

## **National Board for Technology Incubation (NBTI) and the Commercialisation of Research and Development in Nigeria, 2005–2022**



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### **Abstract**

*This paper examines the impact of Technology Incubation Centres on the commercialisation of Research and Development (R&D) in Nigeria. It discusses the role of the National Board for Technology Incubation's (NBTI's) Technology Incubation Centres (TICs) in bridging the gap between R&D activities and market-ready products/services. While existing literature explores technology incubation in general, there is a lack of specific studies on the effects of NBTI's initiatives in commercialising Nigerian R&D outputs. This study fills that gap by conducting an analysis of NBTI's contributions to innovation, start-up support, and indigenous technology commercialisation within the Nigerian context. The study employs a historical research methodology, making use of descriptive and narrative analysis involving oral interviews with key participants and an extensive review of secondary sources such as books, journals, and official reports related to NBTI's activities and the Nigerian technological setting. The findings highlight the role of NBTI's Technology Incubation Centres (TICs) in promoting entrepreneurship, innovation, and economic transformation in Nigeria. It was found that these centres provide essential support services, including infrastructure, access to funding, and mentorship, enabling Nigerian entrepreneurs to convert their innovative ideas into marketable products and services. The study reveals that the impact of TICs covers job creation, wealth creation, revenue generation, promotion of economic diversification, attracting investment, and reducing over-reliance on imported technologies. The study concludes that maintaining a strong innovation ecosystem and promoting economic growth in Nigeria requires ongoing adaptation and enhancement of NBTI's programmes.*

**Key words:** *National Board for Technology Incubation (NBTI), Technology Incubation Centres (TICs), Research and Development (R&D) and Commercialisation.*

## Introduction

The evolution of technology, from primitive tools to advanced systems, has paved the way for structured support in innovation. In the late 1950s, a stand-out moment in this development occurred in the United States with the establishment of some of the earliest technology incubators, designed to nurture technological advancements and facilitate new business ventures. One of the first of these was the Batavia Industrial Centre, launched in 1959 in New York by Joseph L. Mancuso.<sup>1</sup> In the 1980s, the concept of incubation programmes gained international traction, leading to the establishment of science and technology parks worldwide. Notable examples include the Cambridge Science Park in England, founded in 1970, and Tsukuba Science City in Japan, launched in 1973.<sup>2</sup> A key organisational milestone in this period was the founding of the National Business Incubation Association (NBIA) in 1985, a move that showed the leadership role of structured incubation in advancing global technological growth and enterprise. NBIA has grown to a membership of over 2,000 incubation organisations worldwide that support the formation and acceleration of new start-ups. By the late 20<sup>th</sup> century, technology incubation had become a globally recognised economic development tool utilised across Europe, Asia, and other regions. Today there are over 7,000 incubators worldwide continuing the long tradition of assisting innovators in commercialising new technologies through dedicated mentorship and related programming.<sup>3</sup>

Modern technology incubation in Africa can be traced to the late 20<sup>th</sup> century as a strategic initiative to drive innovation and entrepreneurship across the continent. In 1986, South Africa's Inkwenkwezi Private Business Incubator set an early example.<sup>4</sup> A key catalyst for growth in African Technology Incubation was the establishment of the Pan African Business Incubator Network (BIN) in 1998. Supported by USAID, BIN facilitated knowledge sharing among the continent's emerging incubators, helping to build a collaborative foundation for innovation. By 2014, Africa was estimated to have over 150 active incubators, primarily concentrated in countries such as Kenya, South Africa, Nigeria, and Egypt.<sup>5</sup>

Since the launch of the Technology Incubation Programme (TIP) in 1993 and the establishment of the National Board for Technology Incubation (NBTI) in 2005, Nigeria has led initiatives to support local technology development and commercialisation. These efforts aim to bridge the gap between research and development (R&D) and market readiness by setting up Technology Incubation Centres (TICs) across the Country. It also enables Nigerian entrepreneurs to turn their ideas into marketable products and services by providing dynamic resources like infrastructure, access to funding and mentorship. Although many scholars have

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<sup>1</sup> Laurent Probst, *Lessons from 20 Years of Incubators in Europe*, (Luxembourg: European Commission, 2000).22-25.

<sup>2</sup> Laurent Probst, *Lessons from 20 Years of Incubators in Europe*, 27.

<sup>3</sup> Laurent Probst, 27-34.

<sup>4</sup> Herrington, Mike and Jonathan Kaila, "What Are the Characteristics of African Entrepreneurs?" *Global Entrepreneurship Monitor*, Vol. 1 No. 1, (2006), 32.

<sup>5</sup> Graham Haines, *Incubating Success. Incubation Theory and Practice for Technical Entrepreneurship*, (Jerusalem: The World Bank, 2014).

written extensively about technology incubation,<sup>6</sup> none specifically dealt with the impact technology incubation centres have on the commercialisation of Research and Development (R&D) in Nigeria. This paper fills this gap by conducting an investigative study of NBTI's contributions to innovation, start-up support, and the promotion of indigenous technology commercialisation within the Nigerian context from 2005 to 2022.

### **Conceptual Clarifications**

Some concepts such as Technology Incubation Programme (TIP), Technology Incubation Centres and Commercialisation of Research and Development which are relevant to this paper are clarified in this section.

**Technology Incubation Programme (TIP):**<sup>7</sup> The Technology Incubation Programme (TIP) is an organised initiative created to support early-stage technology start-ups by equipping them with vital resources, assistance, and networking opportunities needed for growth and success. The primary goal of TIP is to help entrepreneurs develop their ideas into viable businesses and to create a thriving tech-ecosystem in the region. TIP assist innovation and entrepreneurship and in helping start-ups to grow and thrive in the tech-ecosystem.

**Technology Incubation Centres (TICs):** Technology Incubation Centres are designed to promote startups and small businesses in their growth and development by providing office space, mentorship, and access to funding.<sup>8</sup> They provide a variety of programmes which assist innovation and entrepreneurship, especially in emerging markets.<sup>9</sup> In line with this study, it must be pointed out that the Technology Incubation Centre is one of the major facilitators of commercialisation in Research and Development through the connection that exist between academic innovation and market needs for Nigeria from 2005 to 2022. With this, developing an enabling entrepreneurial ecosystem promotes reasonable economic growth.

