THE RESEARCH SCENE IN NIGERIA’S NON-UNIVERSITY HIGHER INSTITUTIONS

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Abstract
Higher education or academic research has been key to technological and socio-economic progress in the so-called “knowledge societies” of the world. However, research in Nigeria’s non-university sector is carried out in a system that is more constrained than the university system in terms of funding, human resource capacity and adequacy of infrastructural facilities. Additionally, the “publish or perish” syndrome associated with university academics has also caught up with academic staff in the non-university sector. As a result, there is preponderance of basic research in this sector at the expense of applied research, which is more relevant towards meeting Nigeria’s developmental needs. This unhealthy development is in real terms a negation of the expected research orientation or specialty of the polytechnics in particular. In this paper, constraints, limitations and prospects of the non-university sector in R & D activities in Nigeria are discussed. In the light of this, recommendations are made towards revamping and sustaining research in our institutions of higher learning for national development.

Keywords: Higher education; research; non-university sector; funding; constraints; outputs.

Introduction
The Nigerian higher education system is composed of the university sector currently made up of 104 universities and the non-university sector, consisting of 125 polytechnics and 98 colleges of education among others. In fact, the Nigerian higher education system is the largest and most complex higher education system on the African continent (Moja, 2000). However, the distinction between the university and non-university sectors is not very sharp, and there is a tendency to group the polytechnics and colleges of education under the umbrella of universities since many of them have become affiliated with existing universities (Ijaduola, 2009 cited in Ijaduola, 2011).

Worldwide, institutions of higher learning are established for human/manpower development, knowledge generation and research (Oyewole, 2009). But in Nigeria, given the rather low commitment and low priority government is according research and development (R & D) – evidenced by poor R & D funding and government’s inability or unwillingness to firmly entrench research in policy – it would appear that the main thrust of establishing tertiary education institutions is that of producing manpower. This is against the backdrop of R & D being key to technological advancement and socio-economic progress in a knowledge – driven 21st century.

The importance of research as a primary function of institutions of higher learning and as a vehicle for the transformation of human societies and improving the lives of mankind cannot be overemphasised. However, while the universities remain the focal point of higher education research in Nigeria, research is no longer the exclusive preserve of the universities. Indeed, research is now an integral part of the system in polytechnics and colleges of education. For instance, the Scheme of Service for federal polytechnics and colleges of education (also adopted by the state government owned counterparts) promulgated and implemented since 1989 has made research output a very important criterion for the promotion and appointment of academic staff in these institutions. Similarly, the National Board for Technical Education (NBTE) and the National Commission for Colleges of Education (NCCE), the supervisory/regulatory bodies for the polytechnics and colleges of education respectively, have both established Central Research Committees. These committees, in collaboration with institutional
research committees, are responsible for processing and facilitating research funding applications, and for coordinating and managing research activities within the non-university sector.

The massification of tertiary education through annual increases in student enrolment in order to cope with growing demands for higher education in the country and the funding shortfalls arising from this have become the bane of our higher education system in general, and higher education research in particular. Recurrent allocations in these institutions are barely enough for payment of staff salaries and allowances and for maintaining essential services, leaving little or nothing for research (Bako, 2005). As a result of this, there is deterioration or virtual breakdown of research infrastructure (shortage of library facilities, under-supplied or non-functional laboratories/workshops etc) and very limited funding for R & D activities. Unfortunately, one of the attendant fallouts of these shortcomings is a decline in educational quality. In the non-university sector, weak research culture and inadequacy of qualified research personnel are additional research constraints.

In the first of a two-part series (Yusuf, 2012a), we appraised the higher education research scene with emphasis on the university sector. In this second part, constraints, limitations and prospects of the non-university sector in R & D activities in Nigeria are discussed, and recommendations made towards revamping research in our institutions of higher learning.

Definition and types of research
Research may be defined as a scholarly or scientific investigation aimed at discovering and applying new facts, principles, techniques or natural laws (Lapedes et al., 1978). Okafor (2011) defines research as human activity based on intellectual application in the investigation of matter, and stated its aim as the discovery and development of methods and systems for the advancement of human knowledge. Two main types of research are often recognised namely:

1. **Basic research** – This is conducted mainly for the purpose of broadening the frontiers of knowledge, without necessarily paying attention to the applicability of the research results in solving the problems of real life situations. Basic research is more prevalent in the conventional universities.

