



## Nigerian Universities and Research Institutes: Catalysts for Entrepreneurial Ecosystems

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### Abstract

The entrepreneurial ecosystem is increasingly recognized as a crucial driver of economic development, especially in emerging economies. The crucial role Nigerian universities and research institutes play as catalysts in developing a robust entrepreneurial ecosystem cannot be overemphasised. This paper explores how Nigerian universities and research institutes can serve as catalysts for entrepreneurship development, innovation, and economic transformation. Drawing from examples such as Stanford University, Oxford University, and the University of Auckland, as well as contributions from institutions like MIT and Harvard in the U.S. and Tsinghua University in China, the paper highlights strategies, and recommendations for Nigerian institutions to support innovation, industry collaboration, and sustainable economic growth. This paper argues for the critical need to restructure research frameworks within Nigerian universities and research institutes. By implementing strategic reforms, these institutions can transition from a focus on poverty management to advancing innovation and wealth creation. This shift necessitates strengthening research output, cultivating skilled graduates, and prioritizing technology transfer through commercialization activities. The article identifies key practices and strategies Nigerian institutions can adopt to cultivate similar ecosystems. The paper proposes a multi-pronged approach, including the appointment of dedicated leadership roles, the establishment of specific support structures, and the adoption of robust monitoring and evaluation practices. The paper concludes with actionable recommendations for strengthening Nigeria's academic infrastructure to support entrepreneurship and spur economic growth.

**Keywords:** Nigerian Universities, Research institutes, Innovation, Entrepreneurship, Economic development.

### I. Introduction

Globally, universities and research institutes are recognized as engines for innovation and economic development. In this regard, Nigerian universities and research institutes hold a unique position in the country's socioeconomic 'space,' with the potential to drive innovation and entrepreneurship. Despite this potential, Nigerian institutions often face challenges, including limited funding, infrastructure deficits, and inadequate linkages with the private sector. However, Nigerian universities and research institutes can emulate the models of institutions such as Stanford University in the United States, Oxford University in the United Kingdom, and the University of Auckland in New Zealand, which have successfully nurtured and built entrepreneurial ecosystems that support national development. Anchored within thriving entrepreneurial ecosystems, these universities amongst others exemplify how academia-industry collaboration advance economic growth, fuels job creation, and supports technological advancements.

Universities in Nigeria play a pivotal role in national development. However, concerns have been raised regarding the effectiveness of current research frameworks. To enhance their impact, a paradigm shift is necessary, moving away from solely addressing poverty management towards actively promoting innovation and wealth creation. This requires a multifaceted approach that bolsters research productivity, encourages the graduation of industry-ready talent, and facilitates the commercialization of research outcomes. Nigerian universities, with their significant potential, can replicate such success by adopting strategic models and frameworks tailored to the local context. To



achieve this, Nigeria must invest in universities and research institutes as primary catalysts for a vibrant entrepreneurial ecosystem.

### **The Nigerian Higher Education Ecosystem: Potentials and Challenges**

As of 2024, Nigeria had over 270 universities, with two newly established in the first half of the year. Among these institutions, 149 were private universities, while state and federal universities numbered 63 and 62, respectively (Adamu, 2011). Despite this, a lack of funding, limited industry partnerships, and the challenge of brain drain hinder their ability to drive sustainable economic growth. To address these gaps requires strategic focus on creating a culture of entrepreneurship and innovation within academia and facilitating research commercialization to bridge academia-industry divides.

The National Open University of Nigeria (NOUN), based in Abuja and operating across multiple campuses nationwide, was the largest university in Nigeria by enrolment as of 2019. With approximately 565,000 students, NOUN also ranks as one of the largest open and distance learning institutions in Africa, making higher education more accessible to Nigerians across the country. In 2019, Nigeria had over 1.8 million full-time undergraduate students. Among these, the sciences and social sciences were the most popular fields of study, with administration and management as the third most chosen faculty. However, at the master's and (postgraduate) diploma levels, administration and management attracted the highest number of students, reflecting strong demand for these disciplines at postgraduate levels.

