



# 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, as a systematic tool for problem-solving and knowledge expansion, is fundamental to societal progress. However, developing nations such as Nigeria face a persistent strategic dilemma: should limited resources prioritize foundational theory (pure research) or immediate, practical solutions (applied research)? Grounded in the functionalist perspective, this article argues that while applied research is critical for tackling urgent national bottlenecks, including 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 while essential for Nigeria to achieve self-reliance, sustainable development, and global competitiveness because of its utility, functionality and pragmatism, applied research is preferred.

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

## 1. Introduction

Research is the engine of national progress. In the field of education, it is viewed as an instrument for self-reliance and social reconstruction. Scientific research is the formal, thorough, controlled, systematic, and objective application of the scientific approach to finding answers to questions or solutions to societal problems in order to improve the quality of life (Peretomode and Peretomode, 2015). In a developing country such as Nigeria, where issues relating to educational development, technological innovation, healthcare delivery, agricultural productivity, and economic transformation remain pressing, the role of both pure and applied research cannot be overemphasized. Pure research contributes to the development of scientific knowledge and theoretical frameworks that underpin innovation, while applied research provides practical strategies for addressing the numerous socio-economic challenges confronting the nation.

Furthermore, universities, research institutes, and policy institutions in Nigeria are increasingly expected to generate research outputs that not only contribute to global knowledge but also provide locally relevant solutions to national development challenges. Consequently, understanding the relevance and complementary roles of pure and applied research is essential for strengthening Nigeria's research culture and promoting sustainable national development. It is against this background that this paper examines the relevance of pure and applied research in Nigeria and highlights their contributions to knowledge advancement, policy development, and Socio-economic transformation. It attempts to make a case for one that should be prioritized in light of the daunting challenges and problems.

## 2. Conceptual Clarification: Pure (Basic) Research

Pure research (also called basic research or fundamental research) is a type of research carried out to expand knowledge and understanding, without any immediate intention of solving a specific practical problem or producing a commercial application. We think of pure research as laying the groundwork for everything else. It is exploratory; it's about gaining new knowledge and theoretical understanding driven by the researcher's curiosity simply because we want to know, to truly understand the fundamental principles behind what we observe, without a particular application or looking for a specific product or solution in view (Council, 2005).

The real magic of pure research is how it sets the stage for future breakthroughs, even if those breakthroughs aren't obvious right away. It's like building up a huge savings account of scientific knowledge (Lorsch et al., 2024). For example, when scientists first explored the weirdness of quantum physics or relativity, they weren't thinking about iPhones or GPS. They were just curious. But these seemingly abstract discoveries eventually led to technologies we can't imagine living without today, like lasers, transistors (which power all our electronics), MRI scanners, and satellite navigation (Lorsch et al., 2024). These fundamental discoveries, often ignored by the public in their early stages, eventually bring huge, widespread benefits to society. As Lorsch et al., (2024) rightly stated, if we stop asking those fundamental "why" questions, the well of new ideas that applied research draws from, would eventually dry up.

Applied research, in the other hand, is problem-oriented. It involves taking existing theories and applying them directly to solve specific, pressing issues in society. Applied research is much more direct. It's all about "rolling up our sleeves" and using existing scientific knowledge to tackle specific, pressing problems that affect individuals, communities, or the world at large. Its main goal is to find practical solutions based on what science already knows (E.Hedrick et al., 1993).

By taking those theoretical findings, applied research turns them into real-world innovations that address our current needs and challenges. This process usually starts with identifying a problem, digging into why it's happening, and then developing solutions (Georgievski, 2020).

From the foregoing analysis, it can be seen that the results of applied research are all around us. It directly translates scientific understanding into things that improve our daily lives, like new products, processes, systems, and services that enhance health and overall well-being (Georgievski, 2020)

Applied research also acts as a crucial reality check for pure research. When applied scientists try to solve problems, they sometimes hit roadblocks that show them where fundamental understanding is still incomplete. This then sends basic researchers back to the drawing board, fueling discoveries (Henard & McFadyen, 2005). Because its benefits are so immediate and visible, applied research often gets more attention and funding and solutions.

