

Bridging research commercialisation gaps in Nigerian universities: Problems and prospects¹Obiajunwa, O. and ²Okoroma, E.¹Hutzpa Consulting and Innovation Lab Ltd, AUST, KM 10, Umaru Musa Yar'Adua, Galadimawa, Abuja²Department of Agricultural Extension and Rural Development, University of Uyo, Uyo, Nigeria

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ABSTRACT

Research generates knowledge, fosters innovation, and offers evidence-based solutions to societal challenges. Unfortunately, in developing countries like Nigeria, research is largely confined to academic publications without real-world or industrial applications. The study explored the key problems hindering effective research commercialisation in Nigerian universities, the factors contributing to these gaps, and the prospects for addressing them. Data were collected using a structured questionnaire administered to 120 university researchers selected through a multistage sampling procedure. Data analysis was performed using frequency count, percentage, standard deviation and analysis of variance. The results indicated that 15% of the researchers had conducted up to 10 research projects within the last five years; however, none had succeeded in commercialising any of their outputs. The major factors contributing to this gap were lack of knowledge of commercialisation processes (40%), inadequate funding (13.3%), and limited institutional support (5%). A considerable commercialisation literacy deficit was also identified, as 45% of the researchers were unaware of whether their institution had an intellectual property (IP) policy, while 85% of those with access to such policies had never read them. Although the R4i training was described as impactful, only 1.7% of respondents reported initiating any commercialisation effort after the training. The study concludes that research commercialisation efforts in Nigerian universities remain low and recommends mainstreaming research commercialisation modules into research objectives.

Keywords: Research commercialisation, intellectual property, higher education, research for innovation (R4i).

INTRODUCTION

In today's innovation-driven global economy, universities are increasingly recognized not only as centers of knowledge creation but also as critical drivers of national development. Ozor *et al.*, (2025) in their note on imperatives of research and innovation considered such pathway a critical step towards societal and economic advancement through research commercialisation. Hence, they referred to the process of translating academic research into marketable products, services, or technologies that deliver real-world impact as research commercialisation, and those who engage in it as innovators. In high-performing innovation systems, this process is supported by dedicated structures such as technology transfer offices (TTOs), university-industry partnerships, innovation incubators, and responsive intellectual property (IP) frameworks (Etzkowitz & Leydesdorff, 2000; Siegel, Waldman, & Link, 2003; Mian *et al.*, 2016). These mechanisms help ensure that research outputs do not remain confined to academic journals but instead extend into industry, policy, and community applications.

In Nigeria, research activities are conducted across a mix of higher education institutions, research institutes, and government agencies, each with specific mandates. Universities play a dual role in teaching and knowledge creation, producing academic research across disciplines, while federal and state research institutes focus on applied research in areas such as agriculture, health, energy, and technology. Key organizations include the National Universities Commission (NUC), which oversees academic

standards and research policy in universities; the Nigerian Institute of Science and Technology (NIST), which supports technological research; and sector-specific bodies such as the Nigerian Institute for Oil Palm Research and the National Agricultural Research Institutes. These institutions are expected to generate knowledge, develop innovations, and provide evidence-based solutions to societal challenges, although the translation of research outputs into commercial or industrial applications has historically been limited.

Many advanced economies have institutionalized commercialisation as a deliberate strategy to enhance competitiveness. Universities in countries such as the United States of America, Germany, China, and the United Kingdom have embedded broader innovation ecosystems that encourage co-creation between academia, industry, government, and civil society. This integrated approach is well captured by the Quadruple Helix Model, which expands on earlier frameworks by explicitly including the role of civil society, media, culture, and citizens in shaping innovation outcomes (Carayannis & Campbell, 2009; Carayannis, Barth & Campbell, 2012). The model emphasizes that successful research commercialisation depends not only on the technical quality of research but also on active collaboration among universities, industry, government, and civil society, ensuring that research outputs are effectively translated into marketable products, services, or policy solutions.

