

Academia-Industry Linkages: Alternative Platforms for Engagement Under Nigerian Law

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To cite this article:

Bagoni Alhaji Bukar. Academia-Industry Linkages: Alternative Platforms for Engagement Under Nigerian Law. *Advances in Sciences and Humanities*. Vol. 9, No. 2, 2023, pp. 34-40. doi: 10.11648/j.ash.20230902.14

Received: October 25, 2022; **Accepted:** January 25, 2023; **Published:** May 25, 2023

Abstract: The mandate of Nigerian universities and other institutions of higher learning is to among others, teach and carry on research. The ability of universities to effectively carry on these mandates depend on adequate funding. It is a truism that Universities in Nigeria, both public and private are under funded. The low level funding of public universities in particular, has resulted into low level research outputs. Although there are laws and indeed policies that encourage collaborations between universities, industries and other agencies of government, it does appear that there is low level awareness by researches in leveraging on the existing platforms to bridge the academia- industry gap. This article explores alternative/additional funding options for researches based on collaborative platforms under current laws and policies and concludes that these alternatives/additional funding are not resorted to by researchers largely due to low level awareness of the laws and policies underpinning academia-industry and government collaborations. The inability of universities to take advantage of these platforms has impeded researchers from transforming their research findings into products and services. The article has brought to the fore the need for universities and other institutions of higher learning to explore the legislative and policy framework underpinning collaboration with a view to transforming researches into commercial products and services. The article concludes that universities and indeed other institutions of higher learning engaged in teaching and research do not need to depend wholly on government for funding as is currently the case, rather collaboration with government Ministries, Departments, Agencies (MDAs) and industries is available and are necessary in transforming research outcomes into commercial products and services for the benefit of stakeholders under the applicable intellectual property laws and policies. In so doing, the universities would come closer to bridging the academia –industry gap.

Keywords: Academia, University, Industry, Intellectual Property

1. Introduction

In Nigeria as is the case with other countries, universities and other institutions of higher learning are basically engaged in teaching and research and by so doing, generate Intellectual Property rights (IPRs). The IPRs embedded in those researches are in most cases not promoted or protected and many end up as research qua research. The reason for this is not far-fetched, many in the university system are not aware of the existing legal framework for collaboration between the academia and industry on the one hand and academia and ministries, departments and agencies of government (MDA's) on the other hand in scaling-up their researches into products and services. The lack of awareness

has created a gap which has in turn hampered growth, creativity and innovation in the intellectual property space.

Our aim in this article is to examine some laws that promote collaboration and by so doing, bridge the gap between Academia, Industry and MDA's.

2. Academia-Industry Engagement

Arising from above, the words academia, industry and intellectual property appear to be inextricably linked. The term academia refers to Universities and other institutions of higher learning that are engaged in the pursuit of knowledge through teaching, research and community service, all of which undoubtedly, constitute the core mandate of

universities. Indeed, I would say, they are *raison d'être* for establishing universities in the first place. For example, the objects for which Bayero University Kano [1] was established include the following:

- (a) to encourage and promote scholarship and conduct research in all fields of learning and human endeavour;
- (b) to relate its activities to the social, cultural and economic needs of the people of Nigeria; and
- (c) to undertake any other activities appropriate for a university of the highest standard.

In carrying out these objectives, the university is empowered to among other things:

- (a) establish such campuses, colleges, faculties, institutes, schools, extra-mural departments and other teaching and research units within the University as may from time to time seem necessary or desirable, subject to the approval of the National Universities Commission;
- (b) erect, provide, equip and maintain libraries, laboratories, and other buildings or things necessary or suitable or convenient for any of the objects of the University;
- (c) do all such acts or things, whether or not incidental to the foregoing powers, as may advance the objects of the University.