Pure research is the well of discovery, providing the long-term breakthroughs that define the next century. Applied research is the bridge that takes those breakthroughs and makes them useful for society today. For Nigeria, the "high risk" and "long timeframe" of pure research often make it an easy target for budget cuts. However, as noted by Lorsch et al., (2024), failing to invest in this well means that the country will eventually have no new science to apply. Without foundational theories, applied research becomes a series of incremental tweaks to foreign technology rather than revolutionary innovation.

Having established the complementary roles of pure and applied research, it is now necessary to examine Nigeria's current R&D landscape against an ideal integrated model. The preceding discussion raises a critical question: Is Nigeria striking the right balance between these two forms of inquiry? The evidence suggests otherwise.

### **3. The Nigerian Research and Development (R&D) Gap: Current Realities Versus an Ideal Integrated Model**

An examination of Nigeria's R&D landscape reveals a significant misalignment between current practices and the integrated model required for sustainable development. Several indicators illustrate this gap:

First, regarding the origin of innovation, current estimates suggest that approximately 85% of research activity is applied in nature, while only 15% qualifies as basic research. Second, in the domain of technology transfer and adaptation, about 60% is applied, with only 40% representing indigenous basic development. Third, national investment in R&D stands at a mere 0.22% of GDP, far below the global recommendation target of 1.0% or higher recommended by UNESCO for developing nations. Fourth, access to funding remains severely constrained, with 42.98% of researchers reporting a complete lack of research funding (Igiri et al., 2021).

These indicators point to a fundamental structural weakness in Nigeria's innovation ecosystem. Presently, the country's R&D system is disproportionately oriented toward applied research, which predominantly relies on foreign-generated fundamental knowledge (Acharya & Pathak, 2021). This configuration fosters a state of instrumentalism, a scenario in which Nigerian researchers and institutions merely modify or adapt existing foreign technologies rather than generating groundbreaking, homegrown innovations.

An ideal integrated model, by contrast, would demand a substantial and sustained commitment to basic research. Such a commitment is essential for building indigenous intellectual property, nurturing original discovery, and reducing technological dependency. Without a robust foundation in pure research, Nigeria cannot expect to produce the revolutionary breakthroughs that drive long-term economic transformation.

The funding constraint further exacerbates this imbalance. As Igiri et al. (2021) document, nearly 43% of Nigerian researchers operate without any dedicated research funding. This financial scarcity compels many scholars to pursue low-cost, short-term applied projects that promise quick results, while deeper, more speculative fundamental inquiry is systematically discouraged. Over time, this dynamic entrenches a culture of incrementalism rather than innovation.

Moreover, a critical institutional disconnect undermines the research and development cycle. Key research institutes, often the primary sites of applied work, are excluded from accessing TETFUND (Tertiary Education Trust Fund), a major source of academic financing in Nigeria. This exclusion prevents these institutes from partnering effectively with universities, where much of the country's basic research capacity resides. The resulting fragmentation stifles the seamless flow from discovery to application, further widening the gap between current practice and an ideal integrated model (Igiri et al., 2021).

#### **4. Key Obstacles to Research Development in Nigeria (2024–2026)**

Building a robust research ecosystem in Nigeria continues to be hindered by several persistent challenges:

##### **i) Insufficient Funding**

In 2025, Nigeria allocated only about 6.7% of its national budget to education, well below the 15–25% benchmark, recommended by UNESCO.

##### **ii) Poor Infrastructure**

Around half of students in public institutions lack essential classroom furniture, and internet access is unreliable in 65% of rural schools.

##### **iii) Talent Emigration**

Low pay and inadequate facilities have driven many skilled researchers to seek opportunities in Western nations, worsening the country's brain drain.

##### **iv) The “Shelf” Problem**

A significant portion of Nigeria's research output never moves beyond academic libraries into practical, market-ready applications. As Fomunyam (2020) notes, when a Nigerian molecular biology professor is forced to abandon foundational research and focuses entirely on clinical trials, the nation risks losing the very discoveries that could make those trials successful.

## v) Disconnected Research and Development

Acharya and Pathak (2021) describe Nigeria's R&D cycle as often "broken"- failures in applied research seldom trigger new fundamental inquiries. Instead, they tend to generate more incremental, repetitive applied studies.

