**RELEVANCE OF RESEARCH IN SUB-NATIONAL AND NATIONAL DEVELOPMENT**

**BY**

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**1. Introduction**

Research especially social research could be define as a way of going about finding answers to questions, collection of methods people use to produce knowledge, an exiciting process of discovery. It therefore requires persistence, personal integrity, tolerance for ambiguity, interactions with others and pride in doing quality work. (Lawrence 1994) Research is an ongoing process and the end of one study often stimulates new thinking and fresh research questions. Although much important research occurs in colleges, universities and research institutions, however research is being conducted in many other places for many purposes. In private industry, people in market research, personnel, public relations and management conduct research as do many government agencies to help them better plan or deliver services. Research at any level is undertaken to: explore an idea, probe an issue, solve a problem. According to Shuttleworth (2008), research, in its broadest sense, includes any gathering of data, information and facts for the advancement of knowledge.

Furthermore, Creswell (2008) described research as a process of steps used to collect and analyse information to increase our understanding of a topic or issue. The three steps include posing a question, collecting data to answer the question, and presenting an answer to the question. Research is an information tool about the behaviour of phenomena in any sector of the economy. In particular, it is the process by which we seek to observe and describe, explain, predict and control the behaviour of phenomena. Policy research therefore is a special type of research that can provide communities and decision-makers with useful recommendations and possible actions for resolving fundamental problems. Such research provides policy-makers with pragmatic, action-oriented recommendations for addressing an issue, question, or problem. The primary focus of policy research is linked to the public policy agenda and results are useful to the development of public policies (AFDB, 2012). A policy research effort begins with a social issue or question, evolves through a research process whereby alternative policy actions for dealing with the problem are developed.

Over the last few decades Nigeria as a nation has gone through several development agenda to reform the economy. Before the 1980s, the reforms were purely in the form of extended national perspective plans that attempted to mobilize human, material and natural resources of the nation to achieve goals of national life. These national plans were the 1962-1968 Plan, the 1970-1974 Plan, the 1975-1980 Plan, and the 1981-1985 Plan. Often, these Plans went beyond mere economic prescriptions to address social, human and political goals with short-coming which necessitated reform through stabilisation/austerity measures. Due to the short- comings of the previous development plans/programmes, Babangida administration in 1986 introduced Structural Adjustment Programme (SAP) to address the fundamental and structural imbalance in the economy, diversify the economy, strengthen the currency, and build a viable, sustainable industrial infrastructure upon which real economic growth and development can be founded. The reform exercise rested on a tripod of measures: *Liberalization* of foreign exchange transactions, *Rationalization* of public sector agencies and parastatals, and *Optimization* of the capacity for domestic production and stimulation of non-oil exports.

After, the Structural Adjustment Programme (SAP) is the Vision 2010 which was introduced by Abacha administration in 1998. The aim was to “develop a blueprint that will transform the country and place it firmly on the route to becoming a developed nation by the year 2010" (Vision 2010 Report, 1998). The general objective was to transform the country into “a united, industrious, caring and God-fearing democratic society, committed to making the basic needs of life affordable for everyone, and creating Africa’s leading economy”. In 2004, the Obasanjo administration introduced NEEDS - National Economic Empowerment and Development Strategy. The NEEDS reform programme rested on four key strategies (NEEDS, 2004):  Reforming Government and Institutions, Growing the Private Sector, Implementing a Social Charter, Value Re-Orientation. After the NEEDS, there was an introduction of 7 point Agenda of Yar’ Adua administration, vision 20:2020, transformation agenda of the Jonathan administration and government of change by the current administration.

As good as some of these development agenda were, there was little emphasis on research and development which is very necessary/important both at the formulation, implementation as well as at the monitoring and evaluation stage. Nigeria Vision 20:2020 (p. 102) recognizes Research and Development (R & D) as key to global competitiveness. Similarly, the first N.I.P. Volume I, pp.2) identifies weak R & D culture in public and private institutions as one of the major constraints to economic growth and development. Policy research therefore is a special type of research that can provide communities and decision-makers with useful recommendations and possible actions for resolving fundamental problems. Such research provides policy-makers with pragmatic, action-oriented recommendations for addressing an issue, question, or problem. The primary focus of policy research is linked to the public policy agenda and results are useful to the development of public policies (AFDB, 2012).

The critical element in policy-research and evidence-based decision-making is effective linkage among researchers, policy-developers and decision makers. There is none of the three communities that have placed adequate emphasis on such linkage. Several decisions are still being taken without research input, and several research studies are being conducted without policy relevance. The level of development of any society depends on an orderly and programmed management of resources, which requires adequate planning. The articulation of development policies and implementation of strategies should be based on research output. Hence the procedure for carrying out research for the purpose of planning calls for familiarity with research tools, approaches and techniques. Economic planning is a deliberate control and direction of the economy by a central authority for the purpose of achieving definite target and objectives within a specific period of time. The need for economic planning in Nigeria and other developing countries is informed by the need to address their characteristic development challenges, poverty, urbanisation, rapid population growth, and agricultural development dualistic economy and under developed natural resources (Jhingan 2007). The gamut progress in the research development witnessed in the country between 1960s and early 80s decimated due to some factors. Nigerian University Commission identified some of such factors to include:

* Lack of research skills in the modern methods;
* Constraint of equipment for carrying out state-of-the out research;
* Over-loaded teaching and administrations schedules which thee little time for research;
* Disconnect of research from economy, state and community;
* Difficulty in accessing research funds; and
* Diminishing scope of mentoring junior researchers by seasoned and senior researchers due to brain drain.

A study on constraints to the use of research results by productive sector in Nigeria[[1]](#footnote-2) identified the following as major impediments: Poor funding of research; lack of clear-cut enabling policies; poor or indifferent attitude of Industrialist to results of university; poor or indifferent attitude of university scientist; bureaucracy; poor communication between universities and the productive sector; paucity of University-based research results; inadequate research personnel; economic reasons; political reasons and security reasons, among others. The growing evidence on the role and importance of research in national and sub-national governmentt has made investment in research an important component of national strategies for sustained growth and development

**2. Relevance of Research in National development**

Research output is key to development process, thus sources of knowledge are probably less important than the value attached to associated research and the ways in which the research results are utilized. The ability and willingness to evaluate material from whatever source, to understand its characteristics and its reliability, and to relate it to local circumstances are most important. It is fundamental that knowledge inputs into the planning process that have an impact upon decision-making if such processes are to retain public credibility must be of an understood quality and value. Similarly, any processing and presentation of research results for planning purposes must take account both of the inherent qualities of the data and of the reliability and robustness of the methods of analysis used; and this needs to be done in transparent ways. Other roles of research and development include

**Effective planning and Sustainable development**: Any planning or development process cannot yield optimal or "best” outcomes, except they are based on the outputs of well-conducted research. Some people may not believe in the value or outcome of research partly because the lines of communication, from inquiry to outcome, are not as clear as they should be to them. Nevertheless, it is important to properly conduct, disseminate and apply research results in order to improve overall performance and productivity as well as change ineffective and inefficient practices.