In Nigeria, there are over 66 research institutes, the majority of which are established and funded by the Federal Government. These institutes aim to improve standards, enhance knowledge, and develop more efficient practices within their specific fields. Part of their mandate is to ensure that research findings, technological innovations, and new knowledge are adapted and applied to meet local Nigerian needs. Most of these institutes focus on scientific and technological research, and they can be categorized into five fundamental areas of specialization:

1. Science and Technology, with 30 institutes.
2. Agriculture, with 25 institutes.
3. Education, with 4 institutes.
4. Socio-Economic and Cultural studies, with 3 institutes.
5. Medical research, also represented by 4 institutes.

In spite of these distinctions, a considerable amount of overlap exists as several institutes have similar mandates and areas of focus, leading to duplicated efforts. This number could be even higher if we include Colleges of Medicine affiliated with various universities, as these institutions conduct extensive ongoing research in health and medicine. Each research institute operates under a federal ministry based on its area of specialization. For instance, agricultural research institutes report either to the Federal Ministry of Agriculture or the Federal Ministry of Water Resources, depending on their focus. Through this structure, research institutes contribute to Nigeria's development by encouraging innovation tailored to the nation's unique challenges and needs.

Many people might misunderstand our quest for the development of entrepreneurial ecosystem in the higher institutions. One key point is the development, in our students, of the entrepreneurial mindset before graduating, so that our institutions would start churning out employment creators instead of job seekers. Even then, those who get jobs will become intrapreneurs within the confines of the company, which contributes to wealth creation and subsequently, economic growth and development. A great stride was initiated at the basal level with the recent launch of the new curriculum by the Federal Ministry of Education. The new education curriculum introduces about 15 key areas of skill development aimed at equipping students in primary and junior secondary schools (9 years) with the necessary competencies to thrive in a rapidly changing world. These areas include information technology, coding, entrepreneurship, robotics, agriculture, arts and crafts, financial literacy, and environmental sustainability. This curriculum is a step toward addressing the skills gap that has been a persistent issue in Nigeria's education sector, particularly in equipping students with the technical and vocational skills required for the 21st-century workforce.

A notable feature of the new curriculum is its emphasis on practical, hands-on learning experiences. For instance, courses in coding and robotics provide students with opportunities to apply theoretical concepts in real-world scenarios, encouraging critical thinking and problem-solving abilities. Similarly, introducing financial literacy at an early stage helps students develop essential life skills that are critical for entrepreneurship and economic empowerment. The effective implementation of the new curriculum will make the creation of entrepreneurial ecosystems by the higher



institutions much easier at the tertiary levels thus creating enabling environmental for sustainable results.

### **Challenges of Brain Drain on Nigeria's Development**

Brain drain remains a critical issue, with Nigerian graduates frequently seeking opportunities abroad due to limited resources and funding domestically (Benedict & Ukpere, 2012, Mlambo et al., 2019). This trend is not unique to Nigeria; institutions like the University of Auckland and the New Zealand government face similar challenges, underscoring the need for robust local opportunities to retain skilled talent (Vega-Muñoz, 2021). By creating a sustainable entrepreneurial ecosystem, Nigeria could better retain its talent, encourage local innovation, and drive economic development.

### **Current State of Nigerian Universities and Research Institutes**

Switzerland has once again secured the top position in the 2024 Global Innovation Index (GII), a testament to its continued commitment to innovation and technological advancement. The GII, an annual ranking conducted by the World Intellectual Property Organization (WIPO), evaluates the innovative performance of 133 economies worldwide. Following Switzerland, Sweden, the United States, Singapore, and the United Kingdom rounded out the top five. These nations consistently excel in areas such as technological advancements, robust R&D funding, and supportive innovation policies.

Nigeria, ranked 113th globally and 15th in Africa, faces significant challenges in nurturing innovation. Key areas for improvement include research and development, infrastructure development, and supportive policies. While countries like Mauritius (55th), South Africa (69th), Kenya (96th), and Ghana (101st) have made strides, Nigeria still lags behind in terms of innovation performance. However, smaller economies like Rwanda (104th) and Côte d'Ivoire (112th) have demonstrated notable progress, suggesting that focused innovation strategies can yield meaningful results, even in resource-constrained environments. Nigerian universities and research institutes are characterized by substantial research capacity; however, they face several constraints. Issues like underfunding, a lack of adequate infrastructure, and limited alignment with industry inhibit their ability to develop an entrepreneurial ecosystem comparable to those in the US, UK, and New Zealand.