## 5. Comparative Analysis: Which Model Suits Nigeria Better?

### The Case for Applied Research:

The Value of Applied Research cannot be underestimated. This explains why many argue that applied research is more beneficial for Nigeria due to its capacity to deliver immediate, tangible solutions. Given that more than 20 million children are not enrolled in school and youth unemployment stands at 33 percent, the country urgently requires research that can generate employment and boost productivity in the short term. This pressing need is echoed in the 2026 National Research-to-Commercialization Policy, designed to transform publicly funded studies into commercially viable products.

### The Case for Pure Research:

The Value of Pure Research is also enormous. Pure research can be considered more challenging and intellectually demanding because it ventures 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 the Encyclopedia Americana (2026), countries that rely on others for foundational scientific knowledge consistently face weakened competitive standing. In this sense, pure research acts as essential "seed corn" without it industrial growth and self-sufficiency cannot be sustained.

## 6. The Relevance of Pure and Applied Research in a Developing Country Like Nigeria

The relationship between basic (pure) and applied research is often challenged by demands for immediate practical relevance.

### i. Technological and Industrial Development

Pure research lays the theoretical groundwork for scientific and technological progress. Applied research, in turn, transforms these foundational insights into practical tools, machinery, and locally relevant solutions. This process helps reduce Nigeria's reliance on imports and strengthens its industrial competitiveness. Many modern technologies stem from basic discoveries made decades earlier. For Nigeria, investing in pure research is a key strategy for shifting from being a consumer of technology to a creator of it. The value of pure research lies in building a "savings account" of knowledge, preventing the nation from perpetually playing catch-up with external innovations (Lorsch et al., 2024). For example, studies on renewable energy sources (pure research) inform the design of solar-powered devices suited to rural communities (applied research).

### ii. Education

In education, pure research develops theoretical models for learning, curriculum design, and instructional methods. Applied research then assesses the effectiveness of educational interventions, teacher training programs, and policy execution. This relevance extends to higher education, where **Total Quality Management (TQM)** frameworks are examined to address challenges such as limited funding and faculty shortages. A concrete example is research on

cognitive development theories, which guides applied strategies like remedial education programs aimed at improving second looking for a specific product or solution to school performance.

### iii. From Discovery to Application in Health

Fundamental (pure) research enhances our understanding of disease mechanisms, human physiological processes, and the behavioral factors influencing health. In turn, applied research uses these foundational insights to develop medical interventions, vaccines, public health initiatives, and health policies. In Nigeria, biotechnology-focused research is especially valuable for producing locally made biopharmaceuticals, which can lessen dependence on imported medicines and strengthen public health outcomes. For example, basic epidemiological studies on malaria transmission provide essential knowledge that shapes applied efforts such as insecticide-treated bed nets and community-led intervention programs.

### iv. Economic and Social Transformation through Research

Pure research contributes to theoretical frameworks in economic behavior, governance, and social interactions. It also yields tools and strategies for poverty alleviation, entrepreneurship, and infrastructure development. Applied Research serves as a primary engine of innovation and entrepreneurial activity, which in turn fuels industrial growth. Given Nigeria's historical economic dependence on oil, research offers pathways toward diversification and a knowledge-based economy. One practical illustration is applied research aimed at refining manufacturing processes and information technology, thereby raising productivity across multiple industries. Another example is research on microfinance theory, which informs applied programs that support small-scale entrepreneurs and reduce unemployment. These cases support the idea that sound practice is grounded in sound theory, or as the saying goes, "no good practice without a good theory."

### v. Agricultural Research for Food Security and Local Relevance

Applied agricultural research plays a critical role in increasing crop yields, minimizing post-harvest losses, and securing food supplies. Innovations such as genetically modified cowpea, BT cotton, and solar-powered irrigation directly tackle challenges like pest infestations, climate change, and high input costs for farmers. Within the Nigerian context, the most effective research is that which aligns with a broader national strategy. For instance, applying foreign research on chemical fertilizers may boost crop production, an example of applied research. However, without conducting pure research into the unique soil properties of the Niger Delta or the genetic hardiness of indigenous tubers like yams and cassava, locally adopted solutions remain borrowed and potentially less effective (Adelowo et al., 2016). Conducting homegrown pure research generates the fundamental knowledge necessary to create transformative, rather than merely incremental, applied solutions (Acharya & Pathak, 2019). This distinction is akin to "repairing an old engine versus inventing a new way to move."

