharply showed 'good governance' as the missing link in Nigeria's scientific, technological and overall developmental efforts."

The result, in his view,

> "has been pervasive corruption, lack of respect for the rules of the game in all aspects of our national life, absence of participatory democracy, accountability, transparency, a domineering unitary authoritarianism and more recently, an unholy alliance between the civilian and military constituencies that is increasingly being forged to the detriment of overall development of the country."

Yet, there has been growing emphasis, in recent times, on the fact that good governance is a fundamental prerequisite for socio-economic, political, scientific and technological development. This is expected to create the needed room for rapid and sustained economic growth and development to thrive (Young, 1991).

The fallout of the rudimentary state of the country's scientific and technological base is the weak and near negligible contribution of the technology-dependent manufacturing sector to domestic production in Nigeria. While official statistics show that the manufacturing sector employs about twenty five percent of the labour force in the country, it has been argued that the figure represents an exaggeration of the facts, in view of the fact that a substantial part of the labour force so captured actually belong to the craft and cottage industry [see for example, Bamiro *et al* (1994), Igbeka, (1996)]. The contribution of the manufacturing sector to the country's GDP averaged 8.8 per cent between 1981 and 1989. It declined to period average of 7.57 per cent between 1990 and 1995 and further to 6.14 percent between 1996 and 1999. It averaged a paltry 4.44 per cent between 2000 and 2004, see Table 1.

Table 1: Budgetary allocations to science and technology and manufacturing sector contribution to GDP in Nigeria: 1990-2004.

Year	Capital Expenditure ₦bn	Allocation to S&T ₦bn	% of Capital Exp	GDP ₦bn 1990 constant basic prices	Manufacturing Sector Contribution ₦bn	Percentage Contribution To GDP
1995	44.5	0.253	0.57	103.51	6.88	6.65
1996	51.0	1.188	2.33	107.82	6.92	6.48
1997	105.0	1.188	1.13	110.40	6.96	6.30
1998	143.0	0.660	0.46	112.95	6.69	5.92
1999	88.0	0.034	0.038	116.0	6.79	5.85
2000	170.0	n.a	n.a	329.17	13.96	4.24
2001	480.0	7.283	1.517	344.31	14.93	4.34
2002	257.0	3.700	0.014	356.28	16.44	4.61
2003	256.0	0.490	0.86	392.76	17.37	4.42
2004	300.0	0.580	n.a	416.72	19.11	4.59
2005	531.0	n.a	n.a	n.a	n.a	n.a

n.a. = not available.

Sources: Federal Republic of Nigeria Budget Speeches, 1995-2005.
Central Bank of Nigeria Statistical Bulletin, various issues.
Central Bank of Nigeria Annual Report and Statement of Accounts, various issues.

The dismal nature of the contribution of the manufacturing sector to country's GDP as the foregoing statistics reveal largely underscore the nascent and rudimentary nature of the country's science and technology base. The figures are an embarrassing testimony to the fact that Nigeria has made minimal progress in scientific and technological development, especially when considered against the backdrop of the Lima Declaration of 1975, which stipulated that manufacturing in developing countries should account for about twenty five percent of GDP by 2000.

Conscious efforts by successive Nigerian governments at the development of the country's science and technology base started after the attainment of political independence in 1960. Government's awareness of the pervasive role of science and technology in the development process explains the conscious efforts that have been made in this regard. It has been argued, that *in Nigeria, the state has facilitated, regulated, formulated policies on, coordinated and implemented science and technology activities so as to influence, the rate, nature and direction of technology transfer and accumulation as well as endogenous development of technology* (NISER, 2000). The weak and rudimentary nature of the country's science and technology base explains why the federal government, in an effort to engineer technological self-reliance has established many agencies to promote the acquisition and absorption of relevant technology. Such agencies as the National Office for Technology Acquisition and Promotion (NOTAP), the National Agency for Science and Engineering infrastructure (NASENI), the Raw Materials Research and Development Council (RMRDC) are examples of outfits set up by the government to facilitate the nation's efforts at scientific and technological development.

In addition to the foregoing, such programmes as the establishment of Industrial Development Centers, Technology Business Incubator, and Industrial Estates are further evidence of the efforts of the government at the acquisition and development of the country's science and technology base. In addition, the Federal Ministry of Science and Technology has been established, de-established and re-established. Moreover, eight centers of excellence, COEs, that are saddled with the responsibility of carrying out Research and Development in nuclear technology, solar energy, neuroscience, oncology immunology and parasitic and cardiovascular diseases have been established, albeit largely undermanned and lacking in funding.