**Influencing Policy Decisions**: Research outcomes arc very important in influencing policy and in determining policy direction. Many policies have emanated from outcomes of research. Through research, a better understanding of what is actually happening is facilitated and well-informed policy decisions can be taken.

**Facilitating Development Efforts:** Research and development (or R&D), as an activity, has a special commercial significance, apart from its conventional coupling of scientific research and technological development, Generally, R&D activities are conducted by specialized units or centers belonging to companies, universities and state agencies. On a technical level, high tech organizations explore ways to re-purpose and repackage advanced technologies through their research activities. They often reuse advanced manufacturing processes, expensive safety certifications, specialized embedded software, computer-aided design software, electronic designs and mechanical subsystems.

Within the context of commerce (which affects productivity and vice versa), for instance, “research and development” normally refers to future-oriented activities, using similar techniques to scientific research and with broad forecasts of commercial yield. Statistics on organisations devoted to “R&D” may express the state of an industry, the degree of competition or the lure of progress.

In terms of enhancing development efforts, the Japan of the 1990s, for example, was able to build a strong foundation of basic and applied research to ensure Japan’s future economic competitiveness. This approach has also been used in the United States for more than 50 years, with great success (Atkinson, 1997). For several decades, areas such as the Silicon Valley in California, the Route 128 corridor around Boston, and the Research Triangle in the State of North Carolina have also demonstrated clearly how the knowledge revolution, through research, can dramatically affect economies far beyond the boundaries of their respective regions (Sorensen, 2004).

Indeed, the economic evidence about the relationship between research and development (R&D) and American economic growth is now overwhelming. This is because of the fact that more than 50 per cent of the growth in the American economy for about 10 years has been due to investments in research and development (Atkinson, 1997), It should also be noted that in 2006, the world's three largest spenders of R&D were the United States (US$330 billion), China (US$136 billion) and Japan (US$ 30 billion).

**Promoting Knowledge Sharing:** Good research is only effective if it is shared with the right people. In fact research must be disseminated properly and communications must be taken into account in order to have an impact, these days. Applying and sharing knowledge about research results (for planning and development purposes among other things) is increasingly leading to the emergence of network partners and the strengthening of networking among groups with similar research interests. This tends to improve the quality of research and, by implication, its application and effects.

**3. Literature Review on Nigerian Experience and Conceptual Issues**

Development in general is a dynamic process of improvement, which implies a change, an evolution, growth and advancement. Development is a phenomenon suggests that people are able to control their future and can improve their condition in the world (such as living conditions capacity to feed, education level life expectancy etc), through process towards something better.

The purpose of development is to move a society from an existing state, along the most efficient path, to a more desirable state, within a specified time period. In this sense, development may be viewed as the transition from the existing state towards the desired state. Development depends on the interplay of the matrix of interacting social, economic, political, technological and other variables characterizing the existing state and the human response to these conditions. This human response hinges on three main factors: namely, the possibilities existing in the domestic material environment, the past and/or continuous achievements in other societies; and, the constraints and opportunities desired from the global socio-economic environment.

Research process involves discovering and learning new things, which are enjoyable experiences. It is also an essential tool for understanding the events and structures of the social world. The wide spread use of research especially social research throughout the modern society makes research very important and relevant in this generation. The goal of the research process is to produce new knowledge, which takes three main forms:

* Exploratory research; which structures and identifies new problem
* Constructive research: which develops solutions to a problem
* Empirical research: which tests the feasibility of a solution using empirical evidence

Research can also fall into cither basic or applied research. Basic research is not focused on applications; the term "curiosity research" is sometimes used to describe it. It is driven by a sheer interest in the phenomena rather than potential applications. But at a certain point, basic research may reach the stage where there is potential for application and accordingly a need for applied research. Next it moves into the development stage, involving the creation of new products and processes.

There are several research methods that scholars or researchers can use. They include experimental and quasi-experimental studies, interview based studies (structured interviews or information discussions), beneficiary assessment, experiments, simulations, participant observation, statistical surveys, content or textual analysis and so on. (Another paper will provide details of various research methods).

The current global unconventional capitalist development emerged through succession of scientific and technological revolutions over centuries. The advanced capitalist development was determinedly and intelligently nurtured and researched into principally by the western universities as a result of their drive to produce requisite high skilled manpower, knowledge and related services. Research and development has become the most enduring and effective means of boosting sustainable economic development and re-enforcing competitiveness in face of rapid growth taking place between industries, countries and peoples in the world (Bako, 2005). The empirical evidence shows that there is direct relationship between the investments in the world Research and Development (R&D) and capital inform of breakthrough in scientific discovery and technological innovation. For instance, the United States of America has the largest share of the world R&D capital, and as a result has the largest number of world class universities as well the equal lion share of the world knowledge economy (Zinberg, 1986; Castells, 1991; World Bank, 2002). Research is the only source for generating and advancing the frontier of knowledge, skills training and expertise for manpower, and therefore, the most important factor which, facilitates and accelerates economic development and improved living conditions in society.

Numerous ways through which the quality of research output can be measured are identified in the literature. Cetto (1998) argued that quality of research output can be measured through the metric of academic works published in international journals by the world distribution of active serial titles emanating from the universities, which contribute to the generation, dissemination and application of scientific knowledge for development. Quality of research output can as well be measured through academic standard attained by a comparative analysis of the quality of graduates evaluated by labour employers and peer universities. Because of the extensive research carried out by the teaching academic staff and the availability of teaching and research facilities, the Nigerian graduates of the early period were classified among the best in the world (Bako, 2005). Bako (2005) further argued that the quality and relevance of research can be measured by its level of contribution to the general economic growth, development, prosperity and democratic empowerment of the citizenry

Karani (1997) and Okebukola (2002) recalled the role the Nigerian tertiary institutions played as the leader in sub-Saharan Africa (SSA) from 1960s through 80s in terms of quality and quantity of research output, which was attested to by the World Bank, the National Universities Commission, the Nigerian academic staff union and industries that employ graduates. Specifically, Karani (1997) stated that “in terms of quality and quantity, the research out-put of tertiary institutions in Nigeria was about the best in sub-Sahara Africa up to the late 1980s”. Between 1960 and 1980, Nigerian universities yielded the highest rate of return of 46% in some African countries as reported by Hinchciffe (1987) and the high performance directly translate into high economic growth rate, development and relative prosperity in the country. Other countries in the report include Botswana (38.0%), Ghana (37.0%), Lesotho (36.0%), Sierra Leone (33.2%), Kenya (31.0%), Liberia (17.0%) and Somalia (15.0%).

