

PURE vs. APPLIED RESEARCH: A STRATEGIC PATH FOR NIGERIA'S SUSTAINABLE DEVELOPMENT

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Abstract: This paper examines the comparative significance of pure (basic) and applied research in addressing Nigeria's multifaceted development challenges. Research is a systematic tool for problem-solving and knowledge expansion, yet developing nations like Nigeria face a strategic dilemma: should limited resources prioritize foundational theory or immediate practical solutions? Grounded in a functionalist perspective, the article argues that while applied research is critical for tackling urgent national issues—unemployment, poor infrastructure, and public health crises—pure research serves as the indispensable bedrock of long-term scientific innovation, preventing intellectual and technological stagnation. The paper concludes that a balanced, synergistic integration of both research types is essential for Nigeria to achieve self-reliance, sustainable development, and global competitiveness. However, given the country's pressing socioeconomic realities, applied research currently offers the more strategic and pragmatic pathway.

Keywords: Applied research, pure research, functional education, sustainable development, Nigeria, educational administration.

1. INTRODUCTION

Research drives national progress. In education, it is seen as a tool for self-reliance and social reconstruction. Scientific research is the systematic, objective application of the scientific method to answer questions or solve societal problems (Peretomode & Peretomode, 2015). In a developing country like Nigeria—where educational development, technological innovation, healthcare delivery, agricultural productivity, and economic transformation remain pressing—both pure and applied research play crucial roles. Pure research expands scientific knowledge and theoretical frameworks that underpin innovation, while applied research offers practical strategies for addressing socioeconomic challenges.

Moreover, Nigerian universities, research institutes, and policy bodies face growing expectations to produce outputs that contribute both to global knowledge and to locally relevant solutions. Understanding the complementary roles of pure and applied research is therefore essential for strengthening Nigeria's research culture and promoting sustainable development. This paper examines those roles and makes a case for which type should be prioritized given the nation's daunting challenges.

2. CONCEPTUAL CLARIFICATION: PURE (BASIC) AND APPLIED RESEARCH

Pure (basic) research aims to expand knowledge and understanding without an immediate practical or commercial goal. It is exploratory, curiosity-driven, and focused on uncovering fundamental principles. As the Council (2005) notes, pure research lays the groundwork for future breakthroughs, even when those applications are not initially obvious.

Lorsch et al. (2024) describe pure research as building a “savings account” of scientific knowledge. Discoveries in quantum physics or relativity, for example, eventually led to lasers, transistors, MRI scanners, and GPS—technologies that are now indispensable. Without continued investment in fundamental “why” questions, the pipeline of ideas for applied research would dry up.

Applied research is problem-oriented. It takes existing theories and knowledge and applies them directly to specific, pressing issues in society. Its goal is to produce practical solutions, new products, processes, or services that improve daily life (Georgievski, 2020). Applied research also serves as a reality check for pure research; when problems arise in application, they often reveal gaps in fundamental understanding, sending researchers back to basic inquiry (Henard & McFadyen, 2005).

In essence: Pure research provides the long-term discoveries that define future centuries; applied research builds the bridge that makes those discoveries useful today. For Nigeria, the “high risk” and “long timeframe” of pure research make it vulnerable to budget cuts. Yet, as Lorsch et al. (2024) warn, failing to invest in this well means eventually having no new science to apply.

3. NIGERIA’S R&D GAP: CURRENT REALITIES VS. AN IDEAL INTEGRATED MODEL

Nigeria’s research and development (R&D) landscape shows a significant misalignment with the integrated model needed for sustainable development:

- i. *Research orientation*: ~85% applied, ~15% basic.
- ii. *Technology transfer*: ~60% applied, ~40% indigenous basic development.
- iii. *National R&D investment*: Only 0.22% of GDP, far below UNESCO’s recommended 1.0% or higher for developing nations.
- iv. *Funding access*: 42.98% of researchers report a complete lack of research funding (Igiri et al., 2021).

These indicators reveal a structural weakness. Nigeria’s R&D system is disproportionately oriented toward applied research that relies heavily on foreign-generated fundamental knowledge (Acharya & Pathak, 2021). This fosters instrumentalism where researchers merely adapt existing foreign technologies instead of generating homegrown innovations.

