Rima International Journal of Education (RIJE)
ISSN: 2756 – 6749 (p); 3141-2033 (e)
Volume 5, Issue 4, June. 2026; Page: 206—221 DOI: https://doi.org/10.65760/rijessu.v5.4.15

Repositioning Teaching and Research Farms in Nigerian Higher Institutions: A Strategic Framework for Revitalizing Agricultural Education and Food Security

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Abstract

Nigeria's agricultural sector is important in the Nigerian economy. It is accountable for nearly 24 % of the GDP and employs close to 70% of the labor force. Yet it is contending with a worsening food insecurity crisis, with projections suggesting that 33.1 million people may be acutely affected by 2025. An important piece of correcting this situation is modernizing teaching and research farms at post-secondary institutions—facilities that have endured chronic underfunding, poor upkeep, and neglect for decades. This position paper is guided by the Agricultural Innovation Systems (AIS) framework and informed by peer-reviewed studies, government policies, and empirical data from Nigeria and Africa (2020–2026). It delves into the vital roles these farms play in agricultural education. It evaluates their impact on food security, identifies the structural and institutional hurdles that hinder their effectiveness, and suggests a comprehensive strategic framework for their revitalization. This framework includes dedicated government funding, fostering public-private partnerships, reforming the curriculum to include hands-on experiences, strengthening the links between research, extension services, and farmers, and promoting climate-smart agricultural practices. In line with the National Agricultural Technology and Innovation Policy (NATIP, 2022–2027) and the Sustainable Development Goals (SDGs) 2, 4, 8, and 13, the paper urges the government, universities, the private sector, and development partners to recognize teaching and research farms as vital national assets that are essential for transforming Nigeria's agricultural landscape.

Keywords: Teaching farms, Research farms, Agricultural education, Food security, Agricultural Innovation Systems, Nigeria

Cite this as: Ogunbanjo, O. O., & Awe, O. O. (2026). Repositioning Teaching and Research Farms in Nigerian Higher Institutions: A Strategic Framework for Revitalizing Agricultural Education and Food Security. *Rima International Journal of Education, 5*(4), 206—221. DOI: https://doi.org/10.65760/rijessu.v5.4.15

Introduction

Agriculture is the mainstay of Nigeria's socio-economic development, contributing approximately 24% of GDP and employing 70% of the population (FAO, 2024; Oxford Business Group, 2024). With a population exceeding 220 million and projected to reach 400 million by 2050, the imperative to strengthen food production capacity is cogent, urgent, and existential. The World Food Programme (WFP, 2024) estimates that 33.1 million Nigerians will face acute food insecurity in 2025, driven by a food inflation rate of 35.41% in early 2024, Naira depreciation, climate variability, persistent insecurity in the northeast, and structurally weak agricultural production systems. Addressing these challenges requires a critical examination of agricultural education infrastructure in higher institutions, which constitutes the primary means of developing the human capital, innovations, and policies essential for effective national food systems (Egeru et al., 2024). In Nigeria, the Federal Ministry of Agriculture and Rural Development's NATIP (2022–2027) identifies higher institutions as vital contributors to food and nutrition security through 21st-century knowledge and technology (Federal Ministry of Agriculture and Rural Development (FMARD), 2022). Yet the infrastructure most critical to delivering agricultural education—teaching and research farms- continues to suffer from chronic underfunding, deteriorating facilities, and weak institutional coordination (Unizik Journal of Educational Laws and Leadership Studies [UNILAWS], 2024). In comparable African contexts, university farms have successfully bridged academia, agribusiness, and smallholder communities (Frontiers in Sustainable Food Systems, 2024); Nigerian institutions are increasingly unable to replicate this potential.

Theoretical Framework: Agricultural Innovation Systems

This paper is anchored on the Agricultural Innovation Systems (AIS) framework, which conceptualizes agricultural development as a dynamic, interactive process involving universities, research institutes, extension services, private firms, farmer organizations, and policy institutions. The quality of interactions among these actors determines the pace and quality of agricultural innovation (Cees et al., 2025). From an AIS perspective, teaching and research farms are crucial nodes linking knowledge creation (research), knowledge sharing (education and extension), and knowledge application

(farming practice). When these linkages weaken through underfunding, poor management, or inadequate collaboration, the entire innovation system underperforms. Conversely, well-resourced university farms can catalyze systemic change by generating locally relevant innovations, training skilled graduates, and facilitating technology diffusion to smallholder communities. The AIS framework provides both the analytical lens for diagnosing challenges and the theoretical foundation for the strategic framework proposed in Section 5.