A relevant case study illustrating the value of applied research in Nigeria is the recently introduced 2026 National Research-to-Commercialization Policy, which directly confronts the persistent issue often referred to as "**shelf syndrome**." This term describes a long-standing pattern in which thousands of thoroughly researched academic studies remain unused, stored away in university archives instead of being developed into real-world applications.

The new policy marks a shift in perspective, treating research not merely as an academic cost but as a marketable asset. It responds to a striking gap: although Nigeria produces approximately 600,000 graduates and countless research documents each year, fewer than 5% evolve into commercial products. The economic and social consequences of this disconnect are tangible, visible in rising public debt and unemployment levels.

To remedy this, the policy introduces a clear framework for technology transfer. The 2026 national budget reflects this commitment, setting aside 2 billion Naira for the Research, Innovation and Commercialization Committee (RICC) and an additional 3 billion Naira (4.5m USD) for its operational expenses. Furthermore, a 50 million Naira student venture capital fund has been launched to encourage entrepreneurial thinking within universities and colleges.

Ultimately, this policy highlights how research, when deliberately applied, can drive economic expansion, boost industrial competitiveness, and ease pressures on the labor market.

## **ii. A Balanced and Integrated Perspective on Research**

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

A useful analogy compares basic research to making deposits into humanity's collective knowledge account, while applied research resembles making withdrawals to solve specific problems. If a nation continuously withdraws through applied work without ever depositing new fundamental insights that account will eventually run dry (Lorsch et al., 2024). Nigeria, therefore, cannot rely indefinitely on the scientific capital generated elsewhere; it must also contribute its own original discoveries (Igiri et al., 2021).

Without deep fundamental understanding, applied research would be confined to minor, incremental adjustments. Conversely, applied research continually enriches pure research by identifying new questions and practical challenges. These real-world problems often reveal gaps in existing theories, motivating basic scientists to explore underlying principles more thoroughly. This reciprocal dynamic creates a virtuous cycle that both expands human knowledge and accelerates the development of practical solutions. Such ongoing interaction and mutual reinforcement are crucial for the invention, development, and commercialization of new products and technologies. For instance, firms engaged in substantial applied research often find that additional investment in basic science yields disproportionately high returns (Henard & McFadyen, 2005).

In practice, the boundary between pure and applied research is frequently indistinct. Many researchers engage in both types of work rather than specializing exclusively in one (Bentley et al., 2015). This suggests that the distinction is largely a matter of emphasis and primary motivation, not a rigid divide. Ultimately, what drives scientific progress is the quality of the research itself, regardless of its classification (Bentley et al., 2015).

### **iii. Basic vs. Applied Research: Which Is Preferred?**

In developing countries, the question of which type of research takes priority is deeply context-dependent and often sparks intense debate. One common view likens basic research to a savings account of knowledge, while applied research is seen as the interest drawn from that savings to solve immediate problems. From this perspective, favoring one over the other would be as impractical as building a house with only a foundation but no walls or walls without a foundation. A healthy scientific ecosystem, therefore, requires consistent and balanced investment in both pure and applied inquiry.

While we largely agree with this balanced view, the specific context and culture of Nigeria invite a counterargument to the savings-and-interest analogy. 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. Instead, the wise begin construction as soon as they have a fraction of the unknown total cost. Building a home is seen as a gradual process, supported by the familiar consolation that “Rome was not built in a day.” However, for a country like Nigeria, marked by socio-political instability, religious tensions, economic fragility, and deficits in education and technology, these everyday realities create a gap that existing literature often overlooks. While basic research remains an essential foundation for all knowledge, the nation’s urgent, life-altering needs make applied research the more strategic and ethically sound choice at this time.

In settings where resources are severely constrained and populations struggle daily for survival, stability, and opportunity, research must first deliver tangible, implementable results. Applied research meets this requirement by translating established scientific principles into concrete interventions, innovations, and policies suited to real-world conditions. This approach is further justified by its direct engagement with the country’s social challenges, economic difficulties, and infrastructural deficits.