An ideal integrated model would demand sustained commitment to basic research, building indigenous intellectual property and reducing technological dependency. Without such a foundation, Nigeria cannot achieve revolutionary breakthroughs. The funding constraint worsens the imbalance: nearly 43% of researchers operate without dedicated funding (Igiri et al., 2021), pushing them toward low-cost, short-term applied projects and entrenching incrementalism rather than innovation.

Additionally, a critical institutional disconnect exists: key research institutes, where much applied work occurs, are excluded from TETFUND (Tertiary Education Trust Fund) access. This prevents effective partnerships with universities, where most basic research capacity resides, fragmenting the discovery-to-application cycle (Igiri et al., 2021).

4. KEY OBSTACLES TO RESEARCH DEVELOPMENT IN NIGERIA (2024–2026)

- a. *Insufficient funding*: In 2025, Nigeria allocated only ~6.7% of its national budget to education, well below UNESCO’s 15–25% benchmark.
- b. *Poor infrastructure*: About half of students in public institutions lack basic classroom furniture; internet access is unreliable in 65% of rural schools.
- c. *Talent emigration (brain drain)*: Low pay and poor facilities drive skilled researchers abroad.

d. *The “shelf” problem*: Much research never leaves academic libraries. As Fomunyam (2020) notes, when a Nigerian molecular biology professor is forced to abandon foundational research for clinical trials alone, the nation loses the discoveries that could make those trials successful.

e. *Disconnected R&D cycle*: Acharya and Pathak (2021) describe Nigeria’s R&D as often “broken”: failures in applied research seldom trigger new fundamental inquiries, instead generating more incremental, repetitive applied studies.

5. COMPARATIVE ANALYSIS: WHICH MODEL SUITS NIGERIA BETTER?

The Case for Applied Research

Applied research delivers immediate, tangible solutions. With over 20 million children out of school and youth unemployment at 33%, Nigeria urgently needs research that generates jobs and boosts short-term productivity. The 2026 National Research-to-Commercialization Policy reflects this priority by transforming publicly funded studies into marketable products.

The Case for Pure Research

Pure research is more challenging and intellectually demanding, venturing into uncharted territory. If Nigeria focuses exclusively on applied research, it risks becoming a long-term importer of foreign technology rather than an innovator. According to UNESCO Institute for Statistics 2026 R&D Data Release, “countries that rely on others for foundational scientific knowledge consistently due to limited research and development (R&D) funding, infrastructural gaps, or shortage of researchers, also face weakened competitive standing. Pure research acts as essential “seed corn”—without it, industrial growth and self-sufficiency cannot be sustained.

The Relevance of Both Types in a Developing Country

1. *Technological and industrial development*: Pure research lays theoretical groundwork; applied research transforms insights into tools and local solutions. This reduces import dependence and strengthens competitiveness. For example, studies on renewable energy (pure) inform solar-powered devices for rural communities (applied) (Daka, 2023).

2. *Education*: Pure research develops learning models and curriculum theories; applied research assesses interventions and policy execution. Cognitive development theories (pure) guide remedial programs (applied).

3. *Health*: Pure research advances understanding of disease mechanisms; applied research develops vaccines, public health initiatives, and policies. Basic epidemiological studies on malaria transmission, for instance, inform insecticide-treated net programs.

4. *Economic transformation*: Pure research contributes to theories of economic behavior and governance; applied research yields poverty-alleviation tools. Microfinance theory (pure) informs small-scale entrepreneur support programs (applied).

5. *Agriculture*: Applied research increases crop yields and reduces losses (e.g., genetically modified cowpea, solar-powered irrigation). However, without pure research into local soil properties or indigenous tuber genetics, solutions remain borrowed and less effective (Adelowo et al., 2016). Homegrown pure research enables transformative rather than merely incremental solutions (Acharya & Pathak, 2021).

Illustrative Case: 2026 National Research-to-Commercialization Policy

This policy launched in January 2026, directly confronts “shelf syndrome”, the long-standing pattern of thousands of researched studies sitting unused in archives. Although Nigeria produces 600,000 graduates and countless research documents annually, fewer than 5% become commercial products. The policy establishes a technology transfer framework, backed by a 2 billion Naira allocation for the Research, Innovation and Commercialization Committee (RICC) and an additional 3 billion Naira (₦3B ≈ \$4.5M USD) for operations. A 50 million Naira student venture capital fund encourages entrepreneurial thinking in universities. This policy demonstrates how deliberately applied research can drive economic expansion and ease labour market pressures.