2. **Applied research**: This is a practical oriented research usually targeted towards producing usable results, eg for producing basic human necessities thereby improving the quality of life of the citizenry; for improving the quality of industrial products, or for solving social and economic problems. This type of research is generally considered more relevant in tackling Nigeria’s developmental problems.

Other types of research particularly relevant to this discourse are:
- **Higher education/academic research** – an investigative mechanism of finding out why, how, what, where of issues and problems that surround man and his corporate existence in the universe (Ayeni, 2010).
- **Collaborative research** – a joint research effort with common objectives or goals and involving the sharing of ideas, methodologies, facilities etc between individual researchers or research teams from same or different institutions, organisations, countries or regions of the world (Yusuf, 2012a).
- **Research and development (R & D)** – the search and application of knowledge for the development of new and improved products, services and industrial processes of capital development (Bako, 2005).

Research funding
Research funding in Nigeria is generally poor and funding pattern irregular. Nigeria’s R & D budgets are often below 1% of the nation’s gross domestic product (GDP) (Donwa, 2006). This falls short of the 1980 Lagos Plan of Action by which African nations agreed to spend at least 1% of their GDP for the development of their scientific and technological capabilities, and indeed represents very low funding by any standard. As government remains the main sponsor of research in Nigeria’s public institutions of higher learning, obviously the only way to substantially raise R & D funding in these institutions is to diversify their funding sources. In practice, this should involve the
incorporation of public and solicited private financing” (Ibara, 2011) as well as the full exploitation of income generating activities.

Under-funding of science and technology (S & T) research seems to be the leading factor or constraint to high quality, relevant research and innovation in Nigeria and other developing countries. Research funding has developmental implications for every nation. For, it is globally recognised that the rate of industrialisation or development of a country is a function of the proportion of the gross national product (GNP) or the GDP it spends on R & D activities.

Table 1: R & D Expenditure for European Union (EU) and other Major Economies

<table>
<thead>
<tr>
<th>Country</th>
<th>R &amp; D Expenditure as % of GDP</th>
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<tbody>
<tr>
<td>Hungary</td>
<td>0.68</td>
</tr>
<tr>
<td>Netherlands</td>
<td>1.94</td>
</tr>
<tr>
<td>Austria</td>
<td>1.78</td>
</tr>
<tr>
<td>Poland</td>
<td>0.68</td>
</tr>
<tr>
<td>Portugal</td>
<td>0.75</td>
</tr>
<tr>
<td>Slovenia</td>
<td>1.39</td>
</tr>
<tr>
<td>Finland</td>
<td>2.88</td>
</tr>
<tr>
<td>Sweden</td>
<td>3.62</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>1.81</td>
</tr>
<tr>
<td>Iceland</td>
<td>2.07</td>
</tr>
<tr>
<td>Norway</td>
<td>1.65</td>
</tr>
<tr>
<td>Switzerland</td>
<td>-</td>
</tr>
<tr>
<td>Bulgaria</td>
<td>0.57</td>
</tr>
<tr>
<td>Croatia</td>
<td>-</td>
</tr>
<tr>
<td>Romania</td>
<td>0.49</td>
</tr>
<tr>
<td>Turkey</td>
<td>0.50</td>
</tr>
<tr>
<td>China</td>
<td>0.70</td>
</tr>
<tr>
<td>Japan</td>
<td>2.95</td>
</tr>
<tr>
<td>United States</td>
<td>2.59</td>
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In comparison, Nigeria’s R & D spending for the period 2000-2004 was only about 0.3% of its GDP (Donwa, 2006; Okecha, 2008). On the other hand, the developed countries or major economies of the world invest heavily on R & D (Table 1). This adequately explains the relative advantage these countries have in knowledge accumulation (Bako, 2005).