Bako (2005) highlighted some of the factors responsible for the high performance of Nigeria among the League of Nations in SSA Some of such factors include:

* The colonial inheritance factor, which could be studied under the institutional, infrastructural, personnel and tradition of research, handed over to pioneer colonial universities;
* The universities also inherited a well-trained research cadre of staff, mostly British and Americans who had conducted numerous researches in Nigeria and outside;
* A strong tradition of research which the expatriate staff brought to bear to the Nigerian universities from the colonial period and western established universities;
* Quality funding which education generally and universities in particular received from the early post-colonial governments of Nigeria;
* The university-institutional framework created for research in terms of allocation of resources, functions and time for academic staff; and
* Relative institutional autonomy and academic freedom from the democratic regimes of the first and second Republic and (1960-1966 and 1979-1983) neo liberalized military regimes of Gowon-Obsanjo-Murtala 1966-1979, which enabled them and conduct research and pursue knowledge without hindrance from the states and governmental bureaucracies at the national level

However, the performance highlighted above has been eroded in the last few decades because of low government investment in R&D compared to other countries. Nations in the world that have attained a reasonable degree of development and those who aspires to attain similar height are nations that have identified and embraced the tenets of qualitative education, research and development as well as making their services accessible to its people. Brademas (1989) in his recommendations for the future of liberal arts education, observed that education has new mission which includes: preserving peace and security, revitalizing the economy, expanding individual opportunity, enhancing the quality of life and restoring respect for ethical behavior. Orbach (2001) observe that university serves as a broker between government and private interests. The university has the opportunity to serve the public and common good by provoking public debates with unbiased research.

There is an important relationship between economic growth and research &development, between industry creation and political stability, and between the nurturing of research and sowing the seeds of a middle class in developing nations. While R&D funding isn’t the sole indicator of how a nation, region or industry will perform, it certainly is a fundamental consideration among other factors like science, technology, engineering and mathematics education levels, capital markets, healthcare, infrastructure, property rights and immigration policy. In 2014 according to global R&D funding forecast ten countries spent about 80% of the total $1.6 trillion invested on R&D around the world; the combined investments by the U.S., China and Japan accounted for more than half of the total investment on R&D. Together, the U.S. China, Japan and Europe accounted for about 78% of 2014’s $1.6 trillion total investment in R&D.

Most African countries with the exception of South Africa experienced week GDP growth because of under-developed R&D capacities. Based on 2014 global R&D funding ranking (Battele,2014) South Africa R&D as a percentage of gross domestic product(GDP) stood at 1% while gross expenditure on research and development was about 6 billion US dollars.

**Using Research and Development to Grow State Economics.**

Research is critical for development of a Technology-based Economy. A technology-based economy requires:

* a strong intellectual infrastructure, such as universities and public or private research laboratories that generate new knowledge and discoveries;
* efficient mechanisms through which knowledge is transferred from one person to another or from one company to another;
* excellent physical infrastructure, including high-quality telecommunications systems and affordable, high-speed Internet connections;
* a highly skilled technical workforce;
* good sources of capital.

Each element has a direct impact on a state's R&D base and, therefore, on its ability to support a technology- based economy. Many states are building their R&D base through initiatives that address these elements.

Implications for a State's Research and Development Base

Technology industries are driving the new economy. States that position themselves to take advantage of this changing economic environment will realize its benefits; those that do not will see a widening income gap and declining revenue base. Growing state economies in this new century will require building a strong R&D base to support the burgeoning technology industries. To participate fully in the new economy, states should take several actions.

* Develop a plan for building the R&D base. The first step is to develop a clear plan for building the R&D base. The plan should reflect the vision for the state's future, be based on a thorough understanding of the state's economy and R&D assets, and benefit all areas of the state.
* Recognize that building the R&D base means a long-term, sustained, and significant investment.

There is no quick route to acquire a thriving R&D base. Silicon Valley in California, Route 128 in Massachusetts, and Research Triangle Park in North Carolina are the results of decades of public and private investment. For example, North Carolina invested hundreds of millions of dollars during more than twenty- five years to support its universities and the research park's development. Most policy options to build an R&D base require a long-term, sustained, and significant investment.

* Hold initiatives accountable. State policymakers should determine in advance what policies and programs aim to accomplish and how results will be measured. Given the long-term nature of R&D investments, both interim and long-term performance measures should be developed and implemented.

**Investment in Research and Development**

* For more than forty years, states have been taking advantage of their R&D assets to improve their economic future. North Carolina's Research Triangle Park (RTP) was one of the earliest efforts. Created in 1959 through a public-private partnership involving business, academia, and state government, RTP seeks to build on and encourage greater cooperation among Duke University, North Carolina State University-Raleigh, and the University of North Carolina-Chapel Hill. Its efforts to attract companies to locate R&D facilities within the park have resulted in more than 100 R&D facilities. These facilities employ more than 37,000 people with combined annual salaries of more than $1.2 billion.8
* However, in today's global economy, state policymakers must be aware not only of the actions of other states, but also of other countries. Recognizing that a strong R&D base is critical in the technology-based economy, nations worldwide are increasing their investments in their R&D base. Although many European countries have invested heavily in programs designed to promote economic growth through the application of science and technology, countries in Asia and the Americas are also making significant investments. Approaches include funding R&D, offering tax and other incentives to attract and grow technology-based companies, and providing financial and technical assistance to entrepreneurs and new start-up technology companies. As in the United
* States, foreign governments are encouraging government-industry and university-industry partnerships, and subnational levels of government have begun to offer incentives and support for technology-based companies.
* In recent years, Singapore, South Korea, and Taiwan have made tremendous strides in building a technology- based economy. South Korea and Taiwan, both major suppliers of computer equipment to the United States, dramatically increased their patent activity in the la te 1980s, and they continue to aggressively pursue technology commercialization. Singapore is making substantial investments to promote a climate for innovation. Through its National Innovation Framework, Singapore's National Science and Technology and Economic Development Boards have committed $2 billion during the next five years to support the development of industry-driven R&D. These funds will be used to build infrastructure, support university-industry collaboration, recruit and develop R&D-trained personnel, and commercialize technology.9 Taiwan's Industrial Technology and Research Institute, a government-funded, nonprofit intermediary organization, seeks to bridge the gap between university research and industry needs by coordinating research, analyzing industrial trends, conducting market assessments, and gathering global competitive intelligence.10
* While Singapore and Taiwan are positioning themselves to participate fully in the technology-based economy, other countries, including Ireland and Israel, have clearly established themselves as key competitors. Ireland, which has succeeded in attracting a large number of multinational information technology and electronics corporations, is now seeking to grow its base of technology companies, with an emphasis on software development. A key strategy is building a strong R&D base in its universities and businesses. Its National Research Support Funding Board administers grant programs that fund basic research and joint industry- university projects. Ireland also has made a commitment to encourage Irish industry to invest in R&D. The Research Technology and Innovation Initiative, launched in late 1997, provides grants to Irish companies meeting certain criteria to cover between 35 percent and 50 percent of the costs incurred for a research project, depending on its size.11
* Israel has built on its strong base of defense-related technologies and capitalized on its highly skilled, technical workforce. The country has one of the highest per-capita ratios of scientists and engineers in the world. Like Ireland, Israel has succeeded in attracting corporate investment by providing financial and tax incentives to build the country's industrial base. Israel also provides incentives for R&D investments.
* Clearly, policymakers around the world are developing strategies to take advantage of the technology-based economy. Areas that thrive will boast a strong and vibrant research and development base. For state policymakers to develop that base, they must understand what sectors comprise the U.S. R&D base and what elements are needed for a technology-based economy.