**Commercialisation of Research and Development (R&D):** Commercialisation of research and development (R&D) refers to the process of transforming scientific research outcomes, innovative ideas, and technological advancements into marketable products, services, or processes that can drive economic growth and development.<sup>10</sup> In the context of this study, this process involves various stages, including the protection of intellectual property (for example: patents/copyrights), product development, market research, access to funding, and scaling to

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<sup>6</sup> U. Uwuigbe, and C. Okafor, "The Role of Technology Incubation Centres in Promoting Innovation and Entrepreneurship in Nigeria," *Journal of Business and Management*, Vol. 2, No. 1, (2017), 48-79; C. Lee, "College Develops Centre For Technology Incubator," *National Defense*, Vol. 1, No. 7, (2018), 17-54.

<sup>7</sup> "Technology Incubation Programmeme," Accessed. December 1, 2023. <https://www.ijert.org/technology-incubation-programmeme-for-development-of-sustainable-entrepreneurial-skills-in-Nigeria-2>.

<sup>8</sup> A. Bergek, and C. Norrman, "Incubator Best Practice: A Framework," *Technovation*, Vol. 28, No. 1, (2008), 20.

<sup>9</sup> A. Bergek, and C. Norrman, "Incubator Best Practice: A Framework," 20.

<sup>10</sup> R. Grimaldi, M. Kenney, D. S. Siegel, and M. Wright, "30 Years After Bayh-Dole: Reassessing Academic Entrepreneurship," *Research Policy*, Vol. 40, No. 8, (2011), 1045-1057.

meet market demands as explained by Bergek, and Norrman.<sup>11</sup> In Nigeria, the commercialisation of R&D helps to take care of the gap between knowledge creation and its practical application within industries, especially in technology sectors.

**Establishment of the National Board for Technology Incubation (NBTI)** The establishment of the National Board for Technology Incubation (NBTI) in 2005 was motivated by several factors that involved the promotion of innovation, improving economic growth and dealing with the challenges within the Country's technology sector.<sup>12</sup> Nigeria embraced the concept of technology incubation in 1993, with the establishment of its first Technology Incubation Centre in Agege, Lagos, marking a step towards nurturing local talents and promoting innovation. The programme was officially established by the Technology Business Incubation Foundation Takeover Decree No. 5 of 1995 and has been under the umbrella of the Federal Ministry of Science and Technology since July 1995. Over the years, forty other centres have been established in the length and breadth of the Country.<sup>13</sup> Several factors highlight the necessity for establishing the National Board for Technology Incubation (NBTI), particularly the role of effective leadership in driving this initiative. Firstly, the NBTI was created to promote the development and commercialisation of indigenous technologies, empowering Nigerian start-ups to compete on a global scale.<sup>14</sup>

The vision and mission of the National Board for Technology Incubation (NBTI) highlight the organisation's dedication to advancing Nigeria's technological competitiveness. They succinctly express the NBTI's mandate. The Board's vision is to enhance Nigeria's technological competitiveness by using technology incubation to commercialise innovative ideas and research and development (R&D) outcomes. Effective leadership is essential for the achievement of this vision, as the NBTI aims to build state-of-the-art infrastructure that supports technology-based businesses and nurtures the nation's potential for economic growth through value-added industries. Additionally, the Board seeks to build strong connections among entrepreneurs, technology providers, and access to finance, ensuring the development of successful technology-driven enterprises.<sup>15</sup>

The organisation is committed to developing technology-driven entrepreneurs in Nigeria. From 2005 to 2013, the NBTI underwent a major transformation, aligning its strategies to better support the commercialisation of research and development (R&D) findings. Abdurahman Akinyemi Balogun, the Director of Human Resource Management at NBTI, highlights the

<sup>11</sup>A. Bergek, and C. Norrman, "Incubator Best Practice: A Framework," 20-28.

<sup>12</sup> Federal Ministry of Science and Technology, Abuja, *Technology Incubation Programmeme in Nigeria: Policy, Functions, Structures and Operational Guidelines*, (Abuja: NBTI, 2005), 2.

<sup>13</sup> Federal Ministry of Science and Technology, Abuja, *Technology Incubation Programmeme in Nigeria: Policy, Functions, Structures and Operational Guidelines*, (Abuja: NBTI, 2005), 2-3;

<sup>14</sup>National Board for Technology Incubation (NBTI), Accessed, December 19, 2023. <https://www.NBTI.gov.ng/>. U. Uwuigbe, and C. Okafor, "The Role of Technology Incubation Centres in Promoting Innovation and Entrepreneurship in Nigeria," *Journal of Business and Management*, Vol. 2, No. 1, (2017), 1-10.

<sup>15</sup> National Board for Technology Incubation (NBTI), "Functions of NBTI," Accessed. December 26, 2023. <https://www.NBTI.gov.ng/functions-of-NBTI/>.

importance of the establishment of NBTI. He qualifies it as a "strategic decision to commercialise R&D."<sup>16</sup> This emphasis on leadership and strategic direction has been instrumental in driving the organisation's mission to enhance innovation and entrepreneurship in Nigeria's technology landscape."<sup>17</sup> He states that:

...The National Board for Technology Incubation (NBTI) was established to advance technology incubation in Nigeria by building on existing efforts and introducing new initiatives. Effective leadership was instrumental during this period, laying the groundwork for the incubator's renewed focus on leveraging innovation and technological advancements to generate tangible socio-economic benefits for Nigerian entrepreneurs. Under strong leadership, NBTI shifted its focus to expanding its incubation units across the Country, accommodating a diverse range of technological entrepreneurs. By actively promoting the incubation of innovations, NBTI fostered technology transfer and the commercialisation of local innovations. The Board's commitment, guided by effective leadership, was aimed at cultivating a sustainable entrepreneurial ecosystem by creating platforms that nurture and support start-ups through mentorship and reduced certification costs.<sup>18</sup>

### **Organisational Structure of the National Board for Technology Incubation (NBTI)**

NBTI, under the Federal Ministry of Science and Technology, manages Nigeria's technology incubation centres, ensuring effective policy, decision-making, and R&D commercialisation.<sup>19</sup> NBTI is led by the Director General/CEO, who oversees operations and administration, working with the Governing Board for strategic guidance. Its structure includes core directorates and departments, such as the Planning, Research, and Policy Analysis Directorate, which drives strategic initiatives and partnerships, supported by Deputy Directors of Programme & Planning and International & Local Liaison.<sup>20</sup> The Post Incubation and Extension Services Directorate is another core department that ensures enterprise sustainability after graduation. Deputy Directors of Post Incubation Support and Extension Services provide ongoing support to entrepreneurs.<sup>21</sup> The Commercial Directorate drives innovation to market, supported by Deputy Directors of Business Development Management and Technology Commercialisation. The Operations Department oversees technology incubation, ensuring alignment with the TIP policy. It is led by a Director, supported by Deputy Directors M&E I and II.