Research funding in the non-university sector
Funding of federal polytechnics and colleges of education is channelled through the respective regulatory bodies namely, the NBTE and NCCE, while the state government owned institutions are directly funded by the state governments that own them. Funding is generally inadequate. Funds are now released on a monthly basis by way of grants or subventions, as against the usual quarterly allocations, with salaries and allowances gulping most of it. This leaves very little for maintaining essential services, not to talk of R & D activites. Consequently, research activities are seriously hampered in these institutions. The non-university sector is obviously less funded than the universities. Even the ETF/TETF Annual Grants are in favour of the universities (Table 2)
Table 2: ETF Funding of Higher Education (1999-2001)

<table>
<thead>
<tr>
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<th>1999 (₦)</th>
<th>2000 (₦)</th>
<th>2001 (₦)</th>
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<tbody>
<tr>
<td>Universities</td>
<td>2,041,374,962.50</td>
<td>466,000,000.00</td>
<td>184,800,000.00</td>
</tr>
<tr>
<td>Polytechnics</td>
<td>1,087,209,288.00</td>
<td>369,500,000.00</td>
<td>76,926,000.00</td>
</tr>
<tr>
<td>Colleges of Education</td>
<td>1,099,137,930.00</td>
<td>431,200,000.00</td>
<td>181,800,000.00</td>
</tr>
<tr>
<td>Monotechnics</td>
<td>-</td>
<td>193,500,000.00</td>
<td>89,616,000.00</td>
</tr>
<tr>
<td>Interuniversity and other Government Agencies</td>
<td>218,368,885.33</td>
<td>117,360,404.50</td>
<td>277,000,000.00</td>
</tr>
</tbody>
</table>

Despite the direct involvement of the ETF/TETF Intervention Fund in the sponsorship of R & D activities in Nigeria’s tertiary education institutions, most of the fund seems to be channelled towards capacity building – construction and equipping of laboratories/workshops, libraries, lecture rooms etc, and the award of scholarships and fellowships to staff of these institutions.

There are other governmental and non-governmental/international funding agencies such as the National Science and Technology Fund (NSTF), the World Bank, the International Development Research Centre (IDRC), the Organisation for Economic Cooperation and Development (OECD) etc, but the criteria and procedure for accessing their funds are very stringent and rigorous, with the result that only very few academic staff actually benefit from them. The problem of funding is more acute in the state government owned tertiary institutions which are grossly under-funded and under-provided. In many of such institutions, financial handicap is further compounded by lack of autonomy.

Poor funding in the non-university sector would translate to the following among others:
- Declining research infrastructure
- Declining staff quality
- Lower quality research and teaching
- Limited variety in research and teaching

Research in the non-university sector
In Nigeria, the non-university sector comprises the polytechnics, monotechnics and colleges of education (NPE, 1998). The problem with research in this sector is that it is carried out in a system that is more constrained than the universities in terms of funding, human resource capacity and adequacy of infrastructural facilities.

Nature of research
Research in this sector is more casual and less prolific than in the universities. This may be attributed to the weak research culture in these institutions on the one hand, and poor research infrastructure and insufficient number of qualified personnel on the other. However, this is by no means saying that there is no serious or reasonable level of research going on in these institutions. Individual, institutional and in few instances commissioned research efforts are taking place in this sector, though, perhaps to a lesser degree than in the universities.

The colleges of education, in conjunction with the institutes and faculties of education in the universities, conduct educational research for improving teaching/learning methods and perhaps the synthesis and development of educational policies and practices in the country. This is very important, since it is the educational policies and the curricula that shape the Nigerian education system that produces the right quantity and the right calibre of Nigeria’s scientists and researchers in the first place. However, the main focus in this sector are the polytechnics and other colleges of technology from which applied S & T research and copy technology are expected. In other words, professionally, the polytechnics are expected to stress the practical application and utilitarian aspect of their research, instead of duplicating and proliferating the efforts of conventional universities in basic research. Their research focus should be on applied/development research as well as adaptation and modification research. Adaptation is a means of linking imported technology with domestic R & D. It may necessitate for instance, the scaling down of technology to the size of the local market, or matching it to the local skills available, while modification involves adjusting adopted technologies to suit the technological, social and economic conditions of a country (Okafor, 1994).

Interestingly, the “publish or perish” syndrome associated with academics in the university system has also caught up with the polytechnics and colleges of education. The craze for publication by academic staff of these institutions as a vehicle for career advancement has led to the preponderance of basic research in the non-university sector. For the polytechnics in particular, this is a negation of their expected research orientation or specialty.