**Elements Needed for a technology-Based Economy**

Most states envy the economic triumphs of Silicon Valley, Route 128, and Research Triangle Park, and there is no simple formula to replicate the success of these technology-based meccas. However, research on technology clusters points to seven elements that are critical to building a technology-based economy.13 These elements can be grouped into tangible elements—those that are definable and measurable—and intangible elements—those that can be defined only subjectively and are difficult to measure. There are five tangible elements.

* Intellectual infrastructure. In a technology-based economy, a key component for success is a thriving source of new ideas with people who advance their field. This source could be any one of the four sectors already performing R&D or ideally some combination of the four.
* Spillovers of knowledge. A technology-based economy also requires a free flow of ideas or spillover of knowledge. This movement can occur formally, for example, through invention licensing, or informally, for example, through the migration of employees.
* Physical infrastructure. Although a technology-based economy holds out the prospect that people can work wherever they like, an excellent physical infrastructure is still required. In addition to good highways and proximity to airports, physical infrastructure in today's economy also means high-quality telecommunications systems and affordable, high-speed Internet connections.
* Technically skilled workforce. In an economy that is based more on ideas than on manual labor, knowledgeable people with technical skills are fundamental to success. Companies are more likely to locate in areas where a supply of technically skilled workers exists than in areas where training to upgrade workforce skills is needed.
* Capital. For companies to grow, they must have capital. Regardless of the stage or source of capital, companies need financing to expand.

There are two intangible elements.

* Entrepreneurial culture. The intangibility of entrepreneurial culture makes it difficult to define. However, in an entrepreneurial culture, people view starting a company as a routine rather than an unusual occurrence, entrepreneurs are celebrated, individuals know many others who have started their own company, and people view company failure as a possible outcome of doing business rather than a cause for social disgrace.
* Quality of life. Quality of life is subjective and largely in the eye of the beholder, so it can translate into different things for different people. For example, some may view as important low taxes, varied cultural and recreational opportunities, a strong education system, and proximity to environmentally protected areas. In a technology-based economy, companies have more freedom to locate, and quality of life could play a more important role in their decision than it has in the past.

**Research and Development Challenges/Prospects in Nigeria**

Mentoring, quality funding, functional leadership capacity, people’s attitudes towards innovative ideals, and competences of political leaders drives development initiatives,

while ill-will bureaucrats and peoples attitudes skewed towards more of consumption than production propels stagnation/underdevelopment. Nations peopled with progressive thoughts and development initiatives find ways in identifying possible hindrances to attaining desired development in order to proffer possible solutions to the observed constrains which is the true essence of research.

The challenges besetting the research industry in Nigeria will be incomplete if the leadership and administrative/ funding pattern are not mentioned considering how these factors have also constrained its quest to accomplishing sets goals as well as meeting national development needs.

Stakeholders are of the view that one of the major problems militating against scientific research in general and educational research in particular is the complete absence of a clear cut philosophy of national development, a philosophy which should spell out the direction in which Nigeria wants to channel its development efforts, a philosophy that should not change no matter how frequently political power changes hands. With the frequent changes of political power in Nigeria and the attendant instability, inconsistency and incoherence in governmental policies and programmes, the practitioner in the education industry, including the researcher, is left confused. Before the researcher concludes an evaluative study of a particular programme or policy, it is either discarded or replaced with a different, sometimes completely divergent policy or programme.

Political instability has also taken its toll on the educational and research institutes in Nigeria. The academic calendar is frequently disrupted: there are strikes, lockouts, closures and general social upheavals - and all these can influence the orientation, timing, process and quality of any research activity in the field of education. And yet, the politician or policy maker out there is waiting, with his characteristic suspicion of, and impatience with the education researcher. A consistent, coherent and comprehensive philosophy of national development is essential for concerted research effort (Jimoh 1998).

Increase productivity, enhanced socio-economic wellbeing, enhanced income, infrastructural development, employment opportunities, enhanced quality of local produce for both local and foreign markets and the likes remains the hallmark of a well thought out research initiatives and development agenda by prosperous nation with high capacity, visionary/corrupt free leadership.

Expected outcomes of a functional research and development initiatives includes equipping the people with the needed capacity with which they need to carryout their economic activities with appreciable degree of proficiency leading to the attainment of maximum output. These capacities encompasses enhancing the people with the skills and competences needed to effectively harness and utilize the potentials found in ones environment. Nigeria’s case today is evidence of the fact that it is a nation highly populated with whole lot of potentials but with inadequate competences needed to translate these potentials into socio-economic transformations of the nation. One factor in the exceptional growth rate in this industry of research and development in recent years is Israel’s percentage of engineers, the worlds highest, with 135 engineers per 10,000 persons, as compared to 85 per 10,000 persons in the United States. Another factor has been the many thousands of skilled engineers and technicians who have immigrated from the former Soviet Union since 1989. More over, advanced technologies that were originally developed and utilized for military purposes are now being used for developing commercial products for civilian use. With the downsizing of Israels defense industry - as a “peace dividend” - thousands of skilled personnel have left the defense industry since 1988. Many of them were absorbed into the civilian market place, while others formed start-up companies which later became successful high-tech firms (Cohen 2002). They sought for more professionals in addition to the available skilled manpower deployed to harnessing their potentials and making their produce compete favourably in the international market with increase in the GDP level.