6. A BALANCED AND INTEGRATED PERSPECTIVE

Rather than debating which type holds greater value, it is more productive to view pure and applied research as interdependent partners (Henard & McFadyen, 2005). Basic research generates the foundational knowledge that applied research depends upon. As Lorsch, Tabak, and Bertagnolli (2024) emphasize, sustained commitment to basic science is essential; without it, there would eventually be nothing ready for application.

A common analogy compares basic research to depositing into humanity's knowledge account, and applied research to withdrawing to solve problems. If a nation continuously withdraws without depositing new insights, the account runs dry (Lorsch et al., 2024). Nigeria cannot rely indefinitely on scientific capital generated elsewhere; it must also contribute its own discoveries (Igiri et al., 2021). Without deep fundamental understanding, applied research becomes mere incremental adjustment. Conversely, applied research enriches pure research by identifying new questions. In practice, the boundary between the two is often indistinct (Bentley et al., 2015).

But Which Is Preferred for Nigeria?

In developing countries, the question is deeply context-dependent. The savings-and-interest analogy is useful, but it overlooks a key reality: in a resource-poor nation like Nigeria, many people do not wait until they have saved enough to complete a house before laying the foundation. They begin with what they have, accepting that "Rome was not built in a day." Given Nigeria's socio-political instability, economic fragility, and urgent daily needs, applied research becomes the more strategic and ethically sound choice at this time (Okunlola, Sani, & Ayetigbo, 2025)

When resources are severely constrained and populations struggle for survival, research must first deliver tangible, implementable results. Applied research meets this requirement by translating established scientific principles into concrete interventions, policies, and innovations.

Agriculture: Despite strong academic research in soil science and crop improvement, few insights have reached farmers. The problem is not a lack of knowledge but the absence of effective translation mechanisms. Applied research emphasizes iterative, feedback-driven innovation, continuous dialogue between scientists and farmers, and tailoring of solutions to local conditions. It also incorporates value-chain considerations: storage, processing, market access, and harnesses emerging technologies (digital agriculture, precision farming) for low-resource environments (Nairametrics, 2014).

Health: Nigeria has produced substantial biomedical and epidemiological data on malaria, Lassa fever, etc., yet morbidity and mortality remain high. This reflects a systemic "translation failure" rooted in governance weaknesses, not just funding shortfalls. Despite the Abuja Declaration on Health where African Union (AU) member states pledged to allocate at least 15% of their annual national budget to improve the health sector (UNO, 2011), Nigeria allocates far less, and out-of-pocket spending dominates. Implementation science must become a permanent part of the national health research agenda, focusing on service delivery models, scaling interventions, and strengthening primary healthcare systems in order to be meaningful to the populace.

Energy: Nigerian researchers have produced extensive work on solar photovoltaics, biomass, and hybrid systems, but large-scale deployment remains limited. The real constraint is not knowledge generation but the institutional and policy environment—inconsistent regulations, weak financing, limited private sector engagement, and poor enforcement of energy policies.

Engineering and infrastructure: Applied research can focus on low-cost building materials from local resources, directly linking innovation to societal benefit.

Socio-political complexity: Applied social science research can generate context-specific solutions to ethnic and religious conflicts (e.g., pastoralist-farmer clashes in the Middle Belt), improve governance by identifying bureaucratic bottlenecks, and evaluate social welfare programs with actionable data.

Education and technology: Applied research tests teaching methods within Nigerian classrooms (e.g., radio-based math programs, vocational training paired with local tech firms) and fosters "frugal innovation" (mobile health apps, low-cost water purification). This builds the absorptive capacity; trained engineers, agronomists, policy analysts that eventually enables basic research to thrive (Baro et al., 2017).

7. CONCLUSION

For a country like Nigeria, facing urgent, tangible crises daily, applied research is not merely a favorable option; it is a strategic necessity and the most prudent use of limited resources. This approach offers concrete solutions that can:

1. Enhance food security, improved crop varieties and post-harvest storage.
2. Expand electricity access through decentralized energy systems.
3. Improve public health by providing affordable diagnostic tools.
4. Generate employment by using education aligned with market skills and homegrown innovation.
5. Foster social stability by data-driven conflict prevention.

By channeling intellectual and financial resources toward resolving today's most urgent challenges, Nigeria can build resilient institutions, reliable infrastructure, and a capable workforce. Over time, this foundation will create an environment where both basic and applied research can prosper side by side.

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