Nigeria’s economy is rich in natural resources but continues to struggle with structural weaknesses, including limited diversification, heavy dependence on oil, inadequate infrastructure (such as unreliable electricity and poor road networks), underfunded health and education systems, and a large informal sector. In this context, applied research offers a pathway to generate tangible economic value by adapting existing knowledge into practical technologies and systems.

The agricultural sector in Nigeria presents a clear example of this potential. Despite a strong foundation of academic research in areas like soil science, crop improvement, pest management, and climate resilience, these insights have rarely translated into improved developmental outcomes. This disconnect suggests that the core problem is not a lack of scientific knowledge, but rather the absence of effective mechanisms to turn research into scalable, real-world farming solutions.

Addressing this gap calls for a shift away from linear models of knowledge transfer, where information flows one way from researchers to farmers, toward iterative, feedback-driven innovation systems. Applied research emphasizes continuous dialogue between scientists and farmers, allowing field insights to reshape research priorities and design. Such a dynamic process helps refine technologies so they align with local growing conditions, resource limitations, and

traditional practices. For instance, crop varieties developed in laboratories must undergo repeated testing across Nigeria's varied agro-ecological zones before they can be widely accepted and sustainably used.

Moreover, applied research supports the contextual tailoring of innovations to suit the diverse realities of Nigerian smallholder farmers, who face different land tenure systems, access to inputs, and environmental risks. Uniform solutions are rarely effective under such heterogeneity. Through localized experiments and adaptive trials, applied research enables the development of region-specific strategies such as customized fertilizer blends or targeted pest control methods that respond directly to the needs of distinct farming communities. This level of precision is essential for improving both agricultural productivity and the likelihood of farmer adoption.

Another key aspect of applied research solutions is their ability to incorporate value chain considerations into agricultural innovation. Boosting farm-level productivity alone is insufficient without efficient systems for storage, processing, and market access. Consequently, applied research goes beyond production to include post-harvest technologies, supply chain optimization, and market intelligence. For example, developing affordable storage facilities through research can greatly reduce post-harvest losses. Similarly, studies examining market connections can help farmers tailor their output to consumer demand, thereby enhancing income reliability.

Equally significant is the function of applied research in harnessing emerging technologies to address structural limitations. Tools such as digital agriculture, precision farming, and data-driven decision support systems create new possibilities for improving both productivity and resilience. Applied research can help tailor these innovations for low-resource environments, ensuring they remain cost-effective, easy to use, and aligned with current farming methods. In this way, it closes the gap between worldwide technological progress and local practical needs.

Furthermore, the applied research framework promotes institutional responsibility and results-oriented evaluation. By prioritizing measurable outcomes, such as higher crop yields, lower costs, and increased incomes, it redirects research efforts away from purely theoretical work and toward concrete social gains. This focus pushes stakeholders, including universities, government bodies, and development organizations, to coordinate their activities around specific development goals and to rigorously measure the success of their initiatives.

In retrospect, this analysis contends that applied research is not merely a supplement to basic research but rather a strategic reorientation of how knowledge is leveraged for development. This shift is particularly urgent in Nigeria, where the gap between national potential and actual performance remains stark. By prioritizing adaptability, local relevance, and tangible outcomes, applied research offers a concrete pathway to translate existing scientific knowledge into lasting improvements in agricultural productivity, food security, and rural livelihoods.

A similar disconnect emerges in Nigeria's health sector, where extensive scientific inquiry has failed to produce corresponding public health gains. Although the country has been a key setting for biomedical and epidemiological studies on diseases such as malaria and Lassa fever, generating substantial data on transmission, risk factors, and treatments, morbidity and mortality rates stay persistently high. This points to a structural breakdown between knowledge creation and health system effectiveness. The core problem, therefore, appears to be not a lack of scientific evidence but an institutional inability to convert that evidence into routine, population-wide interventions.