The establishment of several S and T universities and polytechnics across the country also represents government's efforts at the development of science and technology in the country. Among these are such specialized institutions as the Federal Universities of Agriculture and Federal Universities of Technology. The role of the government in the development of the country's science and technology base is also evident in the numerous

institutions that have been established and programmes that have been put in place by successive governments.

More recently, the Federal Government entered into a collaborative project with the United Nations Education, Scientific and Cultural Organization (UNESCO) for *The Reform of Nigeria's Science, Technology and Innovation System*. The project is aimed at providing assistance to *the Federal Ministry of Science and Technology in pre-investment analysis of the performance of the Federal Science and technology policies, programmes and institutions in the country with a view to identifying measures to revitalize the science and technology system and increase its effectiveness in meeting society needs particularly for economic competitiveness*

The socio-political imperatives

The role of governments the world over is, in the final analysis, to serve the citizens and make life meaningful for them. The social contract that binds the people and the government expects this from the government. Accordingly, it is the duty of government to create and support an enabling environment for this ultimate objective to be realized.

A number of indicators that are useful in gauging the overall well being of the citizenry have been devised in the literature on development economics. These include such literacy indicators as Adult Literacy Rate, School Enrolment Rate, etc; Health and Nutrition indicators as Life Expectancy at Birth, Population per Hospital Bed, Children Immunization, etc; demographic indicators as Crude Birth Rate, Crude Death Rate, Maternal Mortality Rate, Infant Mortality Rate, etc. These and many more indicators serve to capture the quality of life of the citizenry.

The behaviour of and trends in the aforementioned indicators of well-being of the citizens of a country depends in a fundamental way on the level of development of the country's S and T base. Sadly, Nigeria has performed consistently poorly over the years, when assessed on these standard quality of life indicators. For example, life expectancy at birth has deteriorated precipitously over the years to 43.5 years in 2003 and 43.7 years in 2004 (World Bank, 2006) from 54 years in 2000 (CBN, 2004). This is a strong indicator of a very low quality of life.

The rudimentary nature of the country's technological base largely accounts for the state of affairs described in the foregoing. It is sad to note, for example, that many die in the country for conditions that could otherwise have been preventable, given for example, the availability of requisite facilities in the hospitals in the country. This and many other reasons make it absolutely imperative for government to embark on a conscious and conscientious effort at the systematic, rather than haphazard, disjointed, disparate and uncoordinated approach to the development of the nation's science base, potentials and infrastructure.

The government owes it a duty to serve the citizens that it claims to represent. This translates to a moral and political burden that it has to discharge. It is a political imperative, therefore, for the government to strive in the direction of developing the country's scientific and technological capabilities as a way of discharging the electioneering promise of making life meaningful for the citizens that presumably brought it to power in the first instance, since the development of science and technology is the very fulcrum upon which this promise is realizable.

In addition to the foregoing, and very importantly, the level of respect and prestige a country and its citizens enjoy within the comity of nations is a political issue that is critically dependent on, amongst other factors, the extent of advancement of its scientific and technological know-how. This is a further political imperative for good governance that is fundamental to the development of science and technology in the country. The socio-political imperatives require the following towards the development of S and T: strong political will and commitment, formulation and implementation of good policies, adequate budgetary allocation to and financing of S and T programmes and projects, and management of national resources that is free of corruption and wastages, among others.

Constraints on the development of science and technology in Nigeria

1. Poor funding and staffing of S and T institutions and programmes

Although successive governments have over the years established a number of institutions and put in place a number of programmes that are aimed at the development of the country's science and technology base, it is strikingly clear that these institutions have largely had to grapple with the problem of poor staffing and gross under funding. Worse still is the problem of overlapping functions, which has been aggravated by the problem of poor policy coordination. A striking example in this connection is the fact that while NOTAP is saddled with the responsibility of registering imported technology and enforcing government rules on technology import and commercializing research and development results of the numerous Agricultural and Industrial Institutes that

have been decreed into existence, NASENI is at the same time saddled by the decree establishing it with the coordination of research and development in the country.

To ameliorate the problem associated with the problem of underfunding of research and development institutions that have been decreed into existence, the National Risk Fund was established in much the same way the government sought to improve the growth of Venture Capital industry through the promulgation of the Venture Capital Decree No. 89 of 1993. These efforts notwithstanding, gross inadequacy of funds for research and development remains a fundamental limitation to the efforts at the acquisition of scientific and technological know-how.