The Nigerian research ecosystem remains underdeveloped in terms of commercialisation. While

university research output has steadily increased, particularly under the pressure to “publish or perish,” most studies remain locked within academic publications, disconnected from industry or public need (Adegbola, 2023). The prospects of transforming academic research into viable innovations or actionable policy solutions remain limited by a number of structural challenges such as low awareness of IP rights, inadequate commercialisation training, poor funding, weak university-industry links, and limited incentive structures for applied innovation (Ugonna & Onwualu, 2016, Egbetokun et al., 2017; Ayandibu, 2023). Even where IP policies exist, their utilization is alarmingly low, with most researchers unaware of how to protect or commercialise their outputs (Cece et al., 2022; Dreer, 2022). These challenges are further reinforced by Nigeria’s academic promotion system, which continues to prioritise publication volume over innovation outputs, reducing researchers’ incentives to engage in commercialisation or applied impact.

Efforts to address the commercialisation gap in Nigerian universities have included initiatives such as the Research for Innovation (R4i) training program, which is designed to strengthen the entrepreneurial, innovation, and commercialisation capacity of academic staff. Launched to equip researchers with practical skills in translating research outputs into marketable products and services, the program targets early- and mid-career academics across multiple disciplines. While participants often report increased awareness, interest, and motivation to commercialise their research, systemic limitations, including lack of institutional follow-up, inadequate infrastructure, and limited incentives, have constrained the translation of training into practical outcomes (Chung, Chen & Olson, 2021; Abonyi & Nwadike, 2023).

This commercialisation gap poses a significant challenge to Nigeria’s ambition of transforming into a knowledge-based economy, as outlined in the National Science, Technology and Innovation Policy and Vision of 2050. Without systemic reforms, universities risk remaining isolated from national development priorities and the broader innovation ecosystem. Despite growing policy attention, there is a notable lack of empirical data on how commercialisation mechanisms function in real-world settings, how researchers perceive and engage in commercialisation, and the measurable outcomes of capacity-building efforts like the R4i training program. Hence, the study generates evidence-based insights and actionable strategies for strengthening research commercialisation capacity in Nigerian universities through the following objectives:

- i. To examine the extent of lecturers’ engagement in research and commercialisation activities.

- ii. To identify the institutional, financial, and knowledge-related barriers that hinder commercialisation.
- iii. To determine the key factors contributing to the commercialisation gap, including lack of
- iv. knowledge of commercialisation processes, inadequate funding, and limited institutional support.
- v. To assess lecturers’ awareness and use of institutional IP policy frameworks.
- vi. To evaluate the influence of R4i training on researchers’ attitudes and readiness for commercialisation

THEORETICAL UNDERPINNING

Systemic constraints on innovation in Nigerian universities

Recent academic discourse underscores the persistence of structural, behavioural, and policy-related barriers that hinder the effective translation of academic research into market-ready solutions (Ukwuoma, Amade & Moghalu, 2021). These challenges not only constrain innovation output but also limit the strategic contributions of universities to development. Unfortunately the challenging situation is not merely operational but deeply embedded in the institutional and systemic fabric of the research ecosystem. Studies point to a complex interplay of factors shaping commercialisation outcomes, beginning with the structural conditions of universities. These include chronic underfunding, under-resourced laboratories, outdated research facilities, and the absence of commercialisation infrastructure such as Technology Transfer Offices (TTOs), incubators, and innovation hubs, all of which create a weak foundation for translating research into practical outcomes (Ukwuoma et al., 2021; Omobhude & Chen, 2019). Even when research holds clear market potential, it often fails to move beyond publication due to the lack of institutional mechanisms that supports commercialisation. These gaps are compounded by limited access to innovation financing. Most research is still funded through public subventions and donor grants rather than strategic industry partnerships or competitive innovation funding (Abdulmalik, 2020).

Empirical evidence further validates these deficiencies. Fadeyi et al. (2019), in a cross-sectional study of Nigeria’s top ten universities, found that while resource endowments, such as the number of doctoral staff within the University’s TTO and the TTO’s membership in research consortia, are positively associated with commercialisation potential, actual outputs such as license execution and spin-offs remain low due to poor IP management, weak coordination, and limited institutional

incentives. These have shaped how academic researchers perceive and participate in research commercialisation. Many Nigerian academics lack commercialisation literacy and remain unfamiliar with processes such as intellectual property protection, licensing, and product development. Professional recognition remains closely tied to peer-reviewed publications and teaching, rather than innovation outputs, discouraging entrepreneurial engagement and reinforcing a culture of disengagement. Case studies have shown that weak researcher-industry communication, low entrepreneurial orientation, and limited awareness of commercialisation pathways continue to hinder progress, even where structural mechanisms exist (Ibeme, 2020).