<sup>16</sup> Abdurahman Akinyemi Balogun, 50+, Director Human Resource Management, NBTI, Abuja, 21 September, 2024.

<sup>17</sup> Abdurahman Akinyemi Balogun, 50+, Director Human Resource Management, NBTI, Abuja, 21 September, 2024.

<sup>18</sup> Abdurahman Akinyemi Balogun, 50+, Director Human Resource Management, NBTI, Abuja, 21 September, 2024.

<sup>19</sup> National Board for Technology Incubation, "Organogram of National Board for Technology Incubation," (2023), 1.

<sup>20</sup> National Board for Technology Incubation, "Organogram of National Board for Technology Incubation," (2023), 1.

<sup>21</sup> National Board for Technology Incubation, "Organogram of National Board for Technology Incubation," (2023), 1.

Additionally, NBTI has service departments that support the effective administration of the TIP, including Administration & Human Resources, Information & Communication, Legal Services, Finance & Accounts, Audit, and Procurement. These directorates manage internal operations, ensuring proper oversight of human resources, finance, legal frameworks, and procurement. Each is led by a Director, assisted by Deputy Directors.<sup>22</sup>

NBTI decentralizes governance through zonal and operational directorates, including Procurement, Legal, ICT, Commercial, Operations, HR, Audit, and Finance. These departments support tech entrepreneurship, start-ups, and SMEs, driving innovation and economic growth in Nigeria.<sup>23</sup>

**Table 1: Summary of NBTI's Organisational Structure**

S/N	Position	Function
1	Governing Board	Provides strategic oversight and policy formulation
2	Director General/CEO	Oversees NBTI's operations and decision-making
3	Directorate of Finance & Accounts	Manages finances and maintains account records
4	Directorate of Planning, Research and Policy Analysis	Handles research, policy development, and international collaborations
5	Directorate of Post Incubation and Extension Services	Supports graduate enterprises and provides post-incubation support services
6	Directorate of Commercial	Facilitates technology transfer and commercialisation of R&Ds for value addition
7	Directorate of Administration and Human Resource Management	Manages administrative issues and provides human resource management
8	Directorate of Audit	Provides auditing services
9	Directorate of Operations	Supervises technology incubation activities at the Centres
10	ICT Directorate	Provides critical ICT support for the TIP
11	Directorate of Legal Services	Provides legal support services
12	Directorate of Procurement	Provides critical procurement support services
13	Six Zonal Directorates	Supervise zonal technology incubation centres across the six geo-political zones

Source: NBTI Official Records, 2023

<sup>22</sup> National Board for Technology Incubation, "Organogram of National Board for Technology Incubation," (2023), 1.

<sup>23</sup> National Board for Technology Incubation, "Organogram of National Board for Technology Incubation," (2023), 1.

### Funding Sources of the National Board for Technology Incubation (NBTI)

The primary source of funding for NBTI is the statutory budgetary appropriation from the Federal Government of Nigeria. The allocation is divided into three major categories which are: Capital Budget, Personnel Budget and Overhead Budget.<sup>24</sup>

#### Capital Budget

The capital budget covers infrastructure development, procurement of equipment, and funding for the commercialisation of research and other technology incubation projects. Below is a summary of capital budget allocations from 2009 to 2022:

**Table 2: Capital Budget Appropriations and Releases (2009-2022) (Naira)<sup>25</sup>**

S/N	Year	Amount Appropriated	Amount Released
1	2009	701,813,467.50	701,813,467.50
2	2010	1,851,852,000.00	480,493,000.00
3	2011	80,294,867.00	80,294,867.00
4	2012	454,672,426.00	220,413,934.00
5	2013	351,410,244.00	139,171,267.00
6	2014	760,316,689.00	283,894,262.00
7	2015	275,000,000.00	137,477,507.50
8	2016	983,011,827.00	366,561,826.52
9	2017	1,007,080,098.66	1,003,540,049.53
10	2018	1,771,693,711.00	1,391,040,609.40
11	2019	1,049,683,895.00	425,108,607.39
12	2020	432,443,298.40	432,443,298.40
13	2021	1,396,404,791.00	1,396,404,791.00
14	2022	2,451,224,693.68	2,174,168,379.01

<sup>24</sup> National Board for Technology Incubation, "Funding Source Capital," (2023), 1-5.

<sup>25</sup> National Board for Technology Incubation, "Funding Source Capital," (2023), 3.

### Personnel Budget

This budget covers salaries, benefits, and other entitlements for employees.<sup>26</sup>

**Table 3: Personnel Budget Appropriations and Releases (2009-2022) (Naira)<sup>27</sup>**

S/N	Year	Amount Appropriated	Amount Released
1	2009	80,803,898.81	80,803,898.81
2	2010	94,816,253.98	94,816,253.98
3	2011	107,999,789.00	107,999,789.00
4	2012	163,505,996.00	163,505,996.00
5	2013	181,979,416.00	181,979,416.00
6	2014	193,070,881.00	193,070,881.00
7	2015	222,055,537.00	221,862,949.98
8	2016	207,621,927.00	207,621,927.00
9	2017	228,358,035.00	228,358,035.00
10	2018	289,942,815.00	228,809,744.67
11	2019	300,485,953.00	276,561,771.64
12	2020	2,327,256,367.00	2,327,256,367.00
13	2021	2,512,013,530.00	2,512,013,530.00
14	2022	3,866,286,685.15	2,069,585,614.16

### Overhead Budget

The overhead budget covers administrative costs such as office supplies, utilities, training and maintenance.<sup>28</sup>

<sup>26</sup> National Board for Technology Incubation, "Funding Source Capital," (2023), 1-5.