Thus, academia is the knowledge base or power house, if you will, that generates IP and the industry turns the IP into products and services with the government as will be seen shortly, providing the enabling environment through policies and laws for engagement. As rightly observed:

“Public policy may influence the propensity of firms to collaborate with universities and the scope of such collaborations in many different ways - through a direct role in providing funds to universities and R&D projects, as well as through a regulatory role, which influences the rule sets of public universities and shapes the intellectual property rights regime.” [2]

The aim of research in the academia is to satisfy the immediate and long term community and industry needs by developing critical skills required for national development. Apart from the existing platforms for engagement between academia and industry, the government has through laws and policies expanded the scope to accommodate the Quadruple helix model of innovation. This model adds to the traditional role of universities to engage in economic activities through enterprise and spin-off creation [3].-Market driven researches and innovations by academia will if properly harnessed promote entrepreneurship, foster commercialization of products and services and these will in turn lead to economic growth. In order to ensure that innovations in the universities grow into job-creating commercial products and services, government, industry and academia must collaborate throughout the innovation process [4]. However, the low level synergy between academia, industry and the strict adherence on the outdated laws embedded in university enabling statutes has robbed Nigeria of the benefits of becoming a top player in the global knowledge economy.

Industries on the other hand are entities established with

the objects of carrying on trade, business and manufacture of goods or provision of services either generally or specially. These industries need all those researches by the academia to enhance their growth and development. Unfortunately, the level and flow of research from academia to industry is very low due to near absence of collaboration between the two arising from weak understanding of the power of IP as a game changer.

In the United States of America, several universities in the late nineteenth and early part of the twentieth centuries established partnerships with commercial entities in the Northeast industrial corridor and relied substantially on private money for support. Universities played key role in the development of new engineering and applied sciences disciplines as well as in the development of research- based pharmaceutical firms. Much of university research throughout this period addressed practical problems in agriculture, public health, and industry. Relationships between universities and industry flourished between World War I and World War II. By 1940, 50 U.S companies were supporting 270 biomedical research projects at 70 universities. In 2011, U.S universities received 4,700 U.S patents, executed 4,899 licenses and received over \$2.8 billion in patent related income. In 2013, New York University generated \$214 million from patents and it has about 25 products in the market including Remicade- a drug for treatment of arthritis [5]. The University of Minnesota on the other hand raked in more than \$600million from what became known as abacavir (brand name, Ziagen) commercialized by GlaxoSmithKline and in 2017, the University generated about \$22.8 million in revenue from 273 technologies. [6]

While universities in the U.S and other developed world are adopting the utilitarian approach to research and reaping in millions of dollars from sale, licensing, assignment and royalties, their counterparts in Nigeria are busy engaging in generic commercial activities, like running and managing of hotels, transportation services, sale and production of sachet water etc., ventures that I consider *infra dignitatem* for universities to undertake.

Nigerian universities possess enormous innovative potentials and for any meaningful collaboration between academia and industry to take place, researches emanating from the academia must not only be relevant, but also be of benefit to the society. In addition, they must be novel, of practical application and inventive or non-obvious. Attaining this level of research would obviously require huge investments in capital and resources. The declining state funding for higher education has made it almost impossible for Nigerian universities to come up with marketable research outcomes. Although there are occasional interventions by international organizations and in some cases foreign governments in providing research grants in selected areas, yet, those interventions cannot bridge the funding gap in research resource allocation neither will it take away the responsibility of government in this regard. In fact, government should be the main vehicle driving this

collaboration through public funding even though this will lead to disparate competition between parallel and contending researches for funding.

In order to strengthen the academia –industry relationship, university researches need to be aligned with social, cultural, economic and industry needs of the Nigerian society. Innovation is surely the means by which universities can exploit change in much the same way American universities did [7]. To this end, universities must as a matter of necessity change the current narrative by leveraging on patents and other IP assets. The slogan publish or perish must be replaced with publish, patent and prosper. In recent years, patenting research results with the ultimate aim of commercialization appears to be an interesting option [8]. However, this would require more efforts into ground breaking inventions and innovations that can be translated into competitive job creating commercial products and services. Herein comes the need for alternate platforms for academia- industry engagement. Whether or not the academia and industry are taking advantage of these laws and policies to transit to knowledge economy remains a matter for debate.

