

RESEARCH AND DEVELOPMENT IN AFRICA: ADDRESSING THE ELEPHANTINE PROBLEMS

Emma E.O. Chukwuemeka, PhD

Associate Professor of Public Administration, Nnamdi Azikiwe University, Awka Nigeria

Okey R. Oji, PhD

Direcor, Boundary Adjustment Commission, Abuja, Nigeria

Chukwuemeka Okafor, D.Admin

Department of Public Administration, University of Fort Hare South Africa

Faith Onwuchekwa

Department of Business Administration, Nnamdi Azikiwe University, Awka Nigeria

Abstract

Africa is a black continent that is still dominated by new states, most of which are still very backward in terms of socio-economic development. The continent has potentials for astronomical growth and development but that has that is yet to be achieved due to neglect of the research component. The current status of research in African has been examined and recommendations made for invigorating the vital sectors like industries, government, universities and commerce to foster socio-economic development. Research as a tool for socio-economic development has been identified in this paper as either not properly funded or research findings not properly put into use. It is the position of this paper that research should be adequately funded by the government with the support of the private sector. Human resources development in the area of research enterprise should be pursued vigorously by the governments of African states. Data banks with reliable data should be established at strategic zones in every nation of Africa. Such centres should be properly funded and should also interface with the universities and grant institutions across the globe.

Keywords: Socio-economic development, funding, Research findings

Introduction

In the dynamic environment in which we live, especially Africa that is still a developing Continent, it is very naïve of any person or institution to think that important decisions can continue to be made by rule of thumb or guess work- hunches. The complexity of the decision to be made and the magnitude of the problems confronting the nations of Africa are such that systematic procedure is required in order to ensure that decisions are made as much as possible with all the facts available. Present day decision contends Osuala (2000) often cost a lot of money. Sometimes what are required in everyday decisions are not right or wrong answers but intelligent decisions that are made possible by research. Success in any enterprise involves the identification of the critical aspects of the dynamic

environment, making intelligent forecasts and utilizing those forecasts. All of these involve research and research for many underdeveloped countries of Africa means continued survival.

A growing number of African countries have realized that without investment in science and technology, the continent will remain on the sidelines of the global economy and will find it difficult to bring an end to extreme poverty. (UNESCO, 2014). There has been significant progress in terms of institutions and policy, African contributes to the global research and development effort and this contribution is growing. These are some of the findings of the UNESCO Science Report to be launched at the Organisation's headquarters on 10 November, 2014 to coincide with World Science Day. The report presents a review of the state of science and technology in the world, with a chapter devoted to sub-Saharan Africa.

Encouraging signs in recent years, several countries including South Africa, Kenya, Nigeria and Burkina Faso – have adopted laws supporting biotechnology research. Biosciences are included in the four flagship research programmes in the consolidated plan of Action for Africa's Science and Technology adopted by African Ministers of Science and Technology in 2005. The CPA is one of the most ambitious strategies of recent years and aims to strengthen Africa's research and science and technology capacities. In 2008, 14 countries called on UNESCO to help review their science policy. And, since 2005, six new science academies have been set up in Mozambique, Sudan, Mauritius, Morocco, Tanzania and Zimbabwe compared to just nine in the entire period from 1902 to 2004 (UNESCO Report, 2014).

University-based research and economic development

Universities have frequently been regarded as key institutions in the process of social change and development argues Nebo (2006). Nations across the globe today depend increasingly on knowledge, ideas and skills which are produced in universities (World Bank, 2008). The most expedient role they have been allocated is the production of highly skilled labour and research output to meet perceived economic needs. Nation states often invest in university education because society expects it to contribute in national development in three principal ways, namely: (1) To produce highly skilled personnel in technology, engineering, management and other professions, to produce a corps of academic personnel, that is, the intellectual pool that will, through scientific research, generate new knowledge and innovations to solve development problems.

(2) To produce the teachers, administrators and managers for other levels of human resources development institutions (Oni, 1999).