<sup>27</sup> National Board for Technology Incubation, "Funding Source Capital," (2023), 4.

<sup>28</sup> National Board for Technology Incubation, "Funding Source Capital," (2023), 1-5.

**Table 4: Overhead Budget Appropriations and Releases (2019-2022) (Naira)<sup>29</sup>**

S/N	Year	Amount Appropriated	Amount Released
1	2019	68,815,355.00	44,926,903.36
2	2020	47,901,476.85	47,901,476.85
3	2021	78,815,348.75	78,815,348.75
4	2022	347,405,510.04	202,653,214.19

The figures highlight insufficient federal funding for the program to fully achieve its mandate, making it essential for NBTI to seek alternative sources for sustainability. Consistent and adequate funding is vital to strengthening its impact on innovation and entrepreneurship in Nigeria.<sup>30</sup>

### **National Board for Technology Incubation and Technological Incubation Centres in Nigeria**

Countries increasingly leverage technological innovation to drive industrialisation, boost economic growth, and tackle social challenges. In Nigeria, the National Board for Technology Incubation (NBTI) fosters technological entrepreneurship through its network of Technology Incubation Centres (TICs), focusing on commercialising indigenous technologies and innovations. TICs create a supportive environment for start-ups to develop products and scale operations. Beyond providing offices, labs, and workshops, they offer networking, funding access, and mentorship. By mitigating risks associated with launching innovative businesses, these centres help entrepreneurs overcome challenges like limited capital, inadequate infrastructure, and lack of business experience.<sup>31</sup> Nigeria has become a hub for entrepreneurial activities, hosting numerous start-up incubators and accelerators that cater to the diverse needs of the Country's start-up ecosystem. Some of these include:

1. **Co-Creation Hub (CcHUB):** Leadership has been instrumental in this growth, particularly with pioneering organisations like the Co-Creation Hub (CcHUB) in Yaba, Lagos, which actively supports Nigeria's technology community through its incubation programmes. CcHUB's Pre-Incubation programme, a six-month initiative, empowers entrepreneurs to develop tech solutions for tackling societal challenges. Additionally, through its 12-month Incubation programme, start-ups receive up to \$25,000 and complimentary office space.<sup>32</sup> CcHUB's Accelerators also provide 12-week programmes designed to help start-ups achieve sustained growth.<sup>33</sup>

<sup>29</sup> National Board for Technology Incubation, "Funding Source Capital," (2023), 5.

<sup>30</sup> National Board for Technology Incubation, "Funding Source Capital," (2023), 1-5.

<sup>31</sup> Techpoint, "23 start-up incubators and accelerators in Nigeria that can help you grow your business," Accessed June 15, 2024. <https://techpoint.africa/2023/04/14/start-up-incubators-and-accelerators-in-Nigeria/>.

<sup>32</sup> Techpoint, "23 start-up incubators and accelerators in Nigeria that can help you grow your business," Accessed June 15, 2024. <https://techpoint.africa/2023/04/14/start-up-incubators-and-accelerators-in-Nigeria/>.

<sup>33</sup> Techpoint, "23 start-up incubators and accelerators in Nigeria that can help you grow your business," Accessed June 15, 2024. <https://techpoint.africa/2023/04/14/start-up-incubators-and-accelerators-in-Nigeria/>.

## 2. Wennovation Hub

Wennovation Hub, an innovation accelerator with over a decade of experience, is a force in Nigeria's start-up ecosystem, driven by leadership dedicated to empowering emerging entrepreneurs. The hub has been instrumental in helping numerous start-ups achieve success and in providing tech support to both new and established businesses. With office spaces equipped to expand business ideas across several Nigerian cities, including Ikeja, Abuja, and Ibadan, and even extending to Barbados, Wennovation Hub provides an enabling environment for innovation.<sup>34</sup>

### Greenhouse Capital

Greenhouse Capital, another key player, connects start-ups, corporates, and investors to advance innovation in Africa. Focused primarily on fintech and fintech-enabled ventures, Greenhouse Capital's leadership collaborates with corporate partners to deliver accelerator programmes that rapidly balance businesses. The platform invests in promising founders with vision and resilience in the fintech and fintech-enabled space, having hosted 10 accelerator programmes to date.<sup>35</sup>

### MEST Africa

Another incubation centre that provides incubation for digital businesses across Africa through a robust network of hubs and a specialised technology entrepreneurship training programme is MEST Africa. Founded in Ghana in 2008, MEST Africa's initiative comprises three core components: an Incubation and Seed Fund, a one-year entrepreneurial training programme, and an annual training programme for Entrepreneurs-in-Training. This approach aims to equip successful candidates with full support and initial financing to scale their businesses across African markets. Through hubs in Lagos, Accra, Nairobi, and Cape Town, MEST Africa makes available funding, skill development, and relevant assistance to Africa's tech entrepreneurs.<sup>36</sup>

Other notable Incubation Centres in Nigeria are Enspire, Venture Garden Group, Itanna (an initiative led by the Honeywell Group), Google for Start-ups Accelerator Africa (a virtual programme designed for high-potential Seed to Series A tech start-ups across the African continent), Start-up Wise Guys (a global organization that encourages innovation by providing guidance, mentorship, and investment of up to €65,000 for up to 12% equity), Seedstars (a global corporation focused on emerging and frontier markets, runs an acceleration

<sup>34</sup> Techpoint, "23 start-up incubators and accelerators in Nigeria that can help you grow your business," Accessed June 15, 2024. <https://techpoint.africa/2023/04/14/start-up-incubators-and-accelerators-in-Nigeria/>.

<sup>35</sup> Techpoint, "23 start-up incubators and accelerators in Nigeria that can help you grow your business," Accessed June 15, 2024. <https://techpoint.africa/2023/04/14/start-up-incubators-and-accelerators-in-Nigeria/>.