3. Alternative Platforms for Engagement

Apart from the direct though limited academia-industry research engagements, the government has provided alternative platforms for engagement in sector specific areas for national development. The government as an influential power has the ability to either facilitate or harm collaboration. [9] This article will consider some of these platforms for facilitating academia – industry engagement within the context of Nigeria's laws and policies.

a) THE NATIONAL AGENCY FOR SCIENCE AND ENGINEERING INFRASTRUCTURE ACT [10]

This Act establishes the National Agency for Science Infrastructure to implement the National Science and Technology Policy of the Federal government.

Section 6 (2) (d)-(f) provide that the Agency shall; (d) develop facilities and capabilities, through its subsidiary institutions, universities and polytechnics, for the following activities, namely-

- 1) capital goods oriented research and development work in engineering materials, chemical materials, scientific equipment, engineering accessories, power equipment, engineering tools and environmental protection;
- 2) applied and basic research and development work in new and emerging areas of science and technology, including micro-electronics, computer technology, bio-technology, including nuclear technology, space science and its applications in remote sensing and environmental monitoring, new materials;
- 3) development oriented research in agriculture and forestry environmental conservation, fisheries and animal husbandry, nutrition, human and veterinary medicine, pharmaceutical materials and building and construction materials;

- 4) collaboration with higher educational institutions and other relevant Government institutions, organizations, agencies and commercial industries in the research and development of capital goods and in scientific and engineering manpower training;
- 5) such other activities, as the Agency may, from time to time, deem necessary for the purposes of this paragraph;
- 6) consider applications for research and development grants made by institutions, corporate bodies and individuals for science and engineering on the basis of criteria to be determined by the Agency;
- (f) encourage the growth of in-plant research and development activities in science and engineering;
- (g) publicise the useful results of its research on science and engineering materials and capital equipment, and collaborate with industries to achieve their successful adoption;

The institutions established under the Act are charged with responsibility for research, development and commercialization of results, in anyone or more aspects of the following sectors, namely-

- (a) engineering materials; (b) chemical materials; (c) scientific and communication equipment; (d) power equipment; (e) engineering accessories; (f) mechanical engineering tools; (g) health science sector, comprising-(i) human medicine; (ii) traditional medicine; (iii) pharmaceutical science; (iv) nutritional science; (h) life science sector, comprising-(i) animal bioscience; (ii) plant bioscience; (iii) ecological science; (iv) physiological science; (v) biochemical science; (i) physical science sector, comprising-(i) remote sensing; (ii) environmental conservation;(iii) earth and planetary science; (iv) building and roads; (j) high technology sector, comprising-(i) microelectronics; (ii) computer technology; (iii) nuclear technology; (iv) biotechnology; (k) such other sectors as the Board of Directors, with the approval of the Agency may, from time to time, determine.

The areas for academia –industry engagement in research and commercialization also includes future discoveries which may cover new, useful, and non-obvious inventions. This could be processes, machines, manufacture, and composition of matter spanning a wide range of results of academic work, including devices, chemical compounds, biological materials, research methods and tools, production processes, and software. [11] Leveraging on this law would be of immense economic, social and academic benefit to the academia, the industry and the nation at large.

b) THE NATIONAL CENTRE FOR AGRICULTURAL MECHANIZATION [12]

The government has now focused its attention on agriculture and solid minerals more than ever before, in particular, modernizing agriculture in terms of methods, machinery and input. [13] Investments in research and development is therefore a *sine qua non* for achieving self-sufficiency in food production, preservation and processing. It is partly in realization of this objective that the government

established the National Centre for Agricultural Mechanization for the purpose of utilizing local materials, skills and facilities and to boost quantity and quality of agricultural products. Accordingly, the Centre is empowered to;