Problem Statement

Teaching and research farms in Nigerian higher institutions are in a state of progressive decline. This directly undermines the quality of agricultural education, food security, and national agricultural transformation. Despite supportive frameworks—NATIP (2022–2027), the National Development Plan (2021–2025), and SDG 2 (Zero Hunger)—a critical implementation gap persists. Agricultural budget allocations have remained far below the Maputo Declaration's 10% benchmark, recorded at only 2.5% in 2022, 2% in 2023, and 3.5% in 2024 (Action Aid Nigeria, as cited in Afripoli, 2025); allocations to university farms within this already constrained budget are negligible. The consequences are severe: Nigeria's food trade deficit reached ₦9 trillion between 2021 and 2024 (FAO, 2024), and over 100 million Nigerians faced food insecurity in the first quarter of 2024 (Verivafrica, 2025). This vicious cycle of deteriorating infrastructure, underfunded research, inadequately prepared graduates, and insufficient support for farmers demands a comprehensive, evidence-based strategic framework.

Objectives

Four clear objectives guide this paper:

I. to explore the roles of teaching and research farms in agricultural education within Nigerian higher institutions;

II. to evaluate their direct and indirect contributions to food security in Nigeria;

III. to identify the structural, financial, and institutional challenges limiting their effectiveness; and

IV. to develop a strategic framework for repositioning teaching and research farms in order to enhance their contribution to national food security.

Research Questions

Correspondingly, four research questions were put together to guide the analysis:

I. What roles do teaching and research farms fulfil in agricultural education within Nigerian higher institutions?

II. How do they contribute, directly and indirectly, to food security in Nigeria?

III. What structural, financial, and institutional challenges limit their effectiveness?

IV. What strategic framework is required to reposition them as vital contributors to food security and agricultural transformation in Nigeria?

The remaining part of the paper follows in the following sections: Section 2 describes the methodology; Section 3 clarifies key concepts; Section 4 examines the state of teaching and research farms; Section 5 proposes the strategic framework; Section 6 presents conclusions and recommendations.

Methodology

This study is a position paper that synthesizes existing evidence to advance a clear analytical perspective and propose actionable recommendations, rather than generating primary data. A structured, thematic literature review was conducted across Google Scholar, Scopus, ScienceDirect, PubMed, the FAO digital repository, and FMARD policy portals. Search terms included: "teaching farms Nigeria," "research farms higher institutions Nigeria," "agricultural education food security Africa," "agricultural innovation systems Nigeria," "climate-smart agriculture Nigeria," "public-private partnerships agriculture Nigeria," and "food insecurity Nigeria 2020–2026." Inclusion criteria prioritized peer-reviewed articles, policy documents, institutional reports, and empirical studies published between 2020 and 2026, primarily

from Nigeria, with secondary coverage of sub-Saharan Africa. Seminal pre-2020 works providing theoretical grounding (Ayanda, 2013; Becker, 1964; Kolb, 1984) were included. Opinion pieces without scholarly citations, unverifiable grey literature, and non-African studies without comparative relevance were excluded. Thematic content analysis was applied with organizing materials around four domains aligned with the research questions: roles of teaching and research farms; contributions to food security; challenges; and strategic solutions. All themes were cross-referenced with the AIS framework. Counterarguments identified in the literature—including the fiscal feasibility of dedicated funding, barriers to curriculum reform, PPP performance in resource-constrained settings, and CSA scalability limitations—were critically engaged throughout.

Clarification of Concepts

Agricultural education refers to a structured process through which individuals acquire knowledge, skills, values, and dispositions for productive and sustainable agricultural engagement. In Nigerian universities, it spans undergraduate and postgraduate study in crop sciences, animal sciences, soil science, agronomy, extension, food technology, and agribusiness. Osagiede et al. (2024) argue that it must transition from lecture-dominated approaches to practical, farm-based experiential learning, positioning teaching farms at the centre of curriculum design.