Bridging these structural and cultural divides requires more than isolated interventions; it calls for a systemic recalibration of how research and innovation are governed and incentivised within universities. While studies such as Oboh & Okwilagwe (2017; Ibeme (2020); Okoroma *et al.* (2023); Okonji & Amuda (2023); Ozor *et al.* (2025) provide useful insight into university-industry linkages at the institutional level, their narrow focus leaves critical gaps in understanding the internal academic cultures and policy misalignments that sustain commercialisation inertia. Without a supportive policy environment that not only incentivizes innovation but also aligns university goals with national development priorities, efforts to strengthen commercialisation will remain fragmented. This underscores the need for coherent, cross-level policy frameworks that enable universities to evolve into dynamic hubs of innovation.

Research policy and implementation gaps: National realities and global lessons

In an effort to address persistent structural and behavioral challenges, policy-level interventions in Nigeria have increasingly focused on research commercialisation, though results remain uneven. National measures such as the adoption of the National Intellectual Property (IP) Policy, alongside institutional initiatives like the University of Ilorin's 2025 IP guidelines, reflect growing awareness of the need for clear and structured commercialisation pathways. Many institutions still lack internal policies that define IP ownership, licensing frameworks, or revenue-sharing arrangements (Oboh & Okwilagwe, 2017), thereby creating uncertainty and limiting research uptake among academic staff. A national-level analysis by the Committee of Vice-Chancellors of Nigerian Universities (CVCNU, 2022) found that fewer than 20 percent of Nigerian universities had functioning IP offices or commercialisation protocols aligned with national standards. Even where some university and industry engagement exist, such as staff training, consultancy, or recruitment collaborations, these activities rarely mature into robust innovation

pipelines due to the absence of coherent commercialisation strategies and supportive institutional systems (Uzonwune & Kpee, 2023).

Building on these early efforts, recent initiatives by the National Universities Commission (NUC) have begun to advance a more ecosystem-driven approach to university innovation. As Tsauni (2024) notes, the NUC is working to position innovation as a central pillar in university development through reforms that promote industry partnerships, curriculum redesign, and multi-institutional research consortia. Similarly, TETFund has expanded its support to include patentable research and prototype development (Echono and FUND, 2023), signaling a gradual move toward a more application-oriented research culture. These are promising steps, but their long-term impact will hinge on their sustained implementation, better coordination among stakeholders, and the creation of institutional mechanisms that actively incentivize commercialisation efforts within universities.

Given the ongoing gaps in Nigeria's implementation landscape, valuable lessons can be drawn from other developing countries that have made notable progress in this area. India's Council of Scientific and Industrial Research (CSIR) and South Africa's National Intellectual Property Management Office (NIPMO) offer compelling models. Both demonstrate how government incentives, well-equipped TTOs, and performance-linked funding can significantly improve commercialisation outcomes in public universities. These examples highlight the importance of national coherence, institutional readiness, and functional innovation ecosystems in turning academic research into market-ready products and services. Compared to these contexts, Nigeria's institutional conditions remain less developed, limiting the country's capacity to replicate similar successes. This contrast becomes especially clear when one considers how other countries have operationalized frameworks like the Triple Helix and Quadruple Helix to integrate universities, industry, government, and civil society into dynamic innovation systems.

Notably, while existing literature on research commercialisation in Nigerian universities provides useful theoretical frameworks and policy suggestions, a notable proportion of it remains largely conceptual. There is a noticeable scarcity of empirical studies that examine how commercialisation mechanisms are implemented in practice or why they fail within specific institutional contexts. This lack of grounded evidence has resulted in a fragmented understanding of how factors such as institutional structures, researcher behavior, and policy execution interact to influence commercialisation outcomes. Many studies treat universities as a uniform system, overlooking significant variations in governance structures, research capacity, and policy uptake across

institutions. This homogenized view limits the practical relevance of existing insights and constrains the development of context-sensitive interventions.