- 1) encourage and engage in adaptive and innovative research towards the development of indigenous machines for farming and processing techniques;
- 2) design and develop simple and low-cost equipment which can be manufactured with local materials, skills and facilities;
- 3) standardise and certify in collaboration with the Standards Organisation of Nigeria agricultural machines, equipment and engineering practices in use in Nigeria;
- 4) bring into focus mechanical technologies and equipment developed by various institutions, agencies or bodies and evaluate their suitability for adoption;
- 5) assist in the commercialisation of proven machines, equipment, tools and techniques;
- 6) disseminate information on methods and programmes for achieving speedy agricultural mechanisation;
- 7) provide training facilities by organising courses and seminars specially designed to ensure sufficiently trained manpower for appropriate mechanisation;
- 8) promote co-operation in agricultural mechanisation with similar institutions in and outside Nigeria and with international bodies, connected with agricultural mechanisation.

Already, the National Biotechnology Development Agency (NABDA) has in conjunction with other research institutes developed genetic engineering techniques for producing two varieties of high yielding and boll-worm resistant cotton.

c) NATIONAL METALLURGICAL DEVELOPMENT CENTRE ACT [14]

The metal industry is the foundation for industrialization. The Ajaokuta Steel Mill and other steel Mills, the Itakpe iron ore company are a few of the undertakings by government aimed at accelerating Nigeria's industrialization. In pursuance of these objectives, the Federal government established the National Metallurgical Development Centre to carry out research into mineral ores produced in Nigeria. The Centre's mandate include the following:

- 1) To undertake, through laboratory research and tests, mineralogical appraisal, examination and evaluation of mineral ore samples for the purpose of ascertaining the mineral species contained therein;
- 2) carry out liberation studies, characterisation and identification of ores and other material microstructural components, designed to disengage mineral species, so as to release their valuable grain constituents for industrial use;
- 3) up-grade the qualities of Nigerian low-grade ores and minerals through beneficiation techniques and processes with a view to achieving an efficient and economic extraction of the materials contained therein with the purpose of ensuring self-sufficiency and rendering unnecessary the importation of such ores or

metals as reproduced there from;

- 4) carry out applied research on and develop both conventional and new refractory products using indigenous mineral raw materials;
- 5) conduct applied research into the quality of coals available in Nigeria and develop metallurgical coke from indigenous coal samples;
- 6) develop substitutes for strategic ferrous and non-ferrous alloys by increasing the adaptation and use of locally produced mineral raw materials as alloying elements to be used in the nation's metallurgical and allied industries;
- 7) improve the performance of the processes used in the metallurgical and allied industries through the application of fundamental scientific knowledge to the solution of problems related to steel production, fabrication and utilization;
- 8) conduct research into foundry problems associated with Nigeria's metallurgical and allied industries with particular emphasis on problems relating to foundry molding materials, smelting operations and casting techniques;
- 9) design and develop pilot flow-sheets for various metallurgical processes, especially for the economic standardization and beneficiation of locally produced ores;
- 10) study fundamental aspects of metals and alloys and determine failure nodes in engineering components and structures with particular emphasis on proofs and commercialise any of its scientific break-through for the benefit of Nigerian industries as may be approved by the Board and in accordance with relevant Nigerian laws.

d) NATIONAL SPACE RESEARCH AND DEVELOPMENT AGENCY [15]

This agency was established to encourage capacity building in space science technology development and management and to develop satellite technology for various applications with the following objectives;

- 1) encourage capability building in space science technology development and management, thereby strengthening human resources development required for the implementation of the national space programmes;
- 2) develop satellite technology for various applications and operationalize indigenous space systems for providing space services and shall be the government agency charged with the responsibility for building and launching satellites;
- 3) enhance the development and entrenchment of research, development and production tradition in the Agency, so as to achieve a high output and make the desired impact on national economic and social development;
- 4) promote the co-ordination of space application programmes, for the purpose of optimizing resources and develop space technologies of direct relevance to

national objectives;