The proper environment for research is not yet available in Nigeria. A conducive environment is needed for growth and utilization of research. For this to happen, many things have to be considered. These include adequate infrastructure, trained manpower, institutional capacity, and adequate financial support. It also involves motivating the entire population to adopt a science culture as a pattern of life. These and other matters call for the urgent attention of practitioners and policy makers in Nigeria (Jimoh 1998). Another critical factor hindering the desired break through in science and technology beside the issue of improper placement of persons in headship positions is the non utilization of the services of well trained personnels as majority of Nigerian scientist are either out of the country in search of greener pasture, roaming the street/idle or work in organizations where their scientific competences are not useful.

Educational research, and indeed research of all kinds, is almost as old as man on earth. All that has changed over the years is the approach or method(s) employed in particular research activities. The need to carry out investigations and evolve new theories is one of the mostfundamental functions of the corps of the intelligentsia of a particular society. Similarly, the place of such research activities in the developmental efforts of any society has also been recognized. This is why special attention has been paid to research and documentation by countries that have been eager to develop technologically. For instance, according to Nkwi (1992, p. 35), following the Meiji Restoration in 1968, the Emperor of Japan was required to take five oaths, one of which stated that "knowledge will be sought and acquired from any source with all the means at our disposal, for the greatness and security of Japan". Today, Japan is a great and powerful industrial nation (Jimoh 1998).

A review of Nigeria’s economic development between 2000 to date revealed that overall macroeconomic policies and development strategies have failed to provide an enabling environment that could alter the structure of production and consumption activities in order to diversify the economic base. The country has continued to be a mono-cultural economy, depending on oil, indicating that the export base is yet to be diversified. Widening saving - investment gap, high rates of inflation, chronic balance of payment problems and underutilization of resources have continued to be the order of the day. Poverty and inequality is wide spread with about 71 million Nigerians living below $1 a day and the gini coefficient of 0.49. Socio statistics such as infant, (under 5) and maternal mortality rate as well as unemployment rate are higher than the averages for developing countries (Fakiyesi and Ajakaiye, 2009). In the light of Nigeria’s current economic problems, and particularly its poverty situation and unimpressive rates of economic growth, Dauda (2010); Odia and Omofonmwan (2007;2010) takes the position that educational/ research development should be given utmost attention in a bid to enhance sustainable economic growth and development. Since a healthy, well-educated, innovative people make an economy more productive, it is apparent that capacity building through investment in human capital, particularly education can enhance economic growth, alleviate poverty and protect the Nigerian economy from further distortions.

Accordingly, there is however, a need to critically examine the relationship between investment in education and economic growth in Nigeria, with a view to deriving implications for policy direction (Dauda 2010).

Lawal and Oluwatoyin (2011) noted that development is critical and essential to the sustenance and growth of any nation. They added that a country is classified as developed when it is able to provide qualitative life for her citizenry. And concluded that Nigeria in the last fifty years has been battling with the problem of development in spite of huge human, material and national resources in her possession. Human resource has been identified as one of the most important catalyst in the nations development. In fact it is the major propeller for development. In Nigeria, this important and critical resource has not been fully developed, managed and utilized in such a manner that would engender development. The authors identified factors responsible for human resource development to include; political instability, political corruption, poor investment in education, lack of infrastructural facilities, poverty and low technology. They recommended; improved investment in education, implementable policies on human resource development, involvement of the private organization on human resource development, ensuring political stability and credibility as ways of tackling the problem of human development in Nigeria.

**Relevant Concepts**

The theory found suitable for this paper is the new growth theory. The new growth theory as postulated by Paul Romer, holds that economic growth is generated from within a system as a direct result of internal processes. More specifically, the theory notes that the enhancement of a nation’s human capital will lead to economic growth by means of the development of new forms of technology and efficient and effective means of production.The new postulations contrasts with the views of neoclassical economics, which holds that technological progression and other external factors, are the main sources of economic growth. Advocates of endogenous growth theory have argue that the productivity and economies of today’s industrialized countries compared to the same countries in pre-industrialized eras are evidence that growth was created and sustained from within the country and not through trade.

Romer, further explained that the new growth theory shows that economic growth doesn’t arise just from adding more capital, but from new and better ideas expressed as technological progress. Along the way, it transforms economics from a “dismal science” that describes a world of scarcity and diminishing returns into a discipline that reveals a path toward constant improvement and unlimited potential. Ideas, in Romer’s formulation, really do have consequences. Drawing from Marxists view, one extremely important insight is that the process of technological discovery is supported by a unique set of institutions. Those are most productive when they are tightly coupled with the institutions of the market. The Soviet Union had very strong service in some fields, but it wasn’t coupled with strong institutions in the market. The upshot was that the benefits of discovery were very limited for people living there. The wonder of the United States is that they created institutions of science and institutions of the market. They are very different, but together they have generated fantastic benefits.

Paul Romer opined that, nurturing scientific talent is the key to the nation’s technological superiority and continued wealth creation. Support for higher education is the lever by which the government can move the entire economy.

The problem is this: Evidence shows that undergraduate institutions are a critical bottleneck in the training of scientists and engineers, and graduate schools produce people trained only for jobs in academic institutions. “Some in academic circles maintain that scientists selflessly pursue the greater good, that money - or the lack of it - has no bearing on the career a promising student chooses or the effort that a professor devotes to teaching such students,” Romer. “But the fact is, incentives do matter for what happens on university campus.

“Students could vote with their feet by selecting disciplines in the universities that offer them the best training for the careers that most of them will follow, working outside of academia”, he explains. He added that universities that develop innovative new training programs would be rewarded with an influx of students and tuition fees.

“These grants are intended to increase innovation in business sector, but unless universities train more scientists and engineers, they will go to waste. “Ultimately, it does no good to subsidize business sector demand for highly skilled workers if the university system cannot respond with an increased supply”. He however, emphasizes the need for government to subsidize training of innovators as same is capable of changing lives, change organizations and change the world. This theory best explains the need for research and development as it relates to the quest of national development drawing from Nigeria’s experience.

Methods

The focus of the study is the impact of challenges and prospects of research and development initiatives with specific reference on Nigeria. Stakeholders in the educational/research institutions - students, lecturers/research fellows, administrators and parents in the six Geopolitical Zones in Nigeria constitute the population of this study. The Zones are: South West, South South, South East, North Central, North West and North East. Nigeria is located between latitude 0.40 and 1.30 N of the Equator and between longitude 030 North and 150 East of the Greenwich meridian. Its land mass is 923, 768 square kilometers (356,376 square miles) and a population of 167 million people National Population Commission October, 2011 estimate.