This breakdown can best be described as a systemic “translation failure,” rooted more in governance weaknesses than purely financial shortfalls. Nigeria consistently allocates less than the Abuja Declaration’s recommended 15% of its national budget to health, while out-of-pocket spending still accounts for a large share of total health expenditures. Such conditions weaken service delivery and limit the integration of research findings into practice. Furthermore, fragmented policy implementation and poor inter-agency coordination undermine even well-designed health strategies. Thus, it is reasonable to argue that the country’s enduring disease burden stems as much, if not more, from policy and execution failures than from a lack of resources.

Malaria control offers a clear illustration. Despite strong evidence supporting insecticide-treated nets (ITNs), seasonal malaria chemoprevention, and artemisinin-based combination therapies, coverage and use, remain inconsistent across regions. Surveys repeatedly show a gap between ITN ownership and actual use, driven by behavioral factors, distribution problems, and weak community engagement. In addition, frequent supply chain disruptions lead to stock outs of essential anti-malarial drugs at primary health facilities, undermining treatment adherence and outcomes. These gaps reveal the limits of knowledge in the absence of robust delivery systems, accountability mechanisms, and behaviorally informed implementation strategies. A comparable pattern appears in Lassa fever management. Closing this persistent translation gap will require a decisive move toward implementation-focused and policy-embedded research frameworks.

#### **iv. Priority Actions for Health Systems**

Three priority actions emerge for integrating evidence into Nigeria’s health sector. First, implementation science must become a permanent component of the national health research agenda. This means designing studies that explicitly evaluate service delivery models, methods for scaling interventions, and locally tailored adaptations. Second, primary healthcare systems require reinforcement through better funding, workforce capacity building, and the incorporation of digital tools. Such improvements would create the operational foundation needed to translate research findings into everyday clinical practice. Third, linking research outputs with local pharmaceutical production strategies can boost domestic manufacturing of essential drugs, diagnostic tools, and vaccines, thereby improving both access and national self-reliance.

In summary, the Nigerian health sector does not lack scientific knowledge. Rather, it suffers from an underdeveloped system for converting that knowledge into widespread impact. Bridging this gap calls for coordinated policy changes, strategic investment in health systems, and a shift in research focus toward implementation and real-world outcomes. Without these steps, the country risks a cycle where evidence accumulates without improving population health, a result that is both inefficient and ethically problematic.

#### **v. The Energy Sector: A Case of Knowledge Without Action**

Nigeria’s energy sector offers another clear example of the persistent gap between research production and tangible development outcomes. Over recent decades, Nigerian academics and research bodies have produced a substantial body of foundational work on renewable energy, especially solar photovoltaics, biomass conversion, and hybrid systems suited to rural and peri-urban areas. These studies have addressed not only technical feasibility but also cost-

effectiveness, environmental sustainability, and adaptability to Nigeria's varied ecological zones. Nevertheless, large-scale deployment and integration of these innovations into the national energy grid remain very limited. This contradiction leads to a forceful conclusion: Nigeria's ongoing energy crisis stems less from a shortage of scientific research and more from systemic failures to translate that research into policy-driven, market-ready, and scalable solutions.

Evidence from across the country supports this view. Nigeria continues to struggle with unreliable electricity supply, frequent grid failures, and heavy reliance on fossil fuels and imported energy technologies. Even in economic hubs like Lagos and Abuja, persistent blackouts force households and businesses to depend heavily on diesel and petrol generators. This reliance raises business costs, worsens environmental damage, and increases public health risks. The irony is that this occurs in a nation blessed with abundant solar radiation, particularly in the northern regions.

It is therefore reasonable to argue that the real constraint lies not in knowledge generation but in the institutional and policy environment needed for its application. Inconsistent regulations, weak financing mechanisms, limited private sector engagement, and poor enforcement of energy policies have together restricted the move from research to practice. For example, while renewable energy policies exist on paper, their execution is often fragmented, underfunded, or poorly coordinated across government bodies. Moreover, the high upfront cost of renewable technologies, combined with limited credit access for households and small enterprises, further hinders widespread adoption. Nigeria remains reliant on external technologies, undermining both economic resilience and technological autonomy. This situation reinforces the point that without deliberate efforts to localize production and align research with industrial strategy, renewable energy research will remain developmentally marginal.