Generally, the strength, productive capacity and competitiveness of a country labour force argues Nebo (2006) depend on the quality of research produced by its universities. Countries with a weak university based research lag behind others in labour force competitiveness. As the labour force drives development, such countries lag behind in development. In new states, university-based researchers are able to monitor global; technology needs, assess their relevance to national needs and assist in developing the national technological capacity for economic growth.

Nebo (2006), Udochukwu (2011), Eze (2013), contend that most countries that have achieved a stable economic growth often rely on a critical mass of scientists in a specified field the scientific community – to drive their growth. For example the emergence of China as a new player in the process of globalization outside OECD can partly be attributed to its development of her scientists. In

2003, China had the second highest number of researchers in the World (862,000) behind United States (1.3 million in 1999) but ahead of Japan (675,000) and Russia (487,000).Eze, (2013). Among the OECD regions, Japan had the highest number of researchers relative to total employment (10.4 per thousand), followed by United States of America (9.3) and the EU (5.8) (OECD Scientific Technology and Industry Score Board, 2005).

Research in Africa

Development of science and technology sector in Africa faces a number of challenges. Starting with budgetary obstacles. Research and development attracts considerably less public investment in sub-Saharan Africa than defence, education or health. The proportion of GDP devoted to research and development averages about 0.3% on the continent, seven times less than that spent by industrialized countries on this sector. South Africa spends most on research and development with its investment rising from 0.73% in 2001 to 0.94% in 2006 as a proportion of GDP. South Africa also leads in terms of scientific publications, with 46% of the continent's entire share far ahead of Nigeria (11.4%) and Kenya (6.6%) (Ambe (2013).

More effort is undoubtedly required in education. Africa's rate of adult literacy, 62% is still very low. And higher education in sub-Saharan Africa is reserved for an elite minority, with enrolments in the region. Even where there is high demand, as in Benin, an increase in student enrolments means overflowing classes, a lack of laboratory equipment , underpaid lecturers and too few connections between university research and innovation. And, alongside these low numbers of students in higher education there is marked inequality between the sexes. The enrolment rate of females in Sub-Saharan African universities is one of the lowest in the world. And female students are often confined to disciplines such as the social sciences and health, where job prospects are few.

Brain drain, fostered by the absence of measures to promote research and innovation, the gaps in legislation to protect intellectual property and the low wages earned by scientists, constitutes a major concern. In 2009, at least a third of African scientists or those with engineering degrees were living and working in developed countries. Between 1990 and 2005 many qualified medical doctors and nurses from Nigeria were employed by the Saudi Arabian and American hospitals (Kalu, 2013). The absence of measures to encourage innovation, gaps in the legislation regarding intellectual property rights and low salaries paid to researchers have all contributed to the brain drain. Uganda is one of the ten countries most affected: In 2007, 36% of university graduates, doctors and leading researchers were living abroad. In an effort to halt this phenomenon, Uganda has taken energetic measures to improve salaries for university researchers and teaching staff. Cameroon, Zambia and Botswana, among others have also taken measures along the same lines.

According to UNESCO (2014), some important changes will need to be implemented if the continent is to reach the suggested target of 1000 researchers per million population by 2025. A key element will be the implementation of national science policies based on the industrial and technological needs of each country. Another indispensable element is to increase the funds allocated to Research and development and necessity of rendering science more attractive to pupils in secondary schools and to students.

The need for research as a tool for socio-economic development has long been realized by African nations and yet nothing serious has been done. The slow pace of pursuit bothering on systematic

stagnation of research activities in some sectors in African nations has been largely responsible for the stunted growth and development of Africa as a third world continent.