Teaching farms are agricultural lands and facilities managed by or affiliated with higher institutions to provide structured, practical agricultural training. They translate theoretical knowledge into direct farming experience. The NUC-mandated Farm Practical Training (FPT) programme was designed to ensure this practical foundation (Ayanda, 2013; Bulya et al., 2021). This develops student competencies and prepare graduates for agricultural careers when the appropriate resources are available

Research farms: These are specialized experimental sites linked to universities and agricultural colleges, dedicated to field experiments, technology testing, variety development, and agronomic data generation. Olumide (2024) underscores that adequate funding for research farm infrastructure is essential for producing applicable technologies and providing technical support to farmers—support that is severely constrained across Nigeria.

Food security, according to FAO (2022), exists when all people, at all times, have physical, social, and economic access to sufficient, safe, and nutritious food meeting their dietary needs for an active and healthy life. It rests on four pillars: availability, accessibility, utilization, and stability (Otekunrin et al., 2023; Ojo et al., 2025). Nigeria's food insecurity is of many dimensions that require simultaneous attention to all four pillars.

The State of Teaching and Research Farms in Nigerian Higher Institutions

Skills Training and Human Capital Development

Teaching farms are the primary sites of experiential learning in Nigerian higher agricultural education, grounded in Kolb's (1984) Experiential Learning Theory and Becker's (1964) Human Capital Theory. Through direct participation in crop production, livestock management, irrigation, and post-harvest processing, students develop practical competencies in the classroom (Osagiede et al., 2024). However, Ikuemonisan *et al.* (2022) identify a critical misalignment between Nigerian agricultural degree programmes and the demands of agribusiness careers, reflecting inadequate practical infrastructure. Turyamureba et al. (2024) demonstrate from East Africa that deteriorating farm-based learning environments significantly reduce the relevance of agricultural education to practical farming, raising serious questions about Nigeria's capacity to equip graduates for food security roles.

Research, Innovation, and Technology Development

Research farms are designed to generate applied, location-specific knowledge through field trials on seed varieties, mechanization tools, pest management, and soil fertility. NATIP (2022–2027) designates universities as central innovation units (FMARD, 2022), yet this designation is increasingly aspirational given deteriorating equipment and funding deficits. Olumide (2024) rightly notes that designating universities as innovation hubs without commensurate resources reflects a fundamental contradiction in Nigerian agricultural policy. Cees et al. (2025) confirm that across Nigeria, Benin, Kenya, and Mali, agricultural innovation actors—including universities—struggle to transcend narrow productivity orientations due to inadequate

funding and weak institutional linkages. Critically, increased funding alone is insufficient: if research incentive structures reward publication over practice, and if farmers are excluded from agenda-setting, university farms risk replicating the same disconnected model at greater cost (Olayemi et al., 2020). Funding must therefore be accompanied by governance reforms aligning research priorities with smallholder needs.

Knowledge Transfer, Extension, and Community Engagement

Teaching and research farms hold significant potential as demonstration sites for technology transfer to smallholder farmers, extension workers, and rural communities. Frontiers in Sustainable Food Systems (2024) documents successful African cases where university-industry partnerships and demonstration farms accelerated knowledge diffusion and agribusiness entrepreneurship. In Nigeria, Agbidi et al. (2021) note persistent farmer dissatisfaction with extension officers' inability to transfer relevant innovations, a gap well-resourced university farms could bridge. However, Olayemi et al. (2020) caution that effective farmer-centered extension requires sustained institutional commitment and community trust beyond farm demonstration. Success, therefore, depends on intentional, structured outreach strategies embedded in institutional mandates and accountability frameworks, not infrastructure improvement alone.

Food Production, Value Chains, and Climate-Smart Agriculture

Teaching and research farms directly supplement local food supplies through commercial sales of crops, livestock, fish, and forestry products, while exposing students to the full agricultural value chain viz: production, processing, storage, marketing, and agribusiness management, preparing them for entrepreneurial careers (Adisa *et al.,* 2023). University research farms are also distinctively positioned to develop, test, and demonstrate climate-smart agricultural (CSA) practices that build resilience and reduce greenhouse gas emissions (Akpabio *et al.,* 2023). Igberi *et al.* (2022) and Sylvester et al. (2024) document CSA effectiveness among smallholder farmers in south-eastern and north-central Nigeria, while Saadu *et al.* (2024) show tangible food security benefits from CSA adoption in the northwest. Globally, CSA is among the most promising pathways to SDG 2 in sub-Saharan Africa (Akpabio *et al.,* 2023). However, many CSA practices are resource-intensive or technology-dependent, limiting transferability to resource-poor farmers without sustained extension support (Ojo *et al.,* 2025). University research

farms must therefore balance innovation ambition with practical accessibility, co-designing experiments with farmers to ensure real-world applicability.