- 5) develop national strategies for the exploitation of the outer space and make these part of the overall national development strategies, and implement strategies for promoting private sector participation in the space industry;
- 6) establish and supervise relevant centres and units for the purpose of executing the national space programme;
- 7) establish information network to promote exchange of information in order to facilitate communication and transmission of data concerning the activities of the Agency;
- 8) collaborate with international research centres, non-governmental organisations, universities, industries and other national and international space agencies and authorities;
- 9) promote active participation of Nigeria in the activities of the United Nations Committee on the Peaceful Uses of Outer Space and other United Nations Specialized Agencies involved in space science and technology applications;
- 10) provide support for universities and other academic institutions in the country for research and development projects relevant to the national space programme;
- 11) In carrying out these objectives, the Centre has the power to:
- 12) grant approval for the Agency to enter into research and production partnerships with any company, Non-Governmental Organisation, firm or individual and to appoint technical consultants to advise it from time to time as the need and situation may arise; and do such other things as are necessary for the successful performance of the function of the Agency.

e) THE NIGERIAN ATOMIC ENERGY COMMISSION ACT [16]

This Act establishes the Nigerian Atomic Energy Commission charged with the responsibility of developing atomic energy and other matters relating to peaceful use of atomic energy. Specifically, the Commission shall have power under section 2 (1) (e) to:

“make arrangements with universities and other institutions or persons in Nigeria for the conduct of research into matters connected with atomic energy or radioactive substances and to make grants to universities or other institutions or persons engaged in the production or use of atomic energy or radioactive substances or in research into matters connected with atomic energy or radioactive substances”;

The provisions of the laws discussed above will only be effective if framework for collaboration at national and institutional levels are set up by government and institutions to coordinate research activities. We therefore agree more with Ibeme [20] who opined that if Nigerian universities are to contribute actively to innovation there must be closer interaction between the universities, government and industry as the policy framework and

indeed the laws only provide incentives and help clarify the role of each stakeholder in the innovation loop.

4. Institutional Framework

In order to effectively utilize academia-industry collaboration, universities must develop institutional and policy frameworks for IP management. Some universities have established Research and Innovation offices, others have Intellectual Property and Technology Transfer Offices while many more are in the process of establishing similar offices. The essence for establishing these offices by whatever name called is to coordinate research, harness IP generated from the universities, protect the IP and collaborate with industry for development and commercialization. However, establishing an institutional framework without a policy to drive it would amount to putting something on nothing and expecting it to stand. The IP Policy is the basic document that regulates the relationship between researchers, students, universities and funders. In particular, the Policy deals with the ownership of IP generated by staff/student and the sharing of income derived from it. In short, it is the policy document that deals with the internal and external University IP collaborations. Therefore, a robust IP Policy is indispensable in the promotion of science, technology and innovation and by extension creation of intellectual property rights within the university set-up.

5. Bridging the Funding Gap

There is no doubt that the university system is suffering from funding deficit especially in the area of research. It is obvious that under the prevailing circumstances, government alone cannot meet the minimum threshold for education including research as recommended by UNESCO. Universities must therefore seek new revenue streams in patents and other IP assets in order to augment the deficit. Alternative platforms for research and commercialization of research findings provided under public sector platforms discussed earlier can also be advantageously exploited by the universities. Importantly, universities should be encouraged to adopt collaborative rather than the ‘stand-alone’ or ‘do-it-alone’ posture towards research. In this regard, The Federal Ministry of Science and Technology is playing a very important role by bridging intra-parastatal and inter-agency activities. It is also bridging the gap by bringing emerging Science, Technology and Innovation (STI) issues to private sector and also takes private sector initiatives to the federal government. with the ultimate objective of providing systematic investigatory skills and labour in the form of research and development. We therefore agree more with Ibeme who opined that if Nigerian universities are to contribute actively to innovation there must be closer interaction between the universities, government and industry as the policy framework and indeed the laws only provide incentives and help clarify the role of each stakeholder in the innovation loop. [17]