How can there be breakthroughs and socio-economic development without research. It is only painstaking research that can open up Africa. It is heart-warming to observe that one of the advantages attributed to Africa as a developing continent which would contribute to making it possible for the attainment of a sustainable growth rate capable of positioning it among the 3rd biggest economies in the World by the year 2020 is the establishment of several research centres and universities. It is also gratifying to note that most of the existing research institutions and universities in most African nations do not devote much to research activities. The government of most African nations do not also budget adequate fund for research. Thus the research component of many universities in Africa is weak. In Nigeria for instance, over 99.5% if not all 100% of the university activity and time are devoted to teaching and assessing of students throughout the year, without definite official time designated for doing research (Nebo, 2006). Those that must do research could only do so by stealing time out of their teaching time or spare time , or leave, if they manage to secure it (Beko, 2005).

For the last one and half decades argues Ede (2013) Nigeria universities have been expending over 98% of their research expenditure on paying salaries and allowances and 2% on maintaining services, with zero allocation for research. Out of the total fund budgeted for research between (1999-2006) less than 20% were actually allocated to the Nigerian University Commission (NUC) by the Government, while out of the fund in question less than 50% were actually allocated to the universities, and out of this allocation, less than 3% of the money were utilized for research. Due to the shortfalls the universities have been experiencing in the payment of salaries and maintenance services, the bulk of the research grants were vied for these purposes. This is why most of the Nigerian universities find it difficult to account for the research money received (Due to the shortfalls the universities have been experiencing in the payment of salaries and maintenance services, the bulk of the research grants were vied for these purposes. This is why most of the Nigerian universities find it difficult to account for the research money received (Research Bulletin, NUC, 1977-200 to Federal Universities). This scenario is obtainable in other nations of Africa. To say the least research in most countries of Africa is merely for academic purposes and thus is not taken seriously. This scenario presented hereunder applies to many nations of Africa:

- (1) Researches in many universities in Africa are conducted mostly to earn promotions, thus most researchers are aspiring and relatively new PhD holders. In fact once a university lecturer is promoted to the rank of professor, research ends.
- (2) Most researches in African universities are conducted purely to earn academic promotions and have no relevance to the needs of industry. Thus most industries located in Africa rely on their foreign technical partners for research and development.
- (3) A disconnect exists between theory and practice of science in most nations education system in Africa and industry needs. In fact, there is chronic imbalance between university science and technology curriculum and the needs of industry. Thus, as stated earlier, employers commit a lot of resources retraining school graduates and sharpening their skills so that they can suit the needs of the industry.

(4) There is no system of match-making or brokering to sharpen and bridge the gap between the technology the university can offer and the needs of the industrial firms that are potential users of the technology. Thus, local industries, which should benefit from the university expertise, are finding it increasingly difficult to retrain/retool their staff and have often taken recourse to bringing in expatriate staff for that purpose. Specifically, the communication between the university and industry is weak. This problem is compounded by the fact that local industries lack a robust Research and Development backbone, making it difficult for them to innovate and produce competitively.

Obstacles to research in Africa

Numerous challenges face research efforts in Africa. They are among others:

(1) **Reliability and validity of data:** One of the greatest problems facing scientific research in Africa is lack of reliable statistical data. In most African nations like Nigeria, Ghana, Kenya, Botswana, Zimbabwe etc is access to reliable data. Government officials in these countries are always sensitive to official matters, especially those they feel that border on the security of the government. They deliberately obstruct the publication of empirical data about the government and the ruled. This problem is more pronounced in dictatorial regimes. In some other cases, governments in most African states often publish false statistics for political, economic, social or financial reasons.

(2) **Influence of Values:** Science assumes value neutrality but most research in Africa involves value questions. Issues that border on interest, authoritative allocation of values and in which invariably will introduce bias. Even scientists themselves have their own values (interests) which to some extent affect the result of their research.

(3) **Illiteracy:** Illiteracy remains the most serious problem facing the people of Africa. Most countries in Africa have a disquietingly high percentage of illiteracy. According to available statistics the percentage of illiteracy in Nigeria as at December 2013 was put at 51%, Sudan, 81%, Rwanda 79% (Eze, 2014). The scenario is similar to what obtains in most other African states especially Ghana, Sierra Leone, Gambia and Togo. Most of the illiterate African populations are left out of research samples because of the difficulty of obtaining pertinent data from them. Even when they are interviewed in the language they can understand, they still exhibit an apparent inability to supply needed information. They are at times suspicious and reluctant to furnish information that might change their way of life. Illiteracy has worked restrictively in other ways in making research more difficult in Africa. Most empirical research requires the ability to read in order to answer accurately the questionnaire. Inability to read and write makes mail survey difficult.