4.5 Challenges Facing Teaching and Research Farms

Teaching and research farms face a constellation of interconnected challenges. Chronic underfunding is paramount: Nigeria's agricultural budget has consistently fallen below the Maputo Declaration's 10% benchmark—recorded at 2.5% in 2022, 2% in 2023, and 3.5% in 2024 (ActionAid Nigeria, as cited in Afripoli, 2025)—with allocations to university farms negligible within this constrained envelope. This perpetuates a cycle of decaying machinery, irrigation systems, seed banks, and laboratory facilities, directly constraining technology development and farmer support (Olumide, 2024). The near-total absence of functional public-private partnerships limits access to private investment, while the perception of agricultural lending as excessively risky deters capital flows (Oxford Business Group, 2024). Human resource constraints- shortages of skilled farm managers and technicians, poor remuneration, and limited professional development—further reduce operational capacity. Administrative bottlenecks, land encroachments, and weak institutional policies impede long-term planning, while Cees *et al.* (2025) identify weak institutional interactions as key structural impediments across AIS in Nigeria and comparable African countries. Climate change compounds these vulnerabilities through floods, droughts, and pest outbreaks that increasingly disrupt farm operations (Akinkuolie & Ogunbode, 2025).

Strategic Framework for Repositioning Teaching and Research Farms

1. **Increased and Dedicated Government Funding**

Federal and State Governments must substantially increase budgetary allocations for teaching and research farms, treating them as essential infrastructure rather than ancillary facilities, and working progressively towards the Maputo Declaration's 10% threshold. Dedicated intervention funds—modelled on TETFund and the National Research Fund—should target university farm revitalization, mechanization, irrigation, and research equipment, anchored within NATIP's NGN 5.6 trillion implementation budget (FMARD, 2022). A legitimate counterargument concerns Nigeria's constrained fiscal environment, where competing public demands make ring-

fenced university farm funding politically difficult. This is a real constraint. However, the long-term cost of food insecurity—WFP (2024) estimates 33.1 million Nigerians acutely affected—far exceeds the required investment. Furthermore, complementary mechanisms, including diaspora bonds, sovereign agricultural funds, and development finance, already mobilized in comparable African contexts, can reduce dependence on national appropriations (Coronation Merchant Bank, 2023).

2. **Public-Private Partnerships and Commercialization**

Universities must establish structured PPPs with agribusiness firms, seed companies, and development finance institutions, consistent with Coronation Merchant Bank's (2023) identification of PPP frameworks and agricultural credit as critical food security enablers. Viable models include joint research ventures, contract farming, technology licensing, and agribusiness incubation centres on university farms. Commercialization can enhance—not compromise—educational mandates by providing students authentic market exposure and generating sustainable revenue. However, PPPs in sub-Saharan African settings have a mixed record: Olumide (2024) notes that private actors often prioritize commercially viable enterprises over long-term capacity-building, making university farm PPPs vulnerable to mission drift. Power asymmetries between agribusiness firms and resource-constrained universities further enhance the risk of disproportionate commercial benefit. These risks require clear contractual frameworks specifying educational deliverables alongside commercial targets, independent oversight, and NUC involvement in PPP governance.

3. **Curriculum Integration and Modernization**

Curricula must be redesigned to position teaching farms as the primary site of competency development, not a classroom supplement. Drawing from eight African case studies, Frontiers in Sustainable Food Systems (2024) demonstrates the effectiveness of problem-based, industry-linked pedagogies that engage students in solving real agricultural challenges through farm participation. Digital agriculture tools such as precision farming, drone monitoring, IoT sensors, and agricultural data analytics must be integrated into farm-based instruction to equip the graduates with the skills needed for NATIP's digital agriculture agenda (UNILAWS, 2024; FMARD, 2022). Practical barriers to reform include staff resistance, NUC bureaucratic rigidity, workload pressures, and qualification gaps among farm instructors (Osagiede

et al., 2024; Ikuemonisan et al., 2022). Effective implementation requires revised NUC minimum academic standards, updated workload models that recognize farm-based teaching, sustained staff development, and a phased implementation that gradually builds institutional capacity incrementally. Faculty buy-in is best secured when lecturers co-design farm-integrated curricula rather than receive top-down mandates (Egeru et al., 2024).