As a result, there is growing recognition among scholars and practitioners of the need for more localized researches that go beyond identifying general challenges. Such research should explore how commercialisation strategies can be adapted, scaled, or redesigned to reflect the realities of diverse institutional environments. Addressing these gaps is essential for moving from broad recommendations to actionable strategies that support effective and sustainable research-to-market pathways in Nigerian universities.

Ecosystem approaches to research commercialisation

In practice, efforts to adopt the Triple and Quadruple Helix models in Nigeria have resulted in mixed results. These frameworks, widely recognized for promoting innovation-led development, emphasize collaboration between universities, industry, government, and, in the case of the Quadruple Helix, civil society. However, their implementation in Nigeria has been hindered by persistent institutional weaknesses, fragmented policy environment, limited research funding, and low levels of trust among its key stakeholders (Momoh et al., 2021).

Despite these challenges, recent trends suggest growing alignment with global best practices. The emergence of university-based innovation hubs, science parks, and industry-funded research initiatives reflects a shift, although gradual, toward more collaborative models. In sectors such as agriculture, health, and ICT, joint university–industry projects are beginning to gain traction. For example, while the University of Lagos has institutionalized innovation through its Innovation and Technology Management Office, a recent case study revealed persistent operational barriers, including unstable funding, limited access to industry or angel investment, understaffing, slow patenting processes, and low trust from industry in local innovations (Okonji & Amuda, 2023). Similarly, Ofor-Douglas and Edu (2023) argue that these models can support broader development goals, including infrastructure growth, job creation, and strengthened university–industry linkages.

Nonetheless, key barriers persist. Misaligned stakeholder interests, weak governance structures, underfunding, and resistance to institutional reform continue to hinder the operationalization of Triple and Quadruple Helix frameworks. The Quadruple Helix model, which promotes the inclusion of civil society, cultural actors, and media, remains largely underdeveloped in the Nigerian context. Its practical integration into innovation ecosystems is yet to be meaningfully realized.

Overall, while the Triple and Quadruple Helix models offer valuable conceptual guidance for repositioning Nigerian universities as engines of innovation, their success depends on the development of enabling ecosystems. Deliberate policy support, sustained capacity building, and mechanisms for stakeholder alignment and trust-building are essential. Without these, the models will remain aspirational. Still, they serve as useful global benchmarks for the evolution of research commercialisation within Nigeria's innovation landscape.

Institutional enablers for effective research commercialisation

While systemic approaches like the Triple and Quadruple Helix offer valuable frameworks for fostering innovation, their success ultimately depends on the presence of well-equipped institutions. For commercialisation to move beyond isolated successes and become a sustained pathway for innovation, it must be supported by robust institutional mechanisms. Even with modest progress in adopting global frameworks, the absence of critical infrastructure continues to hinder full-scale implementation across Nigerian universities.

Studies highlight the vast potential of commercialisation as a revenue stream when adequately supported. Licensing agreements, royalties, and the sale of intellectual property rights can contribute to financial sustainability while enhancing global visibility (Uzonwune & Kpee, 2023). Moreover, industry-sponsored training programs, contract research, and consultancy services offer additional opportunities to build researcher capacity and strengthen institutional reputation.

However, these prospects remain largely underexploited due to weak foundational support systems. The lack of dedicated intellectual property advisory units limited legal expertise in technology transfer, and underdeveloped incubation environments constrain universities' ability to capitalize on research outputs (Abdulmalik, 2020). Empirical evidence from Nigerian universities shows that many Technology Transfer Offices, where they exist, operate with minimal staff, inadequate funding, and no structured incentive mechanisms to encourage researcher participation in commercialisation activities (Fadeyi, et al., 2019; Soyinbola, et al., 2024). A recent survey of business educators in three public universities in Rivers State found only moderate awareness of core intellectual property rights such as copyright and trademark, highlighting persistent knowledge gaps that limit the translation of academic outputs into market-ready innovations (Koko, Benibo, & Bupo, 2023). Without coherent policies, strategic investment, and sustained capacity-building, commercialisation efforts are unlikely to scale or deliver transformative outcomes.