(4) **Secrecy:** Many African countries argue (Osuala, 2000) tend to have a special liking for secrecy. Even in government ministries, information that otherwise would be for public consumption is considered "secret". Individuals dislike any activity that appears as "nosing around" or trying to probe them. There is resentment for such questions as: Do you work? Where is your wife? What is your salary level? The prejudices against these types of questions from one whose intentions are not very clear are translated into prejudice for research as a whole.

(5) **Fund:** Virtually all the countries in Africa do not budget adequate fund for research activities. Also the university lecturers and those who work in research institutions are not well remunerated. Most governments think that fund allocated to research component of the economy is a wasted fund and therefore they do not allocate adequate fund for research activities. The government prefers to

vote huge sums of money to maintain security and payment of salaries and benefits to political office holders and assembly men (Asakitikpi (2006).

Funding Agricultural Research in selected countries of Africa

Agriculture is the mainstay of any viable economy and stands out as a major criterion to measure development. It is in recognition of this that the United Nations created many agencies under it that sees to agricultural research and development. Such agencies are International Bank for Reconstruction and Development (IBRD), International Food for Agricultural Development (IFAD) etc. To foster agricultural research and development in Sub-Saharan Africa case studies were commissioned to provide relevant information on the status, constraints and funding of agricultural research in four countries of eastern/southern Africa (Ethiopia, Kenya, Tanzania and Zimbabwe) and four countries of West Africa (Mali, Burkina-Faso, Cote d'Ivoire and Nigeria) (Herz, 2014).

Funding of Agricultural research in Ethiopia

Agriculture accounts for about 40% of GDP, 80% of export earnings and 85% of employment in diverse traditional subsistence systems for production mainly of cereals. Oil seeds and livestock. Governments have accorded relatively low priority to research for improving peasant agriculture, but the recent decentralization of decision making is expected to create a more favourable environment.

Applied research activity is concentrated in the institute of Agricultural Research and specific research areas are also served by centre for plant genetic resources, plant protection, forestry and livestock. Adaptive and developmental research is carried on under the auspices of ministries. Some relevant research is conducted at two universities and two junior colleges. Improved crop varieties, machinery and implements, and methods of livestock husbandry are useful outputs of past agricultural research, some of which have had a demonstrable impact on production.

Funding of agricultural research is mainly from the national (public) budget, averaging less than 1% of the total and about 11% of the agricultural budget over the past eight years. With budgets averaging 36% for personnel costs, 26% for operations and 38% for investment, costs incurred have been met from public funds to the extent of 45%, 34% and 21% respectively over the same period. Grand and loan funds were used to meet on average 20% of personnel costs and 10% of operating costs. In recent years, five commodity research programmes (for coffee, wheat, maize, sorghum and cotton) made up about 15% of the total agricultural research budget.

The main constraints to agricultural research have been lack of national policy, strategy and commitment, of a minimum critical mass of human resources in research disciplines, and of infrastructure maintenance. The needs are removal of these constraints and the setting of research priorities, an increase of allocated resources to adequate levels, means and mechanisms for coordination of the NARS and creation and use of a NARS-wide database, and institution of programme budgeting, all under a detailed master plan.

Kenya

Agriculture accounts for about 30% of GDP of the exports that earn foreign exchange, and 75% of the total employment, with smallholder production providing about 75% of the total output. Less than 20% of the land is suitable for agriculture.

The Kenya Agricultural Research Institute (KARI) is the major institution undertaking research on agricultural commodities and farming systems. Separate research foundations exist for tea and coffee, and irrigation research is carried out outside KARI, as well as relevant research in the universities.