- **Limited Research Commercialization:** Few Nigerian universities have developed structures

to commercialize their research effectively (Ibeme, 2020).

- **Insufficient Incubators and Accelerators:** Unlike Stanford and Oxford, most Nigerian Higher Education Institutions (HEIs) lack incubation or acceleration programs, limiting their support for student-led and research-induced start-ups (Manishimwe, et al., 2024).

- **Weak Industry-Academia Linkages:** There is a notable lack of collaboration between Nigerian universities and private sector entities, reducing opportunities for practical, industry-driven research and innovation (Kolade et al., 2021). Most of them are working in silos with minimal impact on the overall national economy. There is a state and private universities in Nigeria co-located in a densely populated industrial estate with over 100 companies (local and multinationals) for the past twenty years that have not had any meaningful relationship with any of the firms, not to mention the fact that one them don't even have a Centre for Entrepreneurship and Technology development. To enhance its innovation capabilities, Nigeria must prioritize investments in education, research, and infrastructure. Additionally, implementing favourable policies, advancing a culture of innovation, and encouraging collaboration between academia, industry, and government are crucial steps towards a more innovative future.

### **The Role of Universities and Research Institutes in Entrepreneurial Ecosystems**

Universities and research institutions act as knowledge hubs that fuel innovation and entrepreneurship. They produce research that can lead to modern technologies and provide training, networks, and capital access for budding entrepreneurs. They also serve as incubation centres for start-ups, often bridging the gap between academia and industry. Nigerian universities, through strategic partnerships, can encourage university-led entrepreneurship ecosystems by promoting practical-oriented programmes, establishing incubators, and collaborating with private and public stakeholders.

### **Case Studies of Global Leaders in University-led Entrepreneurial Ecosystems**

These case studies illustrate some global university contributions to entrepreneurial ecosystems as a learning curve for Nigeria:

#### **1. Stanford University (United States)**

Stanford University has played a transformative role in the development of Silicon Valley, one of the



world's most renowned innovation hubs. Through its extensive research output, flexible academic programs, and strong industry partnerships, Stanford has created an entrepreneurial culture that attracts talent and investment globally.

- **Research and Development (R&D):** Stanford invests significantly in R&D, enabling breakthroughs in technology and science. This approach has led to innovations that have fuelled the growth of companies like Google, Hewlett-Packard, and Tesla (Trunina, Liu and Chen, 2018).
- **Industry Partnerships:** Stanford's ecosystem thrives on robust partnerships with industry leaders, providing students and researchers with exposure to practical challenges and commercial expertise (Etzkowitz, 2019).
- **Incubation and Acceleration:** The Stanford-affiliated StartX accelerator has supported over 300 start-ups, demonstrating the university's commitment to nurturing innovative ideas (Etzkowitz, 2022).

Stanford University's proximity to Silicon Valley has nurtured a technology-rich ecosystem, producing industry giants like Google, Apple, and Tesla (Saxenian, 1994). Stanford's Office of Technology Licensing (OTL) exemplifies academia's role in commercializing research and fostering entrepreneurship. Through initiatives such as the Stanford Startup Garage, students and faculty receive resources, mentorship, and funding to bring innovations to market. This model demonstrates the importance of industry partnerships and structured support in scaling early-stage ventures into multinational companies.

## 2. Oxford University (United Kingdom)

Oxford University's role in the UK's entrepreneurial ecosystem has been influential, particularly in knowledge transfer and commercialization.