Two institutions (one university and one research institute) were sample from each Geo-political Zone. The institutions sampled, where questionnaires were administered are university of Benin and Nigerian Institute for Oil Palm Research (NIFOR), Edo State in South South Zone, University of Ibadan Oyo State and Nigeria Academy of Science, Akoka Yaba, Lagos in South West Zone, University of Nigeria Nsukka, Enugu State and National Root Crops Research Institute (NRCR) Umudike, Abia State in South East Zone, University of Jos and National Veterinary Research Institute (NVRI), Vom, Jos, Plateau State in North Central Zone, Amadu Bello University and National Research Institute for Chemical Technology (NARICT) Zaria, Kaduna State in North West Zone and University of Maiduguri, and Lake Chad Research Institute (LCRI) Maiduguri, Borno State in North East Zone.

In each of the institutions, 60 respondents were selected in the 12 institutions using purposive sampling technique. 120 questionnaires were administered in each zone, making a total of 720 respondents that were selected from all the Zones.

Questionnaire instrument was used to elicit the desired data for the study. The questionnaire format is made up of 5 points items Likert scale. The instrument is made up of two parts, section A contains the demographic information/biodata of the respondents while section B contains questions designed to elicit desired responses from the respondents. The instrument was validated by two senior associates who are experts in the field, in addition, interview section was held with some stakeholders in the education industry. Also, four indepth interviews were conducted with 1. two administrators - one in a university and one in a research institute - one senior faculty senator member in a university and one senior research fellow in research institute. The statistical tool used for the analysis of data obtained in this study is simple percentage.

* Findings

Research Question One: is a nation’s level of development a function of its research initiative structure?

Table 1: Research initiative structure and National Development

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NO | SA | A | DA | SD | UD | % SA & A | % SD & D | % UD |
| 4 | 108 | 324 | 144 | 72 | 72 | 60 | 30 | 10 |
| 5 | 180 | 504 | 36 | - | - | 95 | 5 | - |
| 6 | 216 | 360 | 36 | 36 | 72 | 80 | 10 | 10 |
| 8 | 360 | 288 | 36 | - | - | 90 | 5 | - |
| 9 | 396 | 180 | 76 | - | - | 80 | 10 | - |
| 10 | 432 | 253 | - | 36 | - | 95 | 5 | - |
| 17 | 360 | 288 | 36 | 36 | - | 90 | 10 | - |
| Total | 2052 | 2196 | 360 | 180 | 144 | 84.3 | 10.7 | 2.8 |

Source: Author’s Field Survey 2011.

84.3 percent of the respondents responded that a nation’s level of development is a function of its research initiative structure. 10.7 percent of the respondents disagreed while 2.8 percent of the respondents were undecided.

Research Question Two: Is a nation’s degree of progress a function of its research administrative efficiency?.

Table 2: Research administrative efficiency and a nation’s degree of progress

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NO | SA | A | DA | SD | UD | % SA & A | % SD & D | % UD |
| 11 | 216 | 360 | 72 | - | - | 80 | 10 | - |
| 12 | 324 | 288 | 36 | - | 72 | 85 | 5 | 10 |
| 15 | 360 | 144 | 108 | 36 | 72 | 70 | 20 | 10 |
| Total | 900 | 792 | 216 | 36 | 144 | 78.3 | 11.6 | 6.6 |

Source: Author’s Field Survey 2011.

78.3 percent of the respondents responded that a nation’s degree of progress is a function of its research administrative efficiency 11.6 percent of the respondents disagreed while 6.6 percent of the respondents were undecided.

Research Question Three: Does pattern/quality of research funding determine a nation’s level ofdevelopment?

Table 3: Research funding and a nation’s pace of development.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NO | SA | A | DA | SD | UD | % SA & A | % SD & D | % UD |
| 1 | 288 | 396 | 36 | - | - | 95 | 5 | - |
| 2 | 288 | 360 | 36 | 36 | - | 90 | 10 | - |
| 3 | 144 | 144 | 324 | 72 | - | 40 | 55 | - |
| Total | 720 | 900 | 396 | 108 | - | 75 | 23.3 | - |

Source: Author’s Field Survey 2011.

75 percent of the respondents support the view that a nation’s pace of development is determined by its level of research funding while 23.3 percent of the respondent disagreed.

Research Question Four: Does a nation’s level of investment on research and development determines its pace of advancement in science and technology?

Table 4: Investment on research and development and national development.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NO | SA | A | DA | SD | UD | % SA & A | % SD & D | % UD |
| 7 | 396 | 288 | 36 | - | - | 95 | 5 | - |
| 13 | 468 | 216 | 36 | - | - | 95 | 5 | - |
| 14 | 360 | 252 | 36 | 36 | 36 | 85 | 10 | 5 |
| 16 | 468 | 144 | 36 | - | 72 | 85 | 5 | 10 |
| Total | 1692 | 900 | 144 | 36 | 108 | 90 | 6.25 | 3.75 |

Source: Author’s Field Survey 2011.

90 percent of the respondents accepted that a nation’s scientific and technological advancement is determined by its level of investment on research and development. 6.25 percent of the respondents disagreed while 3.75 percent of the respondents were undecided.

Discussion

In some developing countries, large public enterprises in different sectors that intensively develop research activities dominate R&D expenditure. In some cases, these enterprises may create “independent” R&D institutes where research efforts are undertaken in an autonomous way with significant R&D budgets. They have their own financial resources, receive funding directly from supporting agencies and may enter into their own contractual arrangements. This sub-sector includes state utilities both at the national and secondary level that are registered as enterprises. They are ‘corporatized’ with a single shareholder and also operate independent research centres or R&D departments as cost centres that may receive funding agency support (UNESCO 2010).

The growing evidence on the role and importance of research and education in the development process has made social sector investment an important component of national strategies for sustained growth and development. In Nigeria, in terms of budget estimates, the ratio of public expenditure on social and community services to total public expenditure averaged 2.2 percent between 1977 and 2007. Out of this amount, about 6.5 percent has been directed to education during the same period. Nevertheless, a major trend in education in Nigeria is that investment on the sector has not been encouraging. Public expenditure on education as a percentage of the gross national product was 1.5 (1960); 1.7 (1985-87) and 0.7 (1995) percent. This compares very unfavourably with other developing countries such as Jamaica 4.9 (1985-87), 7.5 (1995-97) and Malawi 3.5 (1985-87), 5.4 (1995-97) percent (UNDP, 2003: 313). In recent times, the percentage of the annual federal government budget to education in Nigeria for the periods 2005-2007 was 6.3%, 7.8%, 8.7% in 2005, 2006, and 2007 respectively instead of 26.0 percent as recommended by the United Nations Educational Scientific and Cultural Organisation (UNESCO). Evidently, there is still a significant shortfall in educational investment necessary for the realization of sustainable growth and development in the country (Dauda 2010).