<sup>36</sup> Techpoint, "23 start-up incubators and accelerators in Nigeria that can help you grow your business," Accessed June 15, 2024. <https://techpoint.africa/2023/04/14/start-up-incubators-and-accelerators-in-Nigeria/>.

programme designed to support start-ups in reaching these reasonable milestones), FasterCapital (an international internet incubator that aids Nigerian companies by providing needed support in fundraising, technical advice, and business development).<sup>37</sup>

### **Impact of Technology Incubation Centres (TICs) on the Commercialisation of Research and Development (R&D) in Nigeria**

TICs transform innovative research into marketable products for businesses. These centres act as connectors between academic institutions and industries, strategically concentrating on the promotion of entrepreneurship, innovation, and economic transformation. Some of the impact of Technology Incubation Centres on the commercialisation of Research and Development in Nigeria are:

#### **a) Job Creation through the Commercialisation of Research**

One of the most evident and direct impacts of Technology Incubation Centres in Nigeria is job creation. Technology Incubation Centres (TICs) achieve this by transforming research outcomes into economically viable products. Under the leadership of the National Board for Technology Incubation (NBTI), TICs support businesses and entrepreneurship, enabling companies to grow and in turn, strengthening the national economy while creating job opportunities. For instance, the NBTI has supported over 3,000 businesses, leading to the creation of thousands of jobs across various sectors.<sup>38</sup> This has contributed to the reduction of unemployment.

After graduating from technology incubation centres, many start-ups experience growth, which translates into increased employment in areas such as marketing, production, and services. The commercialisation of research and development that would otherwise remain dormant serves as the foundation for new ventures, particularly in sectors like information technology, biotechnology, and agriculture. Clarice Chijioke, the Zonal Director of the South-East Zonal Office in Nnewi and former Centre Manager at TIC in Owerri, emphasises this impact by stating, "Our innovation initiatives have created about ten thousand (10,000) jobs, with more than 20 research institutions partnering in the South East Zone of Nigeria." This leadership in nurturing collaboration and innovation is very important when we talk about driving economic development in the region."<sup>39</sup> The commercialisation of agricultural research in food processing technology, which employs a significant number of people in both rural and urban areas, is one such example. The ripple effect of these businesses further stimulates job

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<sup>37</sup> Olugbenga Olufemi, 50+, Zonal Director South West Zonal Office of the National Board for Technology Incubation (TIC), Lagos and a former Centre Manager of several Centres, Lagos, 11 September, 2024.

<sup>38</sup> Babarinde Adeyemi, 40+, An Entrepreneur at TIC Lagos and a University Lecturer at University of Lagos; Lagos, September 11, 2024.

<sup>39</sup> Clarice Chijioke, 50+, Zonal Director South-East Zonal Office, Nnewi, and former Centre Manager TIC Owerri, Nnewi, 5 September, 2024.

creation in related sectors. According to Babarinde Adeyemi, an entrepreneur at TIC Lagos;

The impact of NBTI has been robust, providing essential spaces for entrepreneurs to establish their businesses, thereby driving job creation and economic development. This support has contributed to the growth of my business and in my very humble opinion to the commercialisation of research and development in Nigeria. I have seen this gesture inspire other entrepreneurs to start their businesses. It facilitates entrepreneurial growth and innovation.<sup>40</sup>

**b) Product Diversification**

A key impact of Technology Incubation Centres (TICs) on the commercialisation of research and development in Nigeria is their role in driving product diversification. Under the leadership and guidance of TICs, entrepreneurs receive assistance in refining and developing innovative products that utilize local raw materials and research findings. This support transforms initial research ideas into commercially viable products aligned with market needs. Chuks Dike Aninye, founder of Dyke Havens Limited, illustrates how TICs empower entrepreneurs to turn research into diverse, market-ready products, demonstrating the leadership role of TICs in the improvement of innovation and economic growth.<sup>41</sup> Chuks Dike Aninye's journey into product diversification began with a single raw material: the tigernuts, a versatile tuber recognised in Nigeria for its nutritional and economic benefits. His experience highlights the strategic leadership role TICs play in helping entrepreneurs maximize the potential of a single commodity through research and innovation. Initially focused on extracting oil from tigernuts, Aninye's project evolved into a unique business model with support from the National Board for Technology Incubation (NBTI). He reflects on how TIC guidance transformed his idea into a robust, diversified venture.

At Dyke Havens Limited, we extract the oil contents of the tigernuts and convert them into flakes. The coarsest part we sell as animal feeds. After that research, I was linked to Alhaji Shittu, who asked me to go to Lagos, and that was how I got into NBTI.<sup>42</sup> This explains the leadership role of Technology Incubation Centres (TICs) in connecting entrepreneurs with mentors, potential investors, and extensive networks essential for scaling research innovations into successful business ventures. After joining the NBTI incubation system, Aninye's research efforts expanded, resulting in three distinct products: tigernuts oil, tigernuts flakes, and animal feeds. This transformation exemplifies the powerful impact of

<sup>40</sup> Babarinde Adeyemi, 40+, An Entrepreneur at TIC Lagos and a University Lecturer at University of Lagos; Lagos, September 11, 2024.

<sup>41</sup> Chuks Dike Aninye, 30+, An Entrepreneur at TIC Lagos and Managing Director of Dyke Havens Nig Limited, Lagos, Lagos, 11 September, 2024.

<sup>42</sup> Chuks Dike Aninye, 30+, An Entrepreneur at TIC Lagos and Managing Director of Dyke Havens Nig Limited, Lagos, Lagos, 11 September, 2024.

commercialising research. What started as an initiative dedicated to oil extraction from tigernuts evolved into a diversified portfolio which in turn maximised the commercial potential of the entire tuber. As Aninye explains:

...I have been with the National Board for Technology Incubation (NBTI) for about 6 months. We produce three (3) different products which are tigernuts oil, tigernuts flakes, and animal feeds. These three (3) products have been of great importance to the company and the community as well.<sup>43</sup>

This demonstrates the leadership-driven efficiency and responsiveness of the TIC system in assisting entrepreneurs to commercialise their research swiftly and effectively. The product diversification inspired by TICs benefits individual entrepreneurs and contributes immensely to Nigeria's economic resilience. With NBTI's guidance, entrepreneurs like Aninye can diversify products, which strengthens the economy against market fluctuations. TICs facilitate research-based product diversification. They enable entrepreneurs to tackle the challenges of commercialisation, spanning product development through to market entry. They do this by putting in place physical spaces, technical support, and mentorship. TICs reduce the typically high start-up costs and associated risks for research-based ventures. This support extends beyond individual businesses, as scaling operations leads to job creation and income generation across various sectors.<sup>44</sup> For instance, in the case of Dyke Havens Limited, the production of tigernuts oil, flakes, and animal feeds does not only contribute to food processing but also animal husbandry, thereby stimulating growth in multiple sectors and ensuring food in the Country. Moreover, the value-added approach aligns with Nigeria's goal of reducing dependence on raw material exports and promoting local processing industries, which can compete in both local and international markets. TICs, through their structured support systems, encourage product diversification by enabling entrepreneurs to fully explore the potential of raw materials through research and innovation.