The poor level of funding of science and technology in the country largely explains the weak and rudimentary state of the country's science and technology base. This is easily attributable to the lack of willingness on the part of the government to strive towards harnessing the creative potentials of the citizenry, as evidenced by the paltry budgetary allocations to the funding of scientific and technological developmental efforts. For example, capital allocation to science and technology stood at 1.4 per cent and 0.15 per cent of total federal government budget in 1986 and 1987, respectively. It deteriorated to 0.13 in 1988 but rose marginally to 0.15 per cent and 0.22 percent in 1989 and 1990, respectively. By 2000 the share of science and technology in total federal government capital allocation stood at 1.27 per cent. This again deteriorated to 1.19 per cent in 2002 and further to 0.87 per cent in 2004. These figures are far below the proposed 5% of annual budget for the development of S and T. (See table1 above). The precipitous decline over the years in relative budgetary allocation to S&T largely underscores the lack of will, on the part of the government towards its development.

2. Weak political commitment

There seems to be palpable insincerity and outright lack of commitment, on the part of government towards the development of S and T. In fact, S and T related issues in official circles are characterized by lack of pragmatic, measurable and time-bound targets. Consider in this regard, for example, the following statement on S and T by the then Minister of Finance in his breakdown of the 1996 budget:

> "in order to encourage private initiatives, Nigerians must be determined to produce their own bolts, nuts and spare parts. Government on its own **would** actively intervene in the technological market by setting up a national agency to assist local investors in searching for, screening and negotiating foreign technologies. The private sector **will** be encouraged to emphasize research and development and government **would** give generous tax incentives. The result of our research institutes **will** be made available for commercialization. The work performed by technicians at Nnewi and Aba in designing and fabricating plant and equipment **will** be encouraged. Government **will** provide appropriate incentives. Government **will** encourage the use of local machines, plant and machinery by providing generous tax incentives to those companies that utilize them for production. Government **will** encourage interactions between private sector, universities and research institutes in all technological matters."

The foregoing have remained **statements of intentions** a decade after. In the same way, President Olusegun Obasanjo, in his Budget Review Speech to the National Assembly in 1999 stated that:

> "Science and Technology, particularly pertaining to Agricultural research **will receive unstinting attention**. We **intend** to establish a biotechnology center. We **will** foster intense and productive cooperation and collaboration between our national research establishments and international research institutions and agencies. We do not intend to re-invent the wheel;, **we must go for** adaptability, relevance, and appropriateness."

While there is a plethora of statements of intentions relating to S and T, what is realized does not portray political commitment in a good light.

It is appropriate to compare the foregoing with some aspects of the Budget Vote Speech by the South African Minister of Science and Technology when he stated *inter alia* that:

> "Our intermediate goal is to dedicate 1% of our GDP to research and development by 2006 In 2003/2004, South Africa's public and private expenditure on R&D was 0.81% of GDP and it is anticipated that the 2004/2005 survey will show a further increase, putting us on course to reach the 1% target by 2008 . . . my department **has** structured a framework for reporting on Science and Technology expenditure across government. The framework includes a survey instrument with internationally benchmarked definitions. It will allow science and technology expenditures reporting by all government departments to be integrated into Estimates of National Expenditure reports, after which the department will be able to analyze such

expenditure and give a comprehensive view of trends, intent and scope of science and technology spending . . . Between 1996 and 2000, South Africa **produced** 222 scientific articles on genetics and 459 scientific articles on microbiology... In line with the critical importance of energy supply, my department **has** devoted major attention to securing the future energy mix required to support South Africa's long term economic and social development . . . my department **has** also taken the lead in the development of the Hydrogen Economy Initiative. . ."

A comparison of the official statements on S and T in both countries reveals clearly that while **statements of non-measurable targets and intentions** characterize the Nigerian case, **statements of measurable targets and realizations** typically characterize the South African case.

3. Application of S and T funds

The use to which budgetary allocation to the development of S and T is put also, fundamentally underscores the lack of genuine will on the part of government to develop the country's indigenous science and technology base and potentials. As Isoun (2004), the Federal Minister of Science and Technology has pointed out, *how the money that has been voted for the development of S and T is being spent is an important indicator of the changes that have taken place* in the effort at the development of science and technology in the country. We are of the view in this context that expending funds that are voted for the development of S and T on such expensive and grandiose technological projects as the launching of an observational satellite used for remote sensing as was done recently for Nigeria in Russia by Russians, perhaps with the peripheral participation of Nigerian scientists, useful though it may be, have little or no bearing with the development of indigenous science and technology base and potentials. Such, indeed contributes little or nothing to the development of basic technology that is needed to solve problems at the most basic and elementary levels in the country.

4. Policy inconsistency

The problem of policy inconsistency and somersaulting also serves to underscore the lack of will, on the part of successive governments in the development of S and T in the country. The establishment, de-establishment and re-establishment of the Ministry of Science and Technology by various governments in the country easily lend credence to this assertion. Added to this is the uncoordinated nature of the feeble efforts that have been made in the development of S and T in the country. The existence of several agencies and bodies with overlapping functions attests to this. In fact, some of these bodies, NASENI, for example, are saddled with the same responsibilities as the Ministry of Science and Technology.