Nations in the world that have attained a reasonable degree of development and those who aspires to attain similar height are nations that have identified and embraced the tenets of qualitative education, research and development as well as making their services accessible to its people. Brademas (1989) in his recommendations for the future of liberal arts education, observed that education has new mission which includes: preserving peace and security, revitalizing the economy, expanding individual opportunity, enhancing the quality of life and restoring respect for ethical behavior. Orbach (2001) observe that university serves as a broker between government and private interests. The university has the opportunity to serve the public and common good by provoking public debates with unbiased research.

This study is aimed at finding out the impact of the challenges and prospects of research and development initiatives with emphasis on Nigeria. The study reveal that 84.3 percent of the respondents stated that a nation’s level of development is a function of its research initiatives and development structure 10.7 percent of the respondents disagreed while 2.8 percent of the respondents where undecided. this structural challenges relates to the pattern of relationship (hostile), political ethnic and religious influence, poor synergy between tertiary institutions and secondary education, government’s policies and actions, the missing link between research outcomes and the industries (see the views of Odia and Omofonmwan, 2007).

The study also revealed that 78.3 percent of the respondents responded that a nation’s degree of progress is a function of its research administrative efficiency. 11.6 percent of the respondents disagreed while 6.6 percent of the respondents were undecided. This findings implies that a whole lot of predicaments confronting Nigeria’s tertiary/research institutions are orchestrated by challenges emanating from administrative deficiencies. These includes issues of both moral and economic corruption. Walshok (1995) observed that administrative challenges in the research universities studied, led to underutilized sources of renewable economic development. She advocated the need for the administrators to commit vigorously to an expanded role that better utilizes the knowledge, expertise, and resources at their disposal for the betterment of the community at large.

Response to the assertion, whether a nation’s pace of development is determined by its level of research funding, 75 percent of the respondents alluded to it while 23.3 percent of the respondents disagreed. The views of Okunamiri, Okoli and Okunamiri (2008) are in alliance with these findings having reviewed the implications of poor funding of Nigeria’s tertiary education which they observed as inadequate.

The study further revealed that 90 percent of the respondents accepted that, a nation’s scientific and technological advancement is determined by its level of investment on research and development. 6.25 percent of the respondents disagreed while 3.75 percent of the respondents were undecided. This findings confirms the observations of the Director General of Nigerian Institute of Medical Research (NIMB), Prof. Innocent Ujah according to Obinna and Onuorah (2011) that one factor responsible for non availability of accurate data in the country was due to lack of interest and funding for research. He hinted that medical research is one major tool to fighting diseases as well as making better policies for general development of a country. Ujah who noted that in most countries of the world 90 percent of the resources are channeled to research stating that his one year as DG of a research institute has shown that Nigeria is yet to appreciate research. His words, “we have the capacity to conduct research but there is no interest and we lack funding and funding is a major barrier to successful research because it is a very expensive venture”.

All the respondents interviewed accepted the fact that what makes the difference between Nigeria’s research and educational institutions and those in the developed nations is that, while the ones here rely majorly on subventions from government, the later relies majorly on royalties from their inventions with patent right. And while the institutes/units are headed on the basis of creativity/prudence and task orientated set of persons, the attainment of such headship positions in Nigeria is majorly determined by political/lobbying prowes of those who occupy them.

They contended that the right step which government must take is to evolve an industrial friendly policy, implemented faithfully in order to encourage and empower existing and would be researchers and industrialists. The respondents equally advocated for the need to put in place an innovation support fund by government to strengthen the will and capability of innovators, noting that it will also help remove the fears experienced by experimenters of losing their resources should their invention fails. Stakeholders hold that as a way forward, system integration strategy must evolve whereby the universities, polytechnics, research institutions network on ideas, innovations/inventions. They all agreed that performance and productivity do not come by accident but through dedication, hardwork, and committed stakeholders.

Cyert and Mowery (1989) present aspects of technological change that are essential to economic progress. They opined that workers need to be more adaptable, research needs to be more focused, and managers need to be more open-minded.

A study conducted by Western Interstate Commission for Higher Education (WICHE) project (1992), observed that accountability was seen as the best way for higher education to demonstrate responsiveness to its public, but a functional role was also expected from governing boards in this area. The report further stated that virtually all the respondents saw the need for commitment to collaboration; most frequently mentioned were partnerships that link higher education with elementary and secondary education. In Nigeria however, stakeholders sees the poor synergy between tertiary institutions and secondary education as a missing link hampering the goal of national development.

It is the conviction of stakeholders that further investment by the government, corporate organizations and individuals in higher education and research activities/enforcement of functional administrative principles will increase accessibility to educational opportunities, basic research and production of new ideas/knowledge, expand the traditional role of providing opportunities for job training and retraining for workers in the labour market, leading to national human capital development and national development.

**Conclusion**

The Nigerian research and educational system has overtime been exposed to large scale corruption, and several inefficiencies including faulty headship selection process. As part of the advocacy geared towards efficiency in the system is the need to give more autonomy in financial management in public educational and research institutions. For instance, through autonomy, higher institutions of learning could improve their financial situation by improving the efficiency and effectiveness of resource generation, use and cutting costs.

Besides, public educational/research institutions should be encouraged to develop resource mobilization strategies, in order to generate revenue by themselves. For this purpose, educational foundations can be set up in order to mobilize financial support from private donations (Dauda 2010).

A philosophy of national development must be evolved and everything must be done to give appropriate legal backing to bodies concerned with research and research-related activities.

Policy-making bodies should be set up to guide research activities. Appropriate government agencies should also ensure that research activities are backed up by adequate infrastructure, adequate personnel and adequate funding. Over-reliance on foreign aid would only reduce the relevance of research activities to the Nigerian situation. In order to sustain scientific and technological impetus, and not with standing the general depression, sub-Saharan nations must inject huge amounts of funds into initiating and expanding training and research facilities (Jimoh 1998).

The seemingly absence of conducive environment needed for qualitative and productive research and scholarship endeavor in the country have over time propelled the incidence of brain drain by legions of scholars and researchers to other parts of the world. The home system deserves rejuvenation and enhancement in order to be able to groom more

scholars and encourage brain gain. A system where unproductive researchers/academia who lack innovation/creativity in every sense of it dominate the scene cannot move the system any step forward.

Future generation researchers/academia in Nigeria look forward to seeing the present trend of poor infrastructure and lack of up to date learning/research facilities replaced with cutting edge/ sophisticated equipments to be able to compete favourably with their peers elsewhere in the world. These aspirations are what the government and relevant stakeholders must respond to if the future development goals of the nation must be attained.