Investment in agricultural research stands at 2.1% of AgGDP, 1.4% of which comes from contributions by external donors. At 76% of allocations of KARI, personnel costs are considered too high in relation to operating costs in part owing to progressive increases in staff for research (15723 in 1993) and support to excessive levels. Acceptable ratios of personnel/operations costs prevail in coffee and tea research which is financed by access on these commodities. Private sector funding is estimated at 7% of total investment in agricultural research. KARI cooperates with private enterprises in some research areas.

United Republic of Tanzania

Agriculture accounts for 50-60% of GDP, 80% of export earnings and over 80% of total (90% of rural employment. Although natural resources are adequate, agricultural production had been low and declining until the mid 1980s. Since then the sector has experienced steady growth.

The Department of Research and Training (DRT) of Ministry of Agriculture is the lead institution of Tanzania's NARS, operating a network of institutions, centres and sub-stations for crop research, livestock research, farming systems research, and training and support services. Other constituents of the NARS are the Tropical Pesticides Research Institute. Sokoine University of Agriculture and the University of Dar-es-Salaam, and parastatal and private sector bodies for certain commodities (tea, sugar, barley, maize).

Funding of agricultural research from the national (public) budget has been limited in recent years accounting for about 25% of requirements with donor contributions covering about 75%. Because of a strong government commitment, however, agricultural research is receiving about 30% of the total budget allocated to the Ministry of Agriculture, and the intention is to raise funding to 1.0% of AgGDP from the current 0.05%. The funding ratio of 75%-donor/25%-government is expected to continue in effect for the duration of the NALRP, i.e. to 1997/98 DRT-donor meetings are held semi-annually to discuss and monitor funding related matters.

Zimbabwe

Agriculture in 1990 accounted for about 13% of GDP, 40% of export earnings and 26% of the total formal employment. It is characterized by a modern sector (large and small scale commercial farming and ranching) and a traditional sector (communal and resettlement diversified or mixed farming systems).

Funding of agricultural research in the public sector has been somewhat inadequate particularly in view of increased responsibilities given to DRSS in recent years. Funding has increased in amount (to Z\$25m in 1990-91) but decreased in real terms to 70% of the 1980 allocation.

Substantial funding of agricultural research occurs in the private sector. Its value is estimated at between Z\$40 and 50 m annually, with tobacco research accounting for more than half of the expenditures. Producer levies on marketed commodities (tobacco, cotton, maize, poultry pigs) are applied in part to finance research. An Agricultural Research Trust is privately funded from sales of

own crop produce and livestock, contract research fees and commodity producer associations contributions. It produces land and facilities for agro-economic trials and demonstrations involving field and horticultural crops.

Mali

Agriculture in 1982 accounted for about 46% of GDP. The livestock sector accounted for 47.5% of AgGDP in 1987 and 35% in 1989. Agricultural exports generate foreign exchange. (Agriculture accounts for about one-half of the GNP and employs more than 80% of the workforce) More than 80% of the population lives in rural areas, mostly occupied in farming of millet and sorghum, rice and maize, cotton and groundnuts (export/cash crops and in ruminant livestock husbandry).

Public funding of agricultural research is inadequate. The budgeting process does not reflect the real possibilities and needs of IER. There are delays and discontinuities in disbursements, and disadvantages in some forms of non-cash receipts. Financial procedures vary by project, causing a profusion of routines that adds to other obstacles to integration and coordination of research programmes in line with priorities.

Burkina Faso

Agriculture accounts for 30% of GDP and 60% of export earnings. It provides employment to 90% of the economically active population, mainly in subsistence farming.

Agricultural research is concentrated in the public sector under the Centre National de la Recherche Scientifique (CNRST). Four institutes are under the direction of CNRST with those for agricultural research (INERA) and forestry and environment (LBTA) receiving 90% of the allocation to the Centre.