4. **Strengthening Research–Extension–Farmer Linkages**

A critical AIS deficit in Nigeria is the weak knowledge flow from university research farms to extension workers and smallholder farmers. Research farms must institutionalize outreach mechanisms: farmer field days, demonstration plots, community trials, and digital extension platforms, disseminating improved technologies in accessible formats. Collaborative platforms linking research farms, Agricultural Development Programmes (ADPs), and farmer cooperatives should be formalized with performance indicators tied to technology adoption rates. Ojo et al. (2025) underscore the vital role of extension agents in disseminating CSA practices in north-central Nigeria, reinforcing the need for structured, formalized university-extension partnerships.

5. **Embracing Climate-Smart Agricultural Practices**

University research farms should serve as model sites for CSA practices tailored towards Nigeria's diverse agro-ecological zones, including water-efficient irrigation, carbon-conscious soil management, energy-efficient mechanization, and adaptive cropping systems (Igberi et al., 2022; ScienceDirect, 2025). Embedding CSA into research farm operations positions universities as credible climate adaptation hubs, contributing directly to SDG 2, SDG 4, SDG 8, and SDG 13 (Akpabio et al., 2023; Ojo et al., 2024). Given scalability constraints, research farms should adopt a tiered demonstration model, showcasing high-technology solutions for commercial actors while piloting low-input adaptations for smallholder farmers—ensuring CSA outputs serve the full spectrum of Nigeria's agricultural stakeholders without prioritizing one at the expense of the other.

Conclusion

There is no doubt that this paper has demonstrated, through the AIS framework, that teaching and research farms in Nigerian universities represent a truly and critically underutilized yet strategically indispensable resource for capacity building, with the potential to revolutionize the nation's agricultural sector. They are not just mere facilities; they are dynamic nodes where agricultural knowledge is created, transmitted, tested, and applied. Their progressive decline constitutes a gradual food security crisis that is producing ill-equipped graduates for a modernizing food economy, generating research of limited practical applicability, and failing the farming communities they were designed to serve.

Crucially, this paper has engaged honestly with the counterarguments and constraints that any credible reform agenda must confront: the fiscal limitations on government funding, the mixed performance record of PPP models, the institutional barriers to curriculum reform, and the scalability challenges of CSA at the farm level. These are not reasons for inaction; they are parameters the strategic framework is explicitly designed to navigate through phased, governance-anchored, and evidence-grounded interventions.

Nigeria's challenge is not about vision; its policy architecture already recognizes the importance of higher agricultural education, but of implementation fidelity, institutional accountability, and sustained political commitment. The strategic framework advanced here reflects the attention Nigeria's food security crisis demands. This is grounded in evidence from Nigeria and comparable African contexts, aligned with NATIP (2022–2027), the National Development Plan (2021–2025), and the relevant Sustainable Development Goals. The repositioning of teaching and research farms is not merely an educational reform. It is a food security imperative.

Recommendations

I. Federal and State Governments should establish dedicated, ring-fenced intervention funds for teaching and research farm revitalization within the NATIP (2022–2027) framework, progressively increasing agricultural budget allocations towards the Maputo 10% threshold, and supplementing appropriations with diaspora bonds and development finance where fiscal space is constrained.

II. University administrators should champion institutional reforms embedding teaching farms at the heart of agricultural curricula through revised NUC minimum academic standards, updated workload models recognizing farm-based teaching, and problem-based, industry-linked pedagogies co-designed with faculty.

III. The private sector should engage as co-investors through structured PPP agreements governed by contractual frameworks specifying educational deliverables and commercial targets equally, with independent oversight to prevent mission drift.

IV. FMARD, in collaboration with NUC, should develop a national university farm revitalization policy framework with clear performance benchmarks, accountability mechanisms, and formalized linkage protocols with ADPs and farmer organizations.

V. Development partners should direct capacity-building support towards modernizing Nigeria's higher agricultural education infrastructure, with explicit focus on CSA integration and digital agricultural technologies, ensuring CSA demonstration programmes are designed with smallholder transferability as an explicit criterion.

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