### c) **Support for Small and Medium Enterprises (SMEs)**

Small and medium-sized enterprises (SMEs) form the backbone of the Nigerian economy, and Technology Incubation Centres (TICs), under good leadership, ensure the growth of tech-based SMEs.<sup>45</sup> TICs provide SMEs with indispensable resources like market access, financial backing, mentorship, and infrastructure, which are essential in

<sup>43</sup> Chuks Dike Aninye, 30+, An Entrepreneur at TIC Lagos and Managing Director of Dyke Havens Nig Limited, Lagos, Lagos, 11 September, 2024.

<sup>44</sup> Jide Fawawowe, 50+, Assistant Director, and former Centre Manager, Technology Incubation Centre (TIC) Lagos; Lagos, 11 September, 2024.

<sup>45</sup> A. Adeoye and S. Elegbede, "The Impact of SME Desks in Nigerian Commercial Banks," *African Journal of Economic Studies*, Vol. 11, No. 3, (2020).

overcoming the common barriers to starting and scaling up a business.<sup>46</sup> TICs create a long-lasting impact by equipping SMEs to be competitive and sustainable in both local and global markets. In 2021, TIC-supported SMEs achieved a 20% increase in total revenue.<sup>47</sup> This was a major boost to Nigeria's Gross Domestic Product (GDP).<sup>48</sup>

**d) Promotion of Collaboration between Research Institutions and Industry**

Technology Incubation Centres encourage collaboration between academic research institutions and the private sector, ensuring that research outputs are both academically robust and commercially viable. This is achieved through a strategic approach; therefore, TICs bridge the gap between research and industry, identifying commercial potential within academic innovations.<sup>49</sup> For instance, the partnership between the National Board for Technology Incubation (NBTI) and Olabisi Onabanjo University (OOU) led to the establishment of a TIC on campus, setting a benchmark for other academic institutions in Nigeria. This Centre holds immense potential to advance R&D outputs across fields such as engineering, biotechnology, and ICT, creating a steady stream of innovations ready for commercialisation. Mr. Aninye, an entrepreneur who benefited from this model, highlighted the impact, stating that:

...It encourages collaboration between entrepreneurs, for example, my tigernuts can be used for cosmetics and food production. It has vitamin E. Some cosmetic entrepreneurs come to us for our products to use to develop theirs. This is how TIC has helped collaboration or unity among entrepreneurs.<sup>50</sup>

**e) Reduction of Dependence on Imported Technology**

Technology Incubation Centres (TICs) in Nigeria have been instrumental in decreasing the Country's dependence on imported technology by actively promoting local innovation and the commercialisation of indigenous research. This focus is especially significant in critical sectors such as agriculture, health and energy, where tailored solutions can effectively address Nigeria's specific challenges. This is achieved through purposeful leadership and strategic initiatives. TICs prioritise the development of homegrown technologies, enhancing the self-sufficiency of the Nigerian economy and minimising the foreign exchange spent on technology imports. This commitment empowers local entrepreneurs and bolsters the overall economic resilience of the

<sup>46</sup> A. Adeoye and S. Elegbede, "The Impact of SME Desks in Nigerian Commercial Banks," 29.

<sup>47</sup> Mohammed Jibrin, 50+, Interview with former DG/CEO NBTI (2005-2013), Abuja, 22 September, 2024; National Bureau of Statistics, Accessed 22 September, 2024, <https://nigerianstat.gov.ng/elibrary/read/1241460>.

<sup>48</sup> Mohammed Jibrin, 50+, Interview with former DG/CEO NBTI (2005-2013), Abuja, 22 September, 2024; National Bureau of Statistics, Accessed 22 September, 2024, <https://nigerianstat.gov.ng/elibrary/read/1241460>.

<sup>49</sup> Nura Manzo, 50+, Centre Manager Technology Incubation Centre Katsina under the North West Zonal office of the National Board for Technology Incubation, Nnewi, 5 September, 2024.

<sup>50</sup> Chuks Dike Aninye, 30+, An Entrepreneur at TIC Lagos and Managing Director of Dyke Havens Nig Limited, Lagos, Lagos, 11 September, 2024.

Nation.<sup>51</sup> For instance, innovations in renewable energy technologies, developed and commercialised within Nigerian TICs, have provided cost-effective solutions for rural electrification. This alone reduces the need for imported power equipment. This shift towards indigenous technology solutions has improved local capacity and boosted the growth of the local manufacturing sector.<sup>52</sup> In this regard, Babarinde Adeyemi highlights the importance of the promotion of indigenous-made goods by sharing an experience from his company. He states that:

To contribute to our quota of ensuring that local goods are prioritized in Nigeria, our company started with the production of 1 ton of Ofada rice weekly. We have evolved by producing what I will call the imported version of rice, the parboiled rice. I can say the level we are is at the production of a high standard of rice. We have also scaled up from 1 ton to about 30 tons every week; which I consider to be a huge development.<sup>53</sup>

**f) Investment in the Tech Ecosystem**

Finally, it requires TICs intervention as the source of mobilising capital to Nigeria's digital market.<sup>54</sup> The numerous start-up incubators along with providing a framework to the incubators that aids their growth assist TICs in attracting huge investment from domestic as well as foreign investors. This drives enhancements to the advancement of individual firms together with the general reinforcement and diversification of the overall information technology sector. The existence of strong TICs remains a solid ground that facilitates the environment that will prompt sustainable growth as well as investor confidence.<sup>55</sup> Subsequently, having obtained their initial support from TICs, Nigerian businesspeople have received momentous venture capital investments, such as those by Future Hub and Adaverse. These investments have contributed greatly to the growth of Nigeria's technology industry.<sup>56</sup>

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<sup>51</sup> Mohammed Jibrin, 50+, Interview with former DG/CEO NBTI (2005-2013), Abuja, 22 September, 2024.