Recently, the Federal Institute of Industrial Research,

(FIIRO), Oshodi collaborated with NASCO Food Limited in the formulation of High Density Nutrient Biscuits for children. Similarly, FIIRO has in collaboration with May & Baker Pharmaceuticals Limited produced Therapeutic Food Supplements for the management of sickle cell anemia. Faculties of Engineering, University centres of research e.t.c have the capacity to engage in inter and intra- university collaboration as well collaboration with the private sector in research and development.

The Presidential Executive Order No.5, a brain child of the Federal Ministry of Science and Technology relating to planning and execution of projects, promotion of Nigerian content in contracts, Science, Engineering and Technology recognizes the importance of Science Technology and Innovation (STI) in National Economic Development, (NED), particularly in the area of promoting Made in Nigeria Goods and services (MNGS). The Federal Government under the prevailing National Science, Technology and innovation Policy (NSTIP) enjoins collaboration with relevant Ministries, Departments, Agencies and other organizations to promote the application of STI in all sectors of the Nigerian economy. It also enjoins the promotion of made in Nigeria campaign under the Economic Recovery and Growth plan (2017-2020) by harnessing STI to drive national competitiveness, productivity and economic activities in all sectors. [18]

In line with the above, companies and firms registered under the Laws of the Federal Republic of Nigeria shall take centre stage in consultancy services involving joint Venture Partnership, relationship and agreements in Law, Engineering, ICT, procurement e.t.c The rationale behind the Executive Order is for the promotion and adoption of local technology to replace foreign ones where they meet standards. Needless to say that in order for university researches to meet necessary standards, there must be collaboration between academia and Industry/entrepreneurs at micro and macro levels. This will in turn lead to agreements for technology acquisition and transfer in line with the extant provisions of the laws and policies of the Federal Government relating to the development of STI.

At this juncture, I would like to share the experience of the University of Maiduguri through the Centre for Entrepreneurship and Enterprise Development Limited (CEED) and the Intellectual Property Technology Transfer Office (IPTTO) in leveraging on some of these alternative platforms and the opportunities provided by the Presidential Executive Order 5 and under other laws.

The University developed a device-the Anti-Skid Brake System Simulation Device for testing the performance and functional behavior of the TE-501 A Alpha Jet Aircraft anti-skid braking system components. Hitherto, the functional behavior of the anti-skid brake system can only be tested on the aircraft or a test bench developed by the manufacturers for the whole brake system. The process is not only cumbersome but expensive. Besides, the Alpha aircraft jets are no longer being produced by the manufacturers and this makes it difficult to source for components. The anti-brake system simulation device came in handy for the Nigerian Air force. It is currently deployed on the Nigeria Air force TA501 and TE

501 Alpha Jet aircrafts. The University of Maiduguri holds the patent for the technology and it is in the process of collaborating with some companies to commercialize it.

The University has also developed a device called the Cylindrical Parabolic Reflecting Telescope for viewing terrestrial and other distant objects. This device can also be used by the military in the fight against insurgency. The Minister, Federal Ministry of Science and Technology has directed the Centre for Basic Space Science to collaborate with the inventor on the project. The area of collaboration is being worked out.

6. Conclusion

Universities should not underestimate or undermine their inventive and innovative capacities. They should be encouraged to take advantage of the opportunities for collaboration provided by private and public bodies rather than engage in commercial activities with little economic or academic value. By leveraging on laws and policies universities will not only free themselves from over dependence on government for research funding but they will also engender stronger collaborations and engagements with industry and by so doing bridge the academia –industry gap. Synergy between academia, industry and government should be the watch word.

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