This underscores the need for Nigerian universities to not only adopt global models of collaboration but also invest in the institutional architecture necessary to support innovation, including clear IP policies, functioning TTOs, staff training, and partnerships with legal and industry actors. Strengthening these internal capacities is essential for translating research into real-world applications and economic value.

METHODOLOGY

The study was carried out across selected institutions of higher learning in the six geopolitical zones of Nigeria. Descriptive survey research design was adopted to investigate the commercialisation practices, institutional support structures, and challenges encountered by academic researchers in Nigeria. This design was suitable for generating structured, quantifiable data across a diverse and geographically dispersed sample of higher education professionals. Respondents completed a structured questionnaire that elicited information on four key areas: research engagement levels, commercialisation activity, awareness and use of institutional intellectual property (IP) policies, and participation in commercialisation support programs such as the Research for Innovation (R4i) training initiative.

To ensure national representativeness and capture potential regional variation, data were collected from academic staff members selected from universities and polytechnics within Nigeria's six (6) geopolitical zones through multistage procedure. The study employed non-probability sampling due to the inaccessibility of population register of academic staff with over 20 research project supervision experience. In the absence of a sampling frame or known population, Creswell (2014) recommends that the study can conveniently adopt a sample size that is inclusive. Hence, the study adopts a sample size of 150, selected from all 6 geopolitical zones through a multistage procedure. In the first stage, two (2) Universities and two (2) Polytechnics were purposively selected from each of the six (6) zones

based on their high-ranking status. Secondly, from each of the selected institutions, academic staff members were stratified into senior lecturers and non-senior lecturers. The senior lecturers were further grouped into those who have supervised more than 20 research projects and those who have not. Finally, five (5) participants were randomly selected from the group of lecturers with more than 20 research supervision, which gives a total sample size of 120 participants. Frequency distribution and percentage scores were used to analyze data collected. Participants were acquainted with the objectives, focus, and potential benefits of the project.

RESULTS AND DISCUSSION

Lecturers' Research Engagement and Commercialisation Rates

Findings from the study reveal that a majority of the lecturers have conducted multiple research projects within the past five years. As presented in Table 1, 25 percent of respondents completed between 1–5 research projects, 20 percent conducted 11–15 projects, while 11.7 percent reported completing over 20 projects. However, 15 percent of the respondents had not undertaken any research projects during the period under review. The findings reveal a striking paradox; research activity is high yet result (Table 2) shows that over 80% are not privy to their institutions' intellectual property (IP) policies, indicating low engagement with research commercialisation frameworks. By implication, although many respondents had completed multiple research projects, some over twenty in the past five years, their unawareness of institutional IP policy potentially makes it difficult to successfully commercialise their work. This reflects a broader trend in Nigerian higher education where academic publishing, rather than innovation output, remains the dominant measure of researchers' productivity (Adegbola, 2023), signaling a misalignment between institutional priorities and national innovation goals.

Table 1: Number of Research Projects Completed

Number of Research Projects Completed	Frequency (n)	Percentage (%)
0 projects	18	15.0
1–5 projects	30	25.0
6–10 projects	18	15.0
11–15 projects	24	20.0
16–20 projects	16	13.3
Above 20 projects	14	11.7
Total	120	100.0

Source: Field survey data (2024)

Key barriers to research commercialisation

The study identified multiple factors constraining the commercialisation of research outputs among

university lecturers. As presented in Table 2, the most frequently cited barrier was limited commercialisation knowledge (40%), far exceeding all other categories. This was followed by insufficient funding (13.3%),

perceived low innovativeness of research outputs (10%), and inadequate institutional support (5%). Notably, 30% of respondents selected “other” barriers, indicating the presence of broader systemic or context-specific constraints not fully captured by the survey categories, while only 1.7% cited time limitations.