This paper is of the view that beside assuaging those obvious inadequacies such as poor funding, decaying infrastructures/facilities, authorities concerned must create the needed ambience conducive for qualitative research/scholarship, provision of subsidies for higher degree training of researchers, protection of purposive/creative researchers, adoption and utilization of findings, and funding the mass production of invented products by researchers in establishing a compelling synergy between the research institutions, the industries and market as a way of creating a sense of fulfillment among researchers as well as raising the productivity profile of the nation.

4. **International Best Practices**

From a global perspective, R&D is concentrated in the triad countries of the United  
States, the European Union and Japan. In the developing world, R&D expenditure and  
output are also concentrated in a relatively small group of countries in each region.  
Examples of these can be found in Gaillard (2008) and Arber et al. (2008) – particularly  
noteworthy is the rapid rise of R&D in Brazil, Russia, India, China and South Africa (BRICS) over the last decade. By implication, the comparative analysis of international research practices for Nigeria will be drawn from United States, Japan, Germany (representing the European Union), Singapore, Russia, China and South Africa.

Certain indicators that are capable of showing commitment to research have been identified in the literature. For instance, expenditure on research stands out. Contained in Figure 1 is the gross expenditure on research and development as a percentage of National Gross Domestic Products in 2000 and 2014. Japan comes top among the countries having as much as 3.59 percent research expenditure as share of GDP. It is followed by Germany with 2.9 percent and United States 2.71. The shares for other countries are 2.05 percent for Chain, 2.2 percent for Singapore, 1.19 for Russia and 0.65 for South Africa.

**Figure 1: Gross Expenditure on Research & Development (GERD) as a Percentage of National Gross Domestic Product (GDP) 2000 and 2014**

**Source: OECD and Network for Science and Technology Indicators**

Besides the gross expenditure on research and development as percentage of GDP, that has relativity of the size of the economies built into it, the gross expenditure of these countries is also presented in Figure 2. It showed that United States has been the biggest spender on research and development and the country has continued increase its expenditure rising from $270 billion in 2000 to $470 billion in 2014. The growth in China’s expenditure on research and development in the last one and half decades is noticeable. China’s R&D expenditure increased from less than $50 billion dollars in 2000 to $360 billion in 2014. In the same period Japan increased its R7D expenditure from $100 billion in 2000 to $150 billion in 2014. Although, there has been marginal increase in in R&D expenditure of Russia, Singapore and South Africa, the countries’ expenditure remained less than $50 billon as at 2014.

**Figure 2: Gross domestic expenditure on R-D, Billion $**

**Source: OECD and Network for Science and Technology Indicators**

There has been several argument who should finance R&D in that various countries. The broad classification of the expenditure is government and business. Governments of nations that price Research and Development usually devote huge money on research activities. Contained in Figure 3 is government expenditure in the selected countries. United States has the highest government expenditure on R&D in both 2000 and 2014, the country almost doubled her expenditure in the period. The government of China also had substantial investment ($74.7 billion) in research and development in 2014. The other countries spent less than $50 billion on research and development in 2014 and South Africa spent the lowest amount.

**Figure 3: Government Expenditure on R-D (2014) Billion $**

**Source: OECD and Network for Science and Technology Indicators**

It is equally important to consider the share of government expenditure on research in total research expenditure, this is presented in Figure 4 Very striking from the figure is the reduction in the proportion of government expenditure on R&D in China despite the huge increase in the total research and development expenditure in the country. Specifically, not minding the fact China’s total expenditure increased from $30 billion in 2000 to $370 billion in 2014, the country’s share of government expenditure on research declined from 56 percent to 20.3 percent.

**Figure 4: Share of Government Expenditure in R-D (Percentages)**

**Source: OECD and Network for Science and Technology Indicators**

Looking at international best practice regarding the commitments of countries to research, it important to consider the personnel in research. Evidence from three countries is presented in Figure 5 It is shown that 895 thousand personnels engages in research and development in Japan in 2014, out of which about 70 percent are researcher and the rest 30 percent are support staff. In Singapore and South Africa there are about 40 thousand research personnels in which majority are researchers and lower percentage are support staff.

**Figure 5: Personnel of Research Institutions (2014)**

**Source: OECD and Network for Science and Technology Indicators**

In 2013, China was positioned as a location for cost-effective manufacturing, including for high-technology products. But efficient manufacturing alone is not adequate to maintain economic growth. Recognizing this, China intends to evolve from a manufacturing-centric model in recent times to an innovation- based economy by 2020. Mirroring the approach taken by the U.S., Europe and Japan since World War II, China is making steady progress at building a research infrastructure and educating the scientists to operate it. In achieving this China in the last five years have committed 2.2 % of GDP to R&D (Battele 2014)

**5. WAY FORWARD**

It has been established from previous sections that research is the hob of development in any economy. If Nigeria will be one of the best 20 economies in the year 2020, then deliberate plan and target must be given to R&D in our development planning at both National and Sub- pnational level. The government should commit certain percentage of its expenditure and GDP to R&D consistently for the next few years especially in the following areas.

* Share of government expenditure on R&D
* Percentage of GDP on R& D
* Development of the capacities of research institutes personnel especially the researchers
* There is need for paradigmatic shift in the whole consciousness, policy, conduct and business of making research as essentially an indispensable component of national and sub national growth and also the necessary tool for development in the country. At the national level, the country should be able to develop its own research priority, agenda and strategic plan which all researchers must abide to and execute. This should lead to creating research institutional framework within the research institutes/centres and universities.
* There should be a decisive shift also at the funding of research, in which public and private contribution should be clearly designated and earmarked in terms of volume and investment capital. The state should earmark a definite percentage of its GDP, not less than two (2) per cent for research and development. Also, the Educational Trust Fund should return to its original idea of being solely a research fund, while all private enterprises should invest at least five (5) per cent of their profit in R&D within Nigerian research institutes and universities.
* Research that will be conducted should be need driven research. Research should be subordinated and dictated by the national research priorities and goals so that the outputs can be useful for community, state or private sectors, trans-disciplinary research, strategic and problem solving research that would eradicate underdevelopment, poverty, corruption and build strong and solid democracy and good governance at the all levels of society should be our focus as a nation. Research should be part and parcel of capital investment in which the generation, dissimilation and application of knowledge should replace or supplement capital accumulation, human development and prosperity in the country.
* Provision of access to the research infrastructure through a combination of investments provided to the universities and public research institutes, an increased visibility of the existing infrastructure and the international mobility of researchers.
* Ensure the integration of the Nigerian research personnel into the international scientific community through international mobility, the organisation and participation at international scientific conferences to create an improved international visibility of the Nigerian scientific publications thus providing a broad access to information resources.

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1. See chapter 17, “University Based Applied Research and Innovation in Nigeria”, available at httt.///research.yahoo.com.appliedreseaerch+NigerianUnivesities8Presearch [↑](#footnote-ref-2)