

# Funding Research in Tertiary Institutions: Sources and Application

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## Introduction

Higher education as a concept embraces teaching, learning, scholarship and research. These activities are, and should be, at the heart of higher education. But there is a range of associated activities which have increased in significance as higher education has expanded and become a greater element in national life. These include increasingly important contributions to the cultural and business life of local, national and international communities.

It is difficult to envisage how a nation hopes to develop if its higher education institutions are neglected or given token attention by the policy makers and other stakeholders in the civil society. The aim of this presentation is to discuss the state of higher education research and to reflect the role of funding in higher education research.

## Towards a Classification of Higher Education Research

The generation of new knowledge and understanding continually improves our quality of life on every level. Research is central to the success of any knowledge-driven economy, creating wealth and employment in both the country and abroad. Universities and other tertiary institutions are the country's primary source of trained experts in all areas of science and technology. Research also underpins our modern public services. Expertise from the research base is essential for properly informed policy making, and for the effective implementation of those policies. In addition, research continually develops our understanding of the world around us and enriches in our cultural lives.

Themes of higher education research often turn out to be long lists. They might include: higher education policy and planning, teaching and learning, higher education systems etc. According to Teichler 1996<sup>2</sup>, we can identify four "spheres of knowledge" which are structured to a certain extent according to the logic of themes and to a certain extent by the disciplines or related areas of expertise of higher education researchers. Many research projects intended to cut across

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<sup>2</sup> Teichler, Ulrich (1996a). "Comparative higher education studies: Potentials and Limits," Higher Education 32 (4), 431-465.

disciplines and themes remain within a single of these spheres, thus validating this typology.

Within this matrix is a series of developmental facts which characterize demand for higher education, and quality assurance in higher education research. Let me therefore begin this talk by making the following observations which will provide a general framework for the paper:

- demand for higher education from suitably qualified applicants of all ages is growing as more people achieve qualifications of at least three "O" level credits required, and more of those who already have higher level qualifications look to upgrade or update them;
- there is a growing diversity of students in higher education with a growing number of mature entrants and part-timers, especially among the civil service cadre;
- higher education continues to have a key role in developing the powers of the mind, and in advancing understanding and learning through scholarship and research;
- Nigerian tertiary institutions must now compete in increasingly competitive international markets where the proliferation of knowledge, technological advances and the information revolution mean that labor market demand for those with higher level education and training is growing, particularly in information technology, and that there is a greater premium on the products of the country's research base;
- many countries in the world are aiming to improve the contribution their higher education systems make to their economic performance;
- higher education has a key role in delivering national policies and meeting industry's needs for science, engineering and technology in research and postgraduate training;
- a flourishing higher education system is important for all sectors of the economy and the education service, supplying qualified manpower, research and innovation, and continuing professional development;
- through scholarship and research, higher education provides a national resource of knowledge and expertise for the benefit of international competitiveness and quality of life, and provides a basis for responding to social and economic change through innovation and lifelong learning;
- higher education continues to have a role in the nation's social, moral and spiritual life; in transmitting citizenship and culture in all its variety; and in enabling personal development for the benefit of individuals and society as a whole;
- higher education is a major contributor to local, regional and national economic growth and regeneration;

In the face of these ideals and expectations of education at the tertiary levels in Nigeria, let me therefore focus attention on the main themes of seminar: **research and funding**. It is fitting that the seminar has these themes for they certainly go together. There is no way tertiary institutions can develop without research; and research is impossible without adequate funding. Countries that

have attained the category of “developed” status did so through massive investment in the research institutions in the respective countries. To provide a more microscopic analysis of these two variables — research and funding — let me look at each variable alone, before merging them into what I hope to be an effective policy template.

### **Research in Nigerian Higher Education**

Throughout the Nigerian higher education system, there is a chronic mismatch between higher education's output and the needs of a modernizing economy. In particular, there is a shortage of highly trained graduates in fields such as science, engineering, technology and medicine, and this has been detrimental to economic and social development. Instead, there has been an abundant production of the civil service class of citizens who would mostly contribute to the bureaucratization of civil society.

Even in this over-indulgence with civil service machinery, higher education in Nigeria has not succeeded in laying the foundations of a critical civil society with a culture of tolerance, public debate and accommodation of differences and competing interests – both in military and civilian administrations. Nor has it contributed significantly to a democratic ethos and a sense of citizenship perceived as commitment to a common good. It is still characterized by teaching and research policies which favor academic insularity and closed-system disciplinary programs. There is inadequate consideration of and response to the needs of our society and insufficient attention to the problems and challenges of the broader African context. For instance, so far the most contributive and significant researchers on Hausa society and culture are foreigners.