- **Oxford University Innovation (OUI):** This organization facilitates technology transfer, linking research with commercial opportunities. OUI supports academic entrepreneurs by offering resources to develop commercially viable products.
- **Oxford Foundry:** A campus-based entrepreneurship centre providing support, mentorship, and funding access, enabling students to launch ventures in various sectors (Whorwood and Scott, 2020).
- **Partnerships with Financial Entities:** Oxford's collaboration with venture capital funds like Oxford Sciences Innovation (OSI) allows it to attract investment for its spin-offs, thereby

strengthening its ecosystem (Bushery, 2024; Smith, Bagchi-Sen and Edmunds, 2019).

## 3. University of Auckland (New Zealand)

In New Zealand, the University of Auckland has become a beacon for entrepreneurship through its initiatives in promoting start-ups and innovation.

- **UniServices:** This subsidiary commercializes university research, linking academia with industry to translate research into marketable products and services (Keane, n.d.).
- **Innovative Student Programmes:** The university offers programs such as Velocity, an entrepreneurship challenge encouraging students to create and pitch start-up ideas (Yun and McNaughton, 2021).
- **Government and Industry Collaboration:** The University of Auckland actively collaborates with government and industry stakeholders, creating a supportive environment for research commercialization (Thomas, 2019).

The University of Auckland's Centre for Innovation and Entrepreneurship has cultivated hundreds of ventures addressing global challenges in sectors like MedTech, AgriTech, and deep technology (Gaston, 2024). Through UniServices, the university commercializes research findings, supports startups, and secures funding from diverse sources. This model showcases the value of comprehensive support for commercialization and access to early-stage funding, elements that Nigerian universities can incorporate to nurture homegrown entrepreneurship.

## 4. MIT and Harvard University (U.S.)

MIT and Harvard anchor Boston's vibrant biotech and robotics sectors, providing a model for Nigerian institutions to emulate. MIT's Innovation Initiative, along with its collaborative networks, has established Boston as a hub for life sciences and artificial intelligence (Etzkowitz, 2002). Harvard's iLab promotes interdisciplinary collaboration and has fostered numerous startups, bridging academia with practical, scalable business applications (Kamarulzaman et al. (2013). These institutions illustrate the benefits of creating supportive environments where students and researchers can innovate and receive guidance on commercialization.

## 5. Cambridge University Science Park (UK)





Oxford and Cambridge are pivotal to the UK's biotechnology and artificial intelligence sectors. Their integration of science parks and research centres encourages both academic and industry collaboration, advancing sectors such as MedTech and clean energy (Owen et al., 2023). These institutions emphasize the importance of cross-disciplinary knowledge and strategic partnerships, setting a precedent for Nigerian universities to align with relevant industries and local needs.

### 6. Tsinghua University (China)

Tsinghua University is integral to Beijing's innovation ecosystem, especially in fields like electronics and computer science (Wang, 2022). Partnering with both the government and private sector, Tsinghua has created one of the most dynamic technology ecosystems in Asia. China's approach of combining academic research, industrial partnerships, and government funding serves as an important model for Nigerian institutions aiming to drive innovation at scale (Li et al., 2024, Hailu, 2024).

### Key Recommendations for Nigerian Universities and Research Institutes to promote Innovation and Create Sustainable Wealth

To effectively promote innovation and increase financial gains, Nigerian universities should consider an integrated approach that encourages the development of science, technology, and patents. Learning from global leaders, the following recommendations outline key areas of focus to help drive academic and economic advancement.

#### 1. Create a National Innovation Strategy

Nigeria could benefit from a unified national innovation framework centered on public-private partnerships, entrepreneurial training, and research commercialization. Aligning this framework with global trends can position Nigerian universities at the forefront of technological and economic development, allowing them to make meaningful contributions on a global scale (Adamu, 2011).

#### 2. Establishment of Dedicated Leadership

We posit that the establishment of the position of Deputy Vice Chancellor for Research, Innovation, and Development (DVC-RID) can provide focused leadership and direction for research activities. This office is expected to focus on creation of innovation hubs, technology parks, and business incubation centres will provide crucial infrastructure to nurture

innovation and support the commercialization of research (Ogundare, 2024).