#### **vi. Engineering and Infrastructure: From Theory to Practice**

In engineering and infrastructure, the value of applied research becomes especially clear when priorities shift from abstract theory to context-specific problem-solving. For Nigeria, investing in applied engineering research offers concrete routes to address pressing development needs. For instance, research can focus on creating low-cost building materials from locally available resources, reducing construction expenses while simultaneously stimulating domestic industries. By emphasizing practical, implementable solutions, applied engineering research directly links scientific innovation to societal benefit, reinforcing its central role in Nigeria's development strategy.

### **7. Navigating Socio-Political and Religious Complexities**

Nigeria's socio-political environment is marked by significant ethnic and religious diversity, which, while culturally valuable, often fuels localized conflicts and governance difficulties. Inefficient bureaucracies, corruption, and ideologically driven policymaking further weaken state capacity, limiting the effectiveness of development interventions. In this context, applied social science research becomes an essential tool for evidence-based governance and conflict reduction, translating theoretical insights into actionable strategies tailored to local realities.

Applied research can generate context-specific solutions to conflict, moving beyond general theories of ethnic or religious violence. For example, recurring clashes between pastoralist herders and farming communities in the Middle

Belt can be systematically studied to identify root causes, including land tenure disputes, resource scarcity, and historical grievances. By grounding interventions in empirical evidence, researchers can design and test practical dispute resolution mechanisms, resource-sharing agreements, and locally led peace committees that work effectively within that specific socio-cultural setting.

Similarly, applied research offers concrete ways to improve governance and policy execution. Instead of relying on abstract administrative theory, studies can identify bottlenecks in ministry procurement processes, map points where inefficiency or corruption is most likely, and develop digital, transparent workflows to enhance accountability. Likewise, evaluating social welfare programs through applied research can generate actionable data on cash transfer reach, program efficiency, and socio-economic impact, enabling policymakers to refine interventions for maximum benefit to vulnerable populations. Through these mechanisms, applied social science research closes the gap between knowledge and action, providing policymakers with evidence-based tools to navigate Nigeria's complex socio-political landscape. By emphasizing empirically grounded, locally adapted solutions, applied research turns abstract understanding into concrete governance reforms and conflict mitigation strategies, reinforcing its strategic importance for national development.

## **8. Accelerating Educational and Technological Progress**

Nigeria's education system often prioritizes rote memorization over critical thinking, and a significant mismatch exists between university curricula and the skills required in the modern workforce, creating an "employability gap." Technology adoption remains uneven, further limiting the country's ability to harness innovation for development. In this setting, applied research creates a direct feedback loop between discovery and implementation, enabling evidence-based interventions that respond to local needs. In education, applied research can rigorously test the effectiveness of different teaching methods within Nigerian classrooms. For example, does a radio-based mathematics program improve learning outcomes in northern states where school access is limited? Does a vocational training program partnered with local technology firms lead to higher job placement rates than a traditional classroom course? Answers to such questions provide a clear, empirically grounded roadmap for improving pedagogy, aligning skills training with labor market demands, and enhancing workforce readiness.

Applied research also drives innovation in appropriate technology. "Frugal innovation", developing simple, robust, and affordable solutions, is especially relevant to Nigeria. Examples include mobile health (mHealth) applications that send prenatal care reminders in local languages or low-cost water purification systems for flood-prone communities. By testing, adapting, and scaling these technologies, applied research ensures that interventions are not only theoretically sound but also practically effective and socially embedded.

For a developing country like Nigeria, prioritizing applied research rests on two considerations. First, urgency and finite resources: Nigeria cannot afford to wait decades for distant breakthroughs to solve problems related to food security, energy, or employment. Applied research offers the most efficient path from investment to immediate impact. Second, the "absorptive capacity" argument: without adequate industrial, technological, and human infrastructure, foundational discoveries cannot be effectively used. Applied research builds this local capacity, training engineers, agronomists, and policy analysts who understand how to solve pressing problems, thereby creating the conditions in which basic research

can eventually thrive. Applied research in education and technology thus addresses urgent development needs while simultaneously strengthening the human and institutional foundations necessary for long-term innovation.

## Conclusion

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

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

By channeling its limited intellectual and financial resources toward resolving today's most urgent challenges, Nigeria can lay the groundwork for 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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