Yet higher education can make a potentially crucial contribution to the development of Nigeria. Only higher education can deliver the requisite research, the training of highly skilled manpower, and the creation of relevant, useful knowledge to equip a developing society with the capacity to participate effectively in a rapidly changing national and global context. But the existing higher education system is unable to make this contribution adequately. It is fundamentally flawed by inequities, imbalances and distortions deriving from its history and present structure. The system of higher education must be reshaped to serve a new social order, to meet pressing national needs, to respond to new realities and opportunities, and most significantly, enable its products to compete proudly in the international labor markets.

### **Purposes and Functions of Higher Education**

Higher education is but one part of an interdependent system of education and training, – it cannot be looked at in isolation. Any dividing line set between further education and higher education, or between higher education and higher level training, is bound to be somewhat arbitrary. This is true particularly for adults – for example, when making a change of career direction a person may need access simultaneously to a range of program spanning both higher and further education and training. Thus within this framework, higher education should have the following objectives:

- to inspire and enable individuals to develop their capabilities to the highest potential levels throughout life, so that they grow intellectually, are well-equipped for work, can contribute effectively to society and achieve personal fulfillment;
- to increase knowledge and understanding for their own sake and to foster their application to the benefit of the economy and society;
- to serve the needs of an adaptable, sustainable, knowledge-based economy at local, regional and national levels;
- to play a major role in shaping a democratic, civilized, inclusive society

The education and skills of our people will be our greatest natural resource in the global economy of tomorrow. They must be developed to internationally excellent standards if we are to prosper. A high quality workforce will secure continued and increasing investment in Nigeria by industry and commerce. Higher education cannot do the task alone: other parts of the education and training sector have a major contribution to make. Thus higher education's relative importance is increasing, both in developing the levels of capability that are needed in the world of work and in providing an underpinning research base. The role of higher education in a developing economy is not just to develop a senior echelon although it must continue to do that: it is increasingly involved in developing the capabilities of people in a whole range of activities.

Research in higher education contributes materially to the nation's wealth-creating capacity. It is important as a part of the research base, which generates much of the basic and strategic research for developments which are directly useful to industry, and public services and commerce. It would be a mistake, however, to rest on a linear model of technology transfer which assumes that the principal direction of causation runs from research outcomes to economic competitiveness. This is too simplistic a model to explain a process where connections are rarely clear. Very often there are long time intervals between a discovery, or the elucidation of a new principle, and its application in revenue-producing products or services. There may be little obvious connection between research in one discipline and the utilization of its results in an unrelated field. The flow of new knowledge between higher education and industry is increasingly becoming a two-way process: the term 'knowledge exchange' rather than 'technology transfer' is becoming more appropriate.

Research also contributes in other ways to our economic health and the quality of life. Medical research is designed to lead to advances in medical treatment, which improve the health of the nation. Such medical research need not be confined to universities, but can be harnessed by higher education institutions and converted into an effective social service. For instance, the famous Maisikeli elixir for jaundice and yellow fever has been produced for years in Kano. Yet to date no single higher institution in the State has attempted an pharmacological collaboration between the producers of the medicine and the established research process to make it better.

The social sciences can help us to understand better the human aspects of changes in the world and how best to adapt to them. Research in the arts and humanities contributes to growing industries in tourism, entertainment and leisure. Service industries and the public and voluntary services rely on research in areas as diverse as finance, economics and organizational behavior.

However, as I mentioned, earlier, research and scholarship, which extend and re-interpret knowledge, and the transmission and dissemination of that knowledge, are not exclusively the province of higher education institutions, but they are features which distinguish higher education institutions from other parts of the education and training system. Universities once held the position where they were the main sources of knowledge generation and transmission. This position has changed as the number and diversity of institutions devoted to knowledge production and dissemination has increased. Higher education institutions' distinctive continuing role within a democratic society is as independent, questioning institutions unconstrained by any particular political or commercial agenda. Such institutions must be dispassionate, committed to the pursuit of truth and able to reflect on the hardest and most complex issues facing the world. This does not mean that every individual or every institution in higher education has to be actively involved in research, but it does mean that research and scholarship are defining purposes of higher education as a whole. Teaching at higher education level must be informed and enhanced by research and scholarship which is in itself, a reason for supporting research in higher education institutions.