#### 3. Promote and Embed Entrepreneurship Education Across All Levels

Integrating entrepreneurship education into curricula is essential for developing students' business acumen. So, early exposure to entrepreneurship is essential for nurturing a steady pipeline of innovators. The recently released curriculum is a step in the right direction. Nigerian universities can take it further by adopting Oxford Foundry's approach by embedding entrepreneurship courses and activities within various academic disciplines. Also, they could learn from programmes such as MIT's Media Lab, which emphasizes hands-on learning and problem-solving. This approach develops entrepreneurial mindsets among students, preparing them for the demands of a rapidly changing world (Etzkowitz, 2002).

#### 4. Establish Specialized University-Based Innovation Hubs

Innovation hubs, such as Stanford's Startup Garage or Cambridge's Science Park, provide essential resources, mentorship, and networking for budding entrepreneurs. Establishing similar hubs within Nigerian universities could nurture local startups, enabling them to tackle pressing challenges and contribute to both local and global economies.

#### 5. Increase Investment in Research Commercialization

Funding initiatives focused on bringing university research to market is critical. The Nigerian public and private sectors can support commercialization through programmes like Harvard's iLab, which transforms academic innovations into market-ready products, driving economic growth. Also, having dedicated marketing and communication directorates can ensure effective communication strategies to promote research findings and attract potential investors for commercialization endeavours.

#### 6. Cultivate Strategic Industry-Academia Collaboration

Strong partnerships with industry are essential for a thriving entrepreneurial ecosystem. Nigerian universities could establish partnerships with key industries to facilitate knowledge transfer, align research with market needs, and provide students with valuable internship and employment opportunities. Nigerian universities could adopt MIT's model of partnering with local tech and



biotech firms, as this type of engagement strengthens ties between academia and industry, resulting in research-driven market solutions and contributing to community development.

### **7. Address Funding Gaps in High-Impact Research**

Securing funding for research projects that are high-risk but offer high rewards is crucial. Government and private-sector investments in research and development (R&D) can help close existing funding gaps and support the creation of scalable Nigerian startups with the potential to compete globally.

### **8. Establish Technology Transfer Offices (TTOs)**

Technology Transfer Offices play a pivotal role in bridging the gap between research and commercialization. These offices provide necessary resources, legal support, and expertise to help researchers transform academic innovations into market-ready products. TTOs assist with patent filings, both domestically and internationally, and facilitate commercialization by marketing technologies to industry partners, negotiating licensing agreements, and forming startups, thus ensuring that university-developed technologies reach broader markets.

### **9. Strengthen Alumni Networks to Support Startups**

Robust alumni networks are invaluable in advancing innovation, as they offer both funding and mentorship for startups. Nigerian universities can emulate Stanford's approach by building strong alumni connections that support student-led projects and provide a valuable resource for aspiring entrepreneurs through mentorship, investment, and guidance.

### **10. Establish Centres of Excellence in High-Growth Sectors**

Specialized centres in high-impact fields such as agriculture, fintech, and renewable energy can drive innovation and skills development. By focusing on industries that are vital to the Nigerian economy, universities can align academic research with national growth needs, establishing themselves as leaders in both local and global knowledge advancements.

### **11. Promote a Strong Research and Development (R&D) Culture**

Nigerian universities need consistent funding to support research and innovation. This could be achieved by forming alliances with private investors

and government bodies, drawing inspiration from Oxford's OUI and the University of Auckland's UniServices model. Also, Nigerian universities should allocate substantial resources toward R&D, providing grants, seed funding, and access to advanced facilities to encourage faculty to pursue groundbreaking projects. Cross-disciplinary collaboration should also be encouraged to inspire current ideas, while specialized centres in emerging fields like AI, biotechnology, renewable energy, and nanotechnology can attract top talent and funding.

### **12. Incentivize Innovation and Patent Development**

To encourage innovation, universities should implement clear Intellectual Property (IP) policies that outline revenue-sharing models between institutions and inventors. Providing financial rewards, such as royalties and bonuses for patented inventions, motivates faculty and promotes a culture of innovation. Additionally, recognition programmes and awards can further raise the profile of inventors, encouraging others to engage in research and development.