The barriers identified in this study help explain the research gap. The most frequently cited constraint was lack of commercialisation knowledge (40%), a finding that points not only to individual skill deficits but also to structural shortcomings in academic and institutional frameworks. Similar gaps have been reported by Awodiji, Ogbudinkpa, and Agharanya (2020), who noted that most Nigerian institutions fail

to integrate innovation management or entrepreneurship into research training. This suggests that without foundational knowledge of intellectual property, patenting, licensing, or venture-building, even prolific researchers are ill-equipped to pursue commercialisation pathways. Funding constraints also emerged as a significant challenge, with respondents highlighting the absence of accessible financing mechanisms such as seed funding, industry investment, or affordable loans that are essential for moving innovations from prototype to market. This reinforces prior findings that commercialisation ecosystems require not only knowledge but also targeted financial support to thrive.

Table 2: Distribution of respondents based on barriers to research commercialisation

Identified barrier	Frequency	Percentage (%)
Lack of knowledge/awareness	48	40.0
Lack of funding	16	13.3
Limited institutional support	6	5.0
Perceived low innovativeness	12	10.0
Time constraints	2	1.7
Others	36	30.0
Total	120	100

Source: Field survey data (2024)

Institutional intellectual property policies awareness

The study assessed respondents’ awareness and engagement with their institutions’ intellectual property (IP) policies. As shown in Table 3, 45% of lecturers were unsure whether such a policy existed in their institution, while 35% believed no policy was in place. Only 20% confirmed the presence of an established IP framework. These results point to a significant gap in both awareness and institutional communication, suggesting that even where policies exist, they may not be effectively disseminated or integrated into academic practice. For instance, nearly half of respondents (45%) were unsure whether their university had an intellectual property (IP) policy, and only 20% confirmed its existence. In terms of IP readership, 85% of the respondents indicated they had never read it, regardless of whether such a policy existed within their institution. This points to a generally low level of awareness and interaction with commercialisation governance structures in Nigerian

universities. Similar patterns of low IP policy awareness have been documented elsewhere in developing-country, where poorly implemented IP frameworks leave researchers without clear commercialisation pathways (Dreer, 2022; Cece et al., 2022). In contrast, Germany’s innovation ecosystem illustrates how coordinated institutional, policy, and financial mechanisms can support commercialisation readiness. Universities and dedicated startup hubs, such as those operating within the *Silicon Allee* model, integrate entrepreneurship education, targeted funding streams, and industry-linked incubation into their structures. At the national level, strategies actively address financing gaps through business angel networks, early-stage venture capital, and corporate venturing partnerships, ensuring innovators can move from prototype to market (Elabidine-Madi & Madi, 2024). This approach underscores the value of aligning education quality, research infrastructure, and policy incentives to translate innovation into high-value job creation and long-term economic growth.

Table 3: Distribution of respondents based on Institutional Intellectual Property Policies Awareness

Institutional IP Policy Awareness	Frequency	Percentage (%)
Unsure if their institution has an IP policy	54	45.0
Institution does not have an IP policy	42	35.0
Their institution has an IP policy	24	20.0
IP Policy Readership		
I have not read it,	102	85.0

Source: Field survey data (2024)

Implementation of Research for Impact (R4i) Training

Table 4 shows the extent respondents have stepped down the impact of R4i training programme they have received. From the result, majority (45.0%) of the respondents expressed improved awareness of IP policy and research commercialisation process only. This was followed by 23.7% who stated that they were yet to stepdown (“*Nothing yet but working on it*”) About 16.9% noted that the training had changed their teaching or supervisory approaches, while 8.5% stated they have further stepped down the training they received to colleagues. Others include 5.1% who indicated influencing the establishment of IP policies in their various institution, and 1.7% who initiated

commercialisation efforts. These findings indicate that while the R4i program has stimulated awareness and some behavioral shifts, most participants remain in the preliminary stages of applying the training outcomes.

The implication of a significant number reporting either no action or only preliminary steps, mirrors the findings by Chung et al. (2021) that training, such as the R4i training without sustained follow-up, mentorship, and incentives rarely produces lasting post training impact. Without such efforts followup, targeted reforms and leadership buy-in, Sule (2024) noted that even well-designed initiatives like R4i are likely to remain isolated successes rather than drivers of systemic transformation.