It is clear that higher education institutions have a major role in their own region or local area. Although, over time, the potential of information technology could lessen the local focus of higher education institutions as developers of individuals, yet with sufficient funding, such institutions will have an increasingly important and multifaceted role in their local communities. The Polytechnics are poised to play a vital role in this direction. This is because close links with local employers can lead to programs which are designed to meet local needs. Research collaboration, which does not need to be at the leading edge of basic research, can help local companies which do not have their own research capability to solve immediate problems. In some areas, a local higher education institution may provide the only major local concentration of skilled and knowledgeable people, who can, if minded to, offer general advice and support to businesses and a point of access to national and international sources of expertise.

With sufficient funding, it is possible to create a strong research base which demonstrates international standards of excellence, and can provide a powerful incentive for inward investment by overseas companies in Nigeria. There is growing evidence that businesses can be attracted to particular localities by the strength of their research base. This was the model that was followed in leading emergent economies of Indonesia, Malaysia, Thailand and The Philippines. These countries continue to attract major international corporate investment due to liberal production labor laws, political stability, and government policy support. As a consequence, they also benefit from the results of the Research and Development (R&D) activities of these corporations.

### ***Research, Innovation and Development***

Thus research and innovation are vital to the future well-being of our nation – contributing both to economic success and to the quality of life – and that if we do not have a flourishing research base the nation will be poorer, both culturally and economically. The research base in higher education has a particular part to play in the preservation and pursuit of knowledge which provides the fundamental understanding and principles from which applications can be developed to meet the needs of society. Higher education also needs to be involved in developing and applying research findings, in technology and knowledge transfer. This is likely to be achieved most effectively when there is direct interaction and joint working between those in higher education and commercial partners. The research community in higher education has an essential role in the innovation and exploitation cycle.

It is clear therefore that a strong agenda of higher education is that it needs to train the next generation of researchers, not just for academia but for industry, commerce and the public services. As the world changes faster and faster, more people need the ability to innovate and to understand how to incorporate research findings into current practice.<sup>3</sup>

If we are to make the transition to a society which is essentially scientifically and technologically based we shall need to cultivate the process of understanding scientific and technological principles better, and to be able to innovate. As we advance in knowledge the challenges increase in complexity. We shall need to understand biological and environmental systems which are far more complex than those studied so far. We shall need to find ways of living in a society which is stable and civilized, but which can adapt to major changes without becoming inward-looking and isolationist. We shall need to exploit the advantages of science and technology, but with an understanding of their ethical and social implications. Research in the social sciences and humanities has a crucial role to play here.

### **Funding Research in Higher Education**

Let me turn my attention now to funding mechanisms. It is clear that anyone involved in higher education is concerned about funding mechanism for research in higher education. Basically, three observations can be made:

- the current state of the research infrastructure is inadequate to support research and train the next generation of researchers needed to attract international attention

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<sup>3</sup> These sentiments were expressed in a review of many higher education research and funding policies of many countries. See, for instance, Higher Education: Report For The 2000 To 2002 Triennium, March 2000, Commonwealth of Australia; Higher Education in the Twenty-first Century - Vision and Action: VOLUME V – PLENARY Bulgaria, UNESCO, Paris, 5 – 9 October 1998; Peter Karmel, Reforming Higher Education, *Occasional Paper Series 2/2000*, Academy Of The Social Sciences In Australia, Canberra 2000

- the Government and its agencies continue to fund higher education institutions and any research activities in them. Consequently, any research products are likely to be in the line of “he who pays the piper dictate the tune” matrix and this can only compromise the objectivity of the researchers.
- No outside funding bodies or agencies can invest in research and development in higher institutions; nor can higher institutions expect research endowments or grants, simply because there are no performance targets.

As a result of these limitations, the current funding arrangements for higher education not only in Kano, but in Nigeria as a whole do not sufficiently support or reward:

- applied research, research with industry, and research which supports local and regional economies;
- collaborative activities within and between institutions;
- research in the arts and humanities.

However, let us be realistic. It is evident that research, particularly in the fields of science, engineering and technology, is expensive. It is an international activity and Nigerian researchers, where there is even a focused research activity, are working in an increasingly competitive global environment. These factors mean that Nigeria cannot expect to be pre-eminent in all research fields, and that higher education institutions can no longer expect to have a research capability in all areas.

The basis for funding research should be to fund excellence wherever it is located – in a department, a team or even the lone outstanding scholar. Yet the funds available to support research are barely sufficient.