<sup>52</sup> Babarinde Adeyemi, 40+, An Entrepreneur at TIC Lagos and a University Lecturer at University of Lagos; Lagos, September 11, 2024.

<sup>53</sup> Babarinde Adeyemi, 40+, An Entrepreneur at TIC Lagos and a University Lecturer at University of Lagos; Lagos, September 11, 2024.

<sup>54</sup> Sunday Aphaji, 50+, Entrepreneur of TIC Jos and Managing Director of Spectral Smt Nig Limited, Jos, 1 May, 2024.

<sup>55</sup> Tukura Zakaria, 50+, Zonal Director, North Central Zone Minna and a former Centre Manager of several Centres; Minna, 5 July, 2024.

<sup>56</sup> Okwy Ohagwa, 50+, An Entrepreneur of TIC Minna, Managing Director Of Ates Ventures Nig Limited and a University Lecturer of FUT, Minna, Minna, 5 July, 2024; Godspower Osefaboro, 50+, Entrepreneur TIC Warri and MD Dunamis Environmental Service Coy Nig Limited, Warri, 8 February, 2024; Emmanuel Tonbra, 50+, An Entrepreneur TIC Benin, Benin, 25 May, 2024.

**Table 4: Technological Innovations, Impact, and Commercialisation Estimates in Nigeria**

S/N	Institution/Technology	Impact	Estimated Cost of Commercialisation	Comments
1	Babarinde Adeyemi's Rice Production	Scaled production from 1 ton to 30 tons weekly	Approximately \$100,000 initial investment	Emphasis on local rice production and quality.
2	Dyke Havens Limited (Tigernut Products)	Product diversification into oil, flakes, and feeds	Approximately 50,000 to 100,000	Expanded from oil extraction to multiple products.
3	Future Hub and Adaverse	Attracted significant venture capital investments	Millions in funding	Strengthened Nigeria's tech ecosystem.
4	Indigenous Renewable Energy Technologies	Reduced dependence on imported technology	Estimated \$200,000 for initial setup	Focus on local solutions for rural electrification.
5	NBTI-supported SMEs	Achieved a 20% increase in total revenue in 2021	Varies; the average SME startup costs \$10,000	Boost to Nigeria's GDP.
6	Technology Incubation Centres (TICs)	Supported over 3,000 businesses	Varies by sector	Job creation and economic growth.
7	TIC at Olabisi Onabanjo University	Enhanced collaboration between research and industry	Varies	An established benchmark for academic-industry partnerships.

This table summarises the various institutions and technologies involved in the commercialisation of research and development, highlighting their impacts and associated costs. It also reflects the role of TICs in Nigeria's economic setup.<sup>57</sup>

<sup>57</sup> Okwy Ohagwa, 50+, An Entrepreneur of TIC Minna, Managing Director Of Ates Ventures Nig Limited and a University Lecturer of FUT, Minna, Minna, 5 July, 2024; Godspower Osefaboro, 50+, Entrpreneur TIC Warri and MD Dunamis Environmental Service Coy Nig Limited, Warri, 8 February, 2024; Emmanuel Tonbra, 50+, An Entrepreneur TIC Benin, Benin, 25 May, 2024; Tukur Zakaria, 50+, Zonal Director, North Central Zone Minna and a former Centre Manager of several Centres; Minna, 5 July, 2024.

## **Challenges of Incubation Centres on the Commercialisation of Research and Development in Nigeria**

Nigerian research and development (R&D) has many obstacles in its commercialisation process, especially when technology incubation centres (TICs) are involved. Administrative challenges, inadequate finance, inadequate infrastructure and weak policy frameworks are the challenges discussed.

### **a. Administrative Challenges**

The bureaucratic processes involved in the commercialisation of R&D in Nigeria can be slow and cumbersome. TICs often have to navigate complex regulatory environments, including obtaining patents, securing licenses, and meeting various legal requirements. These processes can be time-consuming and costly, which discourages startups and innovators from pursuing commercialisation.<sup>58</sup> The administrative inefficiencies within government agencies and Technology Incubation Centres themselves slow down the commercialisation process. The lack of leadership and clear direction within the Ministry of Science and Technology is an underlying issue. This issue is highlighted by Gambo Laraba Abdullahi, who presents it as a leadership problem within the system. In her words:

Despite the fact that we had been given that responsibility, there was not strict adherence to the role of that particular organisation in the Federal Ministry of Science and Technology as a whole because many of the research institutes under science and technology were more or less trying to commercialise their research and to commercialise their research they only look at the benefits that may come, but to commercialise research is a very big project when you look at the result.<sup>59</sup>

This statement explains the misalignment of roles between various institutions under the Federal Ministry of Science and Technology. TICs are mandated to support the commercialisation of research, yet many research institutes within the Ministry try to take on this task themselves without following a structured process. This overlap in roles creates inefficiency and hinders the proper development of a coordinated commercialisation strategy. The absence of strict adherence to defined roles within the ministry has caused research commercialisation efforts to be fragmented, with various entities.<sup>60</sup>

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<sup>58</sup> Emmanuel Tonbra, 50+, An Entrepreneur TIC Benin, Benin, 25 May, 2024.

<sup>59</sup> Laraba Abdullahi Gambo, 50+, former DG/CEO NBTI (2005-2013), Abuja, 21 September, 2024.

<sup>60</sup> Laraba Abdullahi Gambo, 50+, former DG/CEO NBTI (2005-2013), Abuja, 21 September, 2024.

### **b. Inadequate Funding**

The second challenge of Technology Incubation Centres in Nigeria is the lack of adequate funding. R&D activities are capital-intensive and turning innovations into market-ready products requires financial investment.<sup>61</sup> In many instances, TICs in Nigeria rely on government funding, which is often insufficient or delayed.<sup>62</sup> Without consistent financial backing, these centres struggle to support innovators in the development and scaling of their ideas. This lack of funding limits their ability to provide necessary resources such as prototyping equipment, testing facilities and other relevant infrastructure that startups need to thrive. Private sector investment in R&D commercialisation in Nigeria remains relatively low.<sup>63</sup> Venture capital and private equity firms, which are key features in the commercialisation of innovations in other parts of the world are not as prevalent in the Nigerian context.<sup>64</sup> This creates a vacuum, where many promising innovations are unable to move beyond the research phase due to financial constraints.