5. Non-practicalisation of research findings

There is also a discernable lack of will on the part of government to get down to the pragmatic business of mobilizing the citizenry in the conscious and collective direction of developing the country's S and T base and potentials. This entails reaching out to the people and challenging their ingenuity and their inventive will, potentials and capabilities. The lack of will on the part of government in this regard is easily attested to by the failure of government to harness and translate research findings and inventions to concrete and commercializable reality. The often-cited example of the yam-pounding machine easily stands out as an example in this connection. The advertorial announcement that was published in *ThisDay* newspaper of 23rd June 2006 by the Presidential Standing Committee on Inventions and Innovations (PSCII), which called on those with inventions and/or innovations to forward them to be registered, developed and patented, seems to be an effort, on the part of government to redress this problem.

6. Distorted value system

Added to the foregoing is the distorted and misplaced value system in the country in which the preference for foreign made products as compared to locally made ones has helped to stunt the development of local alternatives and hence initiatives. This has helped to stifle the development of indigenous technology that would have been utilized in the making of local alternatives. Worse still, policy makers and those at the helm of affairs who should take the lead in patronizing locally made goods appear guiltier of patronizing foreign made ones, to the detriment of the development of the indigenous scientific and technological know-how that would have been tapped and harnessed in local production.

Summary and conclusion

We have, in this paper, examined the socio-political imperatives of governance in the development of science and technology in Nigeria. Scientific and technological know-how are invisible assets that form the bedrock of the development of any country. The industrial revolution was a product of scientific and technological break-throughs.

Acquisition of scientific and technological know-how can be achieved in any or all of three possible ways viz. through self–development of the indigenous scientific and technological base, through copying/stealing and through transfer from those with the know-how.

Prior to independence, efforts at the development of technology in Nigeria were mainly along the lines of the first approach that is the self-development of indigenous scientific and technological know-how. The onset of colonization brought about a shift in attention to the other two ways of acquiring technology.

Successive Nigerian governments have made various attempts to develop science and technology in the country. These have largely taken the form of policies and establishment of a number of institutions, specialized agencies and enunciation of various science and technology-related programmes. All these are, expectedly, supposed to initiate and facilitate the development of the nation's scientific and technological base and potentials. However, with many of them starved of funds and lacking in requisite manpower, they have been largely incapacitated in the course of trying to fulfill their mandate. Worse still is the palpable lack of sincerity, and in fact the apparently hypocritical attitude by successive governments about the development of science and technology in the country. Statements on S and T related issues by successive governments have characteristically been nebulous and have largely been in the form of statements of intentions without corresponding statements of realization. Indeed, devoid of timeframes and measurable targets, progress in the development of science and technology in the country has been very hard to assess.

The impact of the sum total of the glib statements and feeble efforts that have been made by successive governments in the development science and technology is the rudimentary nature and miserable state of science and technology in the country. Evidence abound to show that successive governments have demonstrated lack of requisite political will to mobilize the citizenry for the development of the country's scientific and technological base and potentials. This is a fallout of the quality of governance in the country.

The quality governance is fundamental to efforts at the mobilization of the citizenry in the unified direction of scientific and technological development. A country that is bogged down by weak, inept, self-serving, visionless and corrupt governance stands the risk of failing to advance its frontiers in scientific and technological know-how. Sadly, the quality of governance in Nigeria has, over the years, been low. And given the empirical finding that good governance and scientific and technological development are strongly positively correlated, the blame for the failure of the country to develop its scientific and technological potentials cannot but be anchored at the doorstep of the poor quality of governance the country has been unfortunate to have over the years.

The foregoing notwithstanding, there are socio-political imperatives for good governance in the development of the country's scientific and technological base and potentials. Responsible governance entails that the government makes efforts and take steps to make life meaningful for its citizens. Science and technology is fundamental to achieving this ultimate purpose of governance.

The dismal and deteriorating nature of such socio-economic development indicators of the well-being of citizens as income per capita, life expectancy at birth, infant mortality rate, maternal mortality rate, school enrolment rate, number of patients per hospital bed etc. sadly, largely underscore the poor quality of life of citizens of Nigeria. Interestingly, the behaviour of these indicators depends in a fundamental way on the level and extent of the development of S and T in the country. Yet, it is important to improve on these standard quality of life indicators and this constitutes the fundamental basis for good governance that is capable of mobilizing the citizens in the unified and desirable direction of the development of science and technology in the country. Good governance geared towards science and technology break-throughs in the country requires disciplined political leadership that is committed to S and T development. It also entails appropriate policies and enabling environment, acceptable deployment of national resources, and adequate funding of S and T activities, among others.

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