Research output
Research in the polytechnics and colleges of education is generally marked by low output or productivity. Chiemeke et al. (2009) who carried out an empirical study on research outputs from
Nigeria’s tertiary institutions reported among others poor research output in Nigerian polytechnics. However, despite teething problems and acute shortcomings, the non-university sector has been making some contribution to R & D. Many researchers in this sector have had scholarly publications in national and international journals, just like their university counterparts. Secondly, the polytechnics in particular have been churning out technological inventions and technical innovations in the form of designs and prototypes of machines, processes and products etc which are of course, products of research and creative development. Notable examples in this respect are the mechanised cassava peeler and gari fryer (Project Development Institute), egg incubator for small scale poultry farmers (Federal Polytechnic, Ilaro), solar-powered steam engine (Kaduna Polytechnic), fluidised bed dryer for grain drying application (The Polytechnic, Nekede) and maize sheller (Federal Polytechnic, Ado-Ekiti). Many of such innovations/breakthroughs have been displayed at Polytechnic Exhibitions.

The pertinent question here is, what have these and other viable research products in the country added to Nigeria’s capacity for technological and socio-economic progress? The major problem with research products in Nigeria is that such products, no matter how viable, are hardly taken further to commercialisation stage mainly because of poor researcher-industry linkage and collaboration. However, the National Office for Technology Acquisition and Promotion (NOTAP), a parastatal under the FMST, has been trying to bridge this gap through renewed efforts aimed among others at establishing a network of linkages among researchers, inventors, industry and research institutions.

**Research focus and research motivation**

As stressed in the first part of this discourse (Yusuf, 2012a), R&D activities in Nigeria’s higher education sector as a whole have to be refocused and revamped if the nation’s technological and socio-economic development is to be fast tracked. Areas of paradigm shift in this respect include:

- Embarking on targeted and demand-driven R&D activities
- Availability of robust ICT infrastructures for teaching and research
- Vigorous commercialisation of viable research results/inventions.

Furthermore, increased funding and raising the present low level of research motivation are necessary. Research motivation in whatever form is effective only to the extent that it raises the human resource input towards boosting R&D activities. Significantly, both research funding and research motivation must be seen and applied as sustained activities, rather than occasional privileges (Yusuf, 2005).

**Conclusion**

With the right research policy framework in place, and given proper research orientation and support, the non-university sector could make substantial contributions in R&D for national development. Research in the colleges of education and the universities should come up with various innovations in educational methods and policies that could transform curriculum content, the teaching-learning process, and educational management and administration in the country. In the polytechnics and other colleges of technology, research and creative development should enhance among others:

- Research manpower training;
- Skills development and acquisition among staff and students;
- Innovative and entrepreneurial culture;
- Employability of polytechnic graduates;
- The teaching-learning process and
- Community and extension services.

**Recommendations**

In the light of the foregoing discourse, the following are recommended towards boosting and sustaining quality and relevant research in our institutions of higher learning:-

1) Rationalised performance – based research funding of public tertiary institutions that should also take due cognisance of the research capacity/capability of the institutions – this is capable of increasing the quality of research, the efficient use of resources, avoiding duplication of research efforts and allowing for specialisation.

2) Integrating ICTs into tertiary education teaching and research.
3) As government remains the main sponsor of research in public institutions, diversification of funding sources through strengthened institution – industry linkages and collaboration, exploring and exploiting income generating activities (consultancy services, SMEs, manufacturing etc) and keeping close and regular contacts with Foundations, Donor Agencies, Philanthropists, Alumni Associations and wealthy Alumni members is necessary.

4) Government should dedicate up to 10% (as against the present 5%) of recurrent allocation to research, as already opined by the Honourable Minister for Education, Prof. Ruqayyatu A. Rufai (2010).

5) Embarking on a joint government/industry initiative to raise the present level of research motivation by among others:
   a) Granting special incentives for quality applied research outputs or inventions that have been successfully commercialised.
   b) Giving substantial incentives to rated/seasoned researchers on an annual basis, while still extending support to non-rated researchers.
   c) Awarding commissioned research and channelling major consulting jobs to the tertiary institutions, as well as the research institutes.

6) Vigorous intellectual property rights education programmes for tertiary education researchers.

7) Government should as a matter of deliberate policy come up with a well articulated national higher education research agenda with clearly defined goals and time frame for targeted and achievable R & D results.

8) Government should invest heavily in cutting edge STI research activities at the tertiary institutions, as well as the research institutes, towards fast tracking the technological and economic development of the nation.

References