Table 4: Distribution of respondents based on the Implementation of R4i Training Impact

Outcome of Post-R4i Training	Frequency	Percentage (%)
Nothing yet but working on it	28	23.7
Altered teaching or supervisory approach	20	16.9
Conducted step-down training	10	8.5
Influenced establishment of IP policies	6	5.1
Started commercialisation activities	2	1.7
Expressed improved awareness of IP policy and research commercialisation process only	54	45.0
Total	120	100

Source: Field survey data (2024)

CONCLUSION AND RECOMMENDATIONS

The study concludes that though the participants engage in high research activity, most of them are not privy to their institutions’ intellectual property (IP) policies, indicating low inclination to engage in research commercialisation. Limited knowledge of research commercialisation was identified as the most constraining barrier to research commercialisation, far exceeding all other categories. Majority of the participants believed no IP policy is in place in their institution. In terms of the impact of participating in R4i most of the participants expressed improved awareness of IP policy and research commercialisation process after their participation. Although interventions like the R4i training program have sparked increased awareness around innovation and commercialisation, their long-term impact appears limited. Without sustained follow-up, institutional alignment, and concrete pathways to implementation, such initiatives are unlikely to shift behavior at scale. The findings of this study therefore reinforce the urgent need for universities to rethink their approach to research, not just as a pursuit of knowledge but as a driver of innovation and national development.

Hence, the study recommends the following:

1. Integration of Commercialisation Training into Research Curricula: To close the persistent knowledge gap, universities should formally integrate commercialisation modules into postgraduate programs and faculty development

initiatives. These modules should cover core areas such as intellectual property rights, technology transfer, licensing, and entrepreneurship. More than technical exposure, the training should promote a mindset shift, positioning commercialisation as a natural extension of the research process.

2. Stronger Institutional IP Policies and Enforcement: While policy formulation is important, meaningful impact depends on implementation. Universities must not only establish clear and context-appropriate intellectual property frameworks but also ensure that researchers engage with them. This requires ongoing faculty training, transparent ownership structures, and incentive mechanisms that reward policy compliance and utilization.

3. Financial Incentives and Funding Accessibility: One of the most significant barriers identified was lack of funding. Addressing this will require the establishment of competitive commercialisation grants, innovation seed funds, and university-managed venture capital pools. Strategic partnerships with industry and government can also open co-financing channels. Just as importantly, academic incentive systems must evolve to reward innovation outputs, such as patents, spin-offs, and social impact, alongside publications.

4. **Monitoring and Evaluation of R4i Program Impact:** The R4i training program has created awareness but risks becoming a standalone intervention. For long-term impact, universities should embed structured follow-up systems, such as mentorship, peer learning communities, and periodic outcome evaluations. Integrating R4i benchmarks into institutional policy frameworks would also ensure that commercialisation becomes a visible and supported performance goal.

5. **Establish and Empower Technology Transfer Offices (TTOs):** Functional TTOs are critical to bridging the gap between academic research and commercialisation. These offices should serve as internal support hubs, guiding faculty through patenting processes, licensing negotiations, and startup incubation. Beyond administrative capacity, TTOs should also cultivate external partnerships and act as innovation liaisons between academia, industry, and government.

6. **Reform of Academic Reward Structures:** Institutional promotion criteria must evolve to reflect a broader definition of academic excellence. Recognizing innovation outputs such as product development, community impact, policy engagement, and entrepreneurial ventures would encourage researchers to pursue work with wider societal relevance. Without this shift, the incentive to engage in commercialisation will remain weak.

7. **Strengthening the National Innovation Ecosystem:** Finally, universities do not operate in isolation. National agencies, funding bodies, and policy actors must support these institutional reforms through coordinated policy, aligned funding, and capacity-building efforts. A collaborative innovation ecosystem anchored in the Quadruple Helix model can thrive only when universities, industries, government, and civil society share a unified vision for research-driven development.

By pursuing these reforms, Nigerian universities can shift from being knowledge producers to becoming engines of innovation and development translating ideas into impact.

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