Let us see how the United kingdom funds research in higher education<sup>4</sup>. In the UK funding for research can come in many forms. Grants are made available to individual researchers, networks of researchers, and those working in research collaborations whether within the UK or internationally. Research students can benefit through support for advanced courses and PhDs, and fellowships are available to support post-doctoral researchers on an independent programme of research.

Independent funding is available for the support of the research infrastructure - the equipment and buildings required for research to take place. Funding is also available to support key research resources such as museum and art collections and research facilities. In recent years, more funding has become available to support the movement of intellectual capital (knowledge and ideas) out of the academic research arena and into the wider world, particularly to industry and commerce. In addition, the following organisations offer support and information on securing funding:

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<sup>4</sup> HERO Higher Education Research Opportunities in the United Kingdom at <http://www.hero.ac.uk/index.cfm>

- Office of Science and Technology (OST)
- The British Council
- The Royal Society
- European Science Foundation (ESF)
- The Royal Academy of Engineering
- National Endowment for Science, Technology and the Arts (NESTA)
- Royal Society of Arts (RSA)
- Royal Society of Edinburgh (RSE)

While research has become increasingly collaborative and international, UK publicly funded research remains an essential part of the world's pursuit and exploitation of new knowledge. All of the following breakthroughs have depended on research made possible by effective funding:

- Proof that influenza is caused by a virus
- Discovery of the first antibiotic, penicillin
- Elucidation of the double helical structure of DNA, providing the key to the genetic code
- Proof that smoking causes cancer
- Isolation and production of unlimited numbers of monoclonal antibodies, with significant implications for treating cancer and AIDS
- Identification of the defective gene which causes Huntington's disease
- Cloning of mammals from adult cells (Dolly)
- Sequencing of the human genome
- Introduction of X-ray crystallographic methods
- Use of cloud chambers in nuclear physics
- Discovery of pulsars
- Discovery of the neutron
- Understanding the structure of insulin
- Inventing the World Wide Web

Further, UK researchers continually contribute new ideas, information, data and understanding, driving our knowledge based economy and maintaining and improving the ways in which we run our lives. Research results may appear in many different forms: as published articles and books, in databases, as patents, as new performances and exhibitions, and as models or sculptures. They may be reported at academic conferences and meetings, through press conferences or press releases or, increasingly, over the Internet.

Nigeria is not short of its research institutes. For instance, the Federal Ministry of Science and Technology supervises forty-eight (48) Research Institutes/Parastatals/Centers through which the Ministry executes its mandate for the development of science and technology in the country. Some of these agencies are:<sup>5</sup>

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<sup>5</sup>Nigerian Parastatals and Research Institutes, at <http://www.y2knigeria.org/parastatals.htm>

- Federal Institute Of Industrial Research Oshodi, (FIRO), Lagos: To carry out research and development, up-to pilot plant stages, in the areas of food production and preservation, textile, pulp and paper and forest products specifically for industrial process.
- National Research Institute For Chemical Technology (NARICT), Zaria: To undertake research and development work into the production of chemicals, polymers and engineering plastics, leather and leather allied products, and man-made fibers.
- National Institute, For Pharmaceutical Research And Development (NIPRD), Abuja : To identify, evaluate and conduct basic and applied research into Nigeria's potential resources for drugs and pharmaceuticals with utilization of local raw materials.
- National Office For Technology Acquisition And Promotion (NOTAP), Lagos: To encourage a more effective process for the identification and selection of foreign technology as well as vet, register and monitor contract agreements for the acquisition of foreign technologies by Nigerians.
- Nigerian Institute For Trypanosomiasis Research (NITR), Kaduna: To research into Trypanosomiasis and onchocerciasis, especially the pathology, immunology and methods of treatment of the diseases.
- Raw Materials Research And Development Council (RMRDC), Abuja: Sourcing, exploitation, acquisition, processing, utilization of local raw materials as feedstock for local industries and minimize dependence on imported raw materials.
- National Center For Genetic Resources And Biotechnology (NACGRAB). Ibadan
- Functions: To undertake developmental research,- data gathering and dissemination of technological information on matters relating to genetic resources utilization, genetic engineering and biotechnology.
- Sheda Science And Technology Complex (SHESTCO), Abuja: To embark on research and development of nuclear facilities for Nigeria as well as establish advanced research laboratories.