Public funding of agricultural research amounts to about 0.08% of GDP and 0.25% of AgGDP. By far the greater part of funding is derived from donor contributions, particularly the World Bank (IDA). Some improvement has occurred since 1989-91 when the Burkinabe funding stood at about 20% and barely served to cover personnel costs. In 1993 the national public funding was 28% of total financing with some increased amount for operations, and the World Bank (IDA) contribution stood at 47.8% or two-thirds of the donor funding.

Cote d' Ivoire

Agriculture is the backbone of the economy of the Country, providing 70-80% of the income and 60% of the total employment. Infrastructure and services are developed specifically for export crops (coffee, cocoa, rubber, oil palm, cotton, and fruit). Staple food crops production covers the needs of the population as does poultry production; beef and mutton production stands at 50% of self-sufficiency. Since independence some parastatal bodies for specific crops have been dismantled and others are in decline or on the point of disappearing.

Funding of specific research projects by external donors (e.g. EEC, UNDP/FAO, IDRC, etc) is particularly important for IDESSA's research on food crops. These contributions were mostly the

costs of operations and equipment. Limited private funding of agricultural research in public sector institutions is provided on a project or contract basis by domestic and transnational companies and by parastatals.

Importance of Research

The importance of research especially to developing and new states could not be overemphasized. All developed nations are at the point they find themselves today because their researchers have worked hard and essentially the enabling environment was created for them. We can therefore enumerate the importance and role of research as follows:

- (a) Research makes an original contribution to advance the existing stock of knowledge, by which societies and economies can become better, more prosperous and more fulfilled. Research fosters the growth of logical reasoning and critical thinking in the society.
- (b) Research is very important to government, business and industry, civil society and economy as a whole. Social and economic progress depends to a large extent on the quality and utilization of research evidence by government, policymakers, industrialists, businesspeople and social groups.
- © Research provides the evidence bases for government social, economic and development policies. Evidence from research (results, conclusions and recommendations) gives valuable guide and insights to policy makers, technocrats and development programme planners. Sound policies are grounded in sound research. For government economic and social policies to be well formulated, they must rely on sound research evidence.
- (d) Research help to evaluate alternative policy options, and fosters the emergence of superior policy options. Through research policy makers and technocrats obtain sets of facts and figures necessary to assess competing policy options.
- (e) Research helps in solving operational and planning problems in business, government, and industry. Business decisions benefit largely from operations research, market research and motivational research. Operations research concerns the use of mathematical, logical and analytical techniques in solving the business objectives/problems of optimization – cost minimization and profit maximization. Motivational research relates to human behavior towards consumption and products. Market research contributes in identifying policies for purchasing, production and sales.
- (f) Research also helps to satisfy the intellectual yearnings of man, for better understanding of social phenomena and economic relationships and processors (Eboh, 2009).

Other importance and purposes of research could be summarized as follows:

- To gather, present and analyze data
- To establish reliability and validity of theoretical postulations
- To add to our knowledge and social regularities
- Contributes to building of theories
- Helps us to know what we do not know before
- Provides researchers training in problem solving as well as in leadership roles
- It enhances data bank, which helps in planning and development

- Research helps to train students for research related jobs with the academic profession (Chukwuemeka, 2005)

Concluding Remarks

The strategies for fostering socio-economic development of African states are to pursue pragmatic research enterprise. Researchers in African are yet to be given their pride of place. A number of things have to be done to encourage robust research among African scholars.

- (1) The starting point should be the dusting-up the dust-laden research findings in the archives to see whether they are still relevant to the needs of the nations where such researches were carried out.
- (2) Adequate funding should be provided by the governments of African states with the support of the private sector. Substantial allocation should be set aside in the yearly budget.
- (3) Manpower and human resources development in research related activities should be pursued vigorously by all African states.
- (4) Data banks to be centrally controlled should be established in each state of Africa with the ultimate goal of ensuring that research findings benefit the industries, agricultural sector, policy makers, government and other sectors of the economy.
- (5) Relevant agencies organizations should be mandated to monitor and evaluate research activities geared towards employing them for socio-economic development.
- (6) More research centres and institutions should be established and properly funded. Such centres should interface with the universities and grant institutions across the globe.

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