### **13. Develop University-Based Incubators and Accelerators**

Incubators and accelerators should be established across Nigerian universities to provide hands-on support for students and faculty involved in entrepreneurial ventures. Establishing incubators and accelerators can help professors and students turn research spin-offs into viable startups. These programmes offer resources such as business training, mentorship, and investor connections, cultivating a vibrant innovation ecosystem. Universities should also host networking events and pitch competitions, promoting a culture of entrepreneurship and collaboration on campus. Leveraging the successful model of Stanford's StartX, Nigerian universities could create programs that support and fund start-ups.

### **14. Advance University-Industry Collaboration**

Collaborative research projects with industry partners provide professors with real-world challenges, which often lead to commercially viable solutions. Industry-sponsored initiatives, shared IP arrangements, and consulting opportunities allow faculty to work directly with companies, generating patents and additional revenue streams for both professors and universities.

### **15. Provide Education and Training on Innovation and IP**



Equipping faculty and students with knowledge of commercialization is essential. Universities can offer workshops and courses in innovation, entrepreneurship, and IP management, while mentorship programmes involving experienced entrepreneurs can guide faculty members through the commercialization process, encouraging innovative thinking and practical know-how.

#### **16. Leverage Government Policy, Support, and International Funding**

Government policies supporting research, innovation, and start-ups are crucial. Hence, government grants and international funding opportunities are key to expanding the scope of university R&D initiatives. Public-Private Partnerships (PPPs) enable Nigerian universities to co-develop marketable technologies, creating shared benefits for the institution, government, and industry partners alike. Nigerian universities should advocate for favourable policies and incentives, encouraging both foreign and local investments in university-led research and development.

#### **17. Encourage Open Innovation and Collaboration**

Universities can promote open innovation by establishing platforms for faculty to collaborate with external researchers, students, and industry professionals, encouraging shared ideas and co-development. Fostering international and national collaborations with other universities, aligning with Sustainable Development Goal 17 (Partnerships for the Goals), would leverage diverse expertise and resources to drive innovation. Participation in global research networks increases the commercialization potential of academic research, expanding the reach and impact of university innovations.

#### **18. Establish a Culture of Continuous Innovation**

Strong leadership is essential to prioritize research, patenting, and commercialization within the university's mission. Engaging students in research projects and innovation activities nurtures a pipeline of future inventors, creating a culture that values continuous innovation and secures the institution's status as a source of innovative research.

#### **19. Monitoring and Evaluation**

The establishment of dedicated Monitoring, Evaluation, Accountability, and Learning (MEAL) frameworks is essential to track progress. This includes monitoring research grants, patents, publications, products derived from research, commercialization efforts, and technology transfer

activities (e.g., licensing). Also, implementing a system for annual reporting, similar to the Association of University Technology Managers (AUTM) database, will provide transparency and facilitate communication of research achievements.

We are of the opinion that through strategic implementation of these recommendations, Nigerian universities and research institutes can develop a robust culture of innovation and position themselves as leaders in science, technology, and intellectual property. This approach not only brings financial rewards and recognition for faculty but also strengthens the institution's reputation, attracts talents, and ensures long-term growth and sustainability.

## **II. Conclusion**

Nigerian universities and research institutes possess immense potential to catalyse entrepreneurial ecosystems, provided they adopt strategic frameworks tailored to their unique context. There is much to learn from the success of global models and institutions such as Stanford, Oxford, and Auckland for Nigerian universities and research institutes. Effectively pursuing these suggestions would make them become pivotal players in establishing a culture of entrepreneurship by emphasizing strategic partnerships, commercialization of research, and innovation-focused education, and ultimately, advancing national economic development. In this respect, the Nigeria's higher education institutions can transform into robust incubators of economic growth and innovation through enhanced funding, industry linkages, policy support, and commitment to entrepreneurship. Nigerian universities by implementing these proposed reforms can create a more robust research ecosystem that advances innovation and drives wealth creation. This will contribute significantly to the nation's overall development trajectory. We need concerted efforts from all stakeholders including government for Nigerian universities to become the central nodes within a vibrant entrepreneurial ecosystem that contributes to sustainable national development in 2025 and beyond.

#### **Competing Interests**

The authors have declared that no competing interests exist.

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