To resolve this issue, it is crucial to expand funding sources for technology incubation centres by engaging various levels of government and exploring partnerships, grants, venture incentives, and other stakeholder contributions. Additionally, strengthening government involvement through shared infrastructure and promoting crowdfunding opportunities are viable strategies. Establishing a strong network and mentorship programs that connect innovative startups with investors can ensure a steady flow of funds for sustainable growth. Furthermore, a portion of the commercialized technology should be remitted to NBTI as a requirement for their support.

### **c. Poor Infrastructure**

Infrastructure is another barrier to the effective operation of technology incubation centres in Nigeria. Many TICs lack access to modern facilities, equipment, and technologies required for the development of innovative products. For instance, laboratories may be outdated, or there may be a shortage of tools needed for high-tech prototyping, testing, and product development. This makes it difficult for innovators to refine their products and services to meet market standards. Additionally, Nigeria's unreliable power supply is a considerable challenge for R&D activities. Constant power outages disrupt research processes and prolong the time it takes to

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<sup>61</sup> Laraba Abdullahi Gambo, 50+, former DG/CEO NBTI (2005-2013), Abuja, 21 September, 2024; Abdurahman Akinyemi Balogun, 50+, Director Human Resource Management, NBTI, Abuja, 21 September, 2024; Hussaina Bakari, 50+, Director Operations, National Board for Technology Incubation NBTI, Abuja, 22 September, 2024; Olugbenga Olufemi, 50+, Zonal Director South West Zonal Office of the National Board for Technology Incubation (TIC), Lagos and a former Centre Manager of several Centres, Lagos, 11 September, 2024.

<sup>62</sup> Mohammed Jibrin, 50+, Interview with former DG/CEO NBTI (2005-2013), Abuja, 22 September, 2024.

<sup>63</sup> Mohammed Jibrin, 50+, Interview with former DG/CEO NBTI (2005-2013), Abuja, 22 September, 2024.

<sup>64</sup> Mohammed Jibrin, 50+, Interview with former DG/CEO NBTI (2005-2013), Abuja, 22 September, 2024.

bring innovations to market.<sup>65</sup> Without a stable infrastructure, technology incubation centres are unable to offer the conducive environment required for startups to succeed.

#### **d. Weak Policy Frameworks**

The policy landscape in Nigeria does not always support the commercialization of research and development (R&D). Although the government has made efforts to promote innovation through various initiatives, the regulatory frameworks governing intellectual property (IP), technology transfer, and innovation commercialization remain weak or poorly enforced. This lack of protection discourages investment in R&D, as innovators and investors face risks such as intellectual property theft and unfair competition. Additionally, the absence of strong incentives for R&D and innovation provides little motivation for private sector involvement in commercialising research. As a result, Technology Incubation Centres (TICs) in Nigeria struggle to create an environment conducive to attracting investment.

Government policies significantly shape R&D commercialization, particularly by influencing the entrepreneurial landscape. A recent example is the removal of the fuel subsidy by President Bola Ahmed Tinubu's administration, which has had widespread effects on businesses across the country. Entrepreneurs, especially those engaged in R&D commercialization, have experienced direct consequences, including rising transportation and utility costs, alongside broader economic challenges linked to the policy shift. As Aninye notes, *"The issue of subsidy removal by the government of President Bola Ahmed Tinubu has affected a great deal, but as entrepreneurs, we find ways to adapt to the situation."* This statement underscores the resilience of Nigerian entrepreneurs while also highlighting the additional challenges that government policies can impose on the commercialization process.

The subsidy removal has led to increased fuel prices, subsequently driving up transportation costs—a critical factor for businesses involved in R&D commercialization. Whether it is transporting raw materials, delivering finished products, or facilitating collaboration with partners, higher transportation expenses pose a significant burden. Additionally, rising utility costs, particularly electricity, present further challenges. Given that R&D processes often rely on extensive energy use for laboratories, manufacturing, and testing, escalating energy prices directly impact operational costs. These

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<sup>65</sup> Babarinde Adeyemi, 40+, An Entrepreneur at TIC Lagos and a University Lecturer at University of Lagos; Lagos, September 11, 2024; Chuks Dike Aninye, 30+, An Entrepreneur at TIC Lagos and Managing Director of Dyke Havens Nig Limited, Lagos, Lagos, 11 September, 2024; Godspower Osefaboro, 50+, Entrepreneur TIC Warri and MD Dunamis Environmental Service Coy Nig Limited, Warri, 8 February, 2024; Emmanuel Tonbra, 50+, An Entrepreneur TIC Benin, Benin, 25 May, 2024; Okwy Ohagwa, 50+, An Entrepreneur of TIC Minna, Managing Director Of Ates Ventures Nig Limited and a University Lecturer of FUT, Minna, Minna, 5 July, 2024.

increased expenses hinder businesses' ability to scale up and bring research-driven innovations to market.<sup>66</sup>

Beyond transportation and utility expenses, businesses also face economic challenges such as inflation and fluctuating exchange rates. These factors can hinder access to capital, disrupt the supply of materials, and impact overall profitability. For entrepreneurs operating within Technology Incubation Centres (TICs) or other R&D-driven organizations, these challenges can constrain innovation and delay the commercialization of new products.<sup>67</sup>

## **Conclusion**

The commercialization of research and development in Nigeria has been significantly influenced by technology incubators operated by the National Board for Technology Incubation (NBTI). Through the provision of essential resources and mentorship, NBTI has successfully supported hundreds of entrepreneurs in transforming innovative ideas into viable businesses. This, in turn, has driven economic growth and job creation across various industries. Technology Incubation Centres (TICs) play a crucial role in bridging the gap between research and the marketplace by providing the necessary support to convert research findings into commercially viable products and services. They foster collaboration between research institutions and entrepreneurs to maximize the potential of new technologies. In Nigeria, the incubation system championed by NBTI has played a vital role in advancing research commercialization for national development, demonstrating outstanding success.

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<sup>66</sup> Babarinde Adeyemi, 40+, An Entrepreneur at TIC Lagos and a University Lecturer at University of Lagos; Lagos, September 11, 2024.

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