Yet despite these impressive sounding objectives, it is interesting to note that a significant proportion of these research institutes are independently-based and separately funded by the Ministry of Science and Technology. Their links to higher education is possibly in the occasional consultancies some members of the higher institutions get from these research centers. My argument is that these research institutes are best placed in higher and tertiary institutions, and universities. Let me quote an example from funding research in the UK:

Public funding for research carried out by higher education institutions in the UK is provided primarily from two sources under the 'Dual Support System'. The three Higher Education Funding Councils and the Department of Higher and Further Education, Training and Employment for Northern Ireland provide funding for a basic research capacity in their respective countries. The other main source of public funding is the UK Research Councils, which award funds to higher education institutions throughout the UK for the support of specific research projects and programmes. In the arts

and humanities, the Arts and Humanities Research Board now provides project funding, although formally it is not a Research Council.<sup>6</sup>

The principles underlying the Council's main formula funding for research are that it should be:

- allocated selectively on the basis of assessments of the quality of research, to achieve value for money and to ensure that funding is concentrated on the highest quality research; and
- that it should be available to all higher education institutions meeting the qualifying criteria.

Thus as we can see, the government in the UK ties funding of research councils to higher education institutions, a reverse case to Nigeria where the funding is from the Federal Government to the individual research institutes.

### **Conclusions**

Higher education institutions attract income from a variety of sources. The relative proportions of income provided by these sources reflect the diversity of institutions' missions and the markets they serve. If they are to be truly competitive then they need to diversify their services so that they can generate extra revenue which will fund research. At the same time, there are many developmental social-awareness researchers that can be undertaken without massive R&D budgeting.

Tuition fees represent one of the ways higher institutions generate this extra income. Yet Nigeria is still a developing nation, and as such tuition at higher levels tended to be subsidized by the Government. Obviously therefore there is a limit to the reliance on tuition fees to support research activities.

The other dimension is to create "commercial" courses with the view of attracting clientele ready to pay whatever it takes in order to move on in the professional ladder. There is also a danger to this, for it might lead to the prostitution of education and compromising the quality of research. Under this commercial drive, useless courses with useful-sounding titles are created to give impression of being immersed in the 21<sup>st</sup> century; whereas behind the façade there is nothing.

International aid agencies are another source of possible funding, and in this regard the Internet is awash with websites offering funding in all research areas. However, to attract funding, institutions must present high quality research proposals that promise to advance the cause of human knowledge. And it is in this that most institutions would probably need to a lot of work. The first would be to ensure high quality research output from members of the academic community. Unless departments have first class scholars and researchers, they cannot provide effective guidance to students; and nor can they attract sufficient funding from international aid agencies. Thus self-evaluation is probably the first step in the efforts of any institutions wanting to beef up its research funding base. How qualitative are our products — and I am not referring to students output, but the

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<sup>6</sup> Formula Funding For Research 2000-01 (in UK) at <http://www.somis.dundee.ac.uk/planning/shefc/grant00-01/annexb.htm>

quality of books, journals, inventions, patents, improvisations, local research efforts and so on that the individual members of the academic community engage in ?

As I argued, our research institutes should be within higher education systems. Within these confines, they will serve two purposes: first they will provide an effective academic environment for the students in these institutions who will be able to benefit from the research by way of acquiring refinements of scientific methodology. Secondly, they will attract further funding from multilateral agencies and collaborations with other tertiary institutions around the world. Isolated as they are now, and under a Ministry, means they are subjected to the usual civil service bureaucracy which is in total contrast to the cherished intellectual tradition of generating new knowledge. However, if for bureaucratic reasons they cannot be located with higher education institutions, then they can be affiliated to these institutions so that they can also award degrees since, presumably, they conduct high impact research.

I said presumably, because despite the massive amount of funds sunk into the maintenance of these research centers, and in spite of their lofty names and ideals, Nigerians are yet to benefit from the outcomes of any concrete research carried out in these institutes.

I am sorry if my paper has disappointed those of you who expect me to present a blue print for perfect sourcing of funding for research. The truth is, there is no such perfect blue-print. I have pointed out the best starting point, and that is institutional self-evaluation. Unless an institution has quality staff it cannot generate quality research and thus attract funding. However, based on the practice around the world, may I suggest a set of principles against which future research funding arrangements should be judged. These principles are that:

- excellence should be supported;
- adequate funding for infrastructure to support high quality research and training should be provided;
- whatever research is selected for support, it must be fully funded;
- funding policies to support research should, as far as possible, promote, not devalue teaching;
- different types of research should be supported by different streams of funding – including support for applied and regional work;
- funding streams and mechanisms